EFFICACY OF PSYCHO-NUTRITIONAL INTERVENTION PACKAGE IN THE CURE PROCESS OF TYPE 2 DIABETES MELLITUS

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CERTIFICATE

This is to certify that the thesis entitled **EFFICACY OF PSYCHO-NUTRITIONAL INTERVENTION PACKAGE IN THE CURE PROCESS OF TYPE 2 DIABETES MELLITUS,** submitted by **Mr. ASHRAF. C.,** to the Department of Psychology, University of Calicut, is a record of bonafide research work carried out by him under my supervision and guidance. The results embodied in this thesis have not been submitted to any other University or Institution for the award of any degree or diploma.

C.U. Campus,
05.12.2008.

Dr. J.BABY
(Supervising Guide)

DECLARATION

I, **ASHRAF.C.**, do hereby declare that this work reported in the thesis entitled **EFFICACY OF PSYCHO-NUTRITIONAL INTERVENTION PACKAGE IN THE CURE PROCESS OF TYPE 2 DIABETES MELLITUS** is original and carried out by me in the Department of Psychology, University of Calicut, under the guidance and supervision of **Dr. J.BABY.** I further declare that this thesis or any part of this has not been submitted for any degree, diploma, recognition or title in this or any other University or Institution.

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Dedication

Dedicated to my beloved parents who lost their lives early due to diabetes and related symptoms.

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INTRODUCTION

The interaction of mind and body has been a concern for philosophers and scientist for centuries. Different models of relationships have predominated at different times in history, but current emphasis is the unquestionable unity of the two which has originated the field of Psychology. Health psychology is the field within psychology develops to understand psychological influence on how people stay healthy, why they become ill and how the cure process takes place. It focuses on health promotion and maintenance, prevention and treatment of illness; the etiology and correlation of health, illness and dysfunction and the improvement of health care system and the formulation of health policy (Taylor, S.E., 2006)

The present study deals with the efficacy of psychonutritional cure methods in the cure process of Type 2 diabetes mellitus, a psychosomatic disease. The bio-psycho-social model in health psychology research is followed in this study. The bio-psycho-social model's fundamental assumption is that any health or illness outcome is the consequence of

the interplay of biological, psychological and social factors. The biomedical model is reductionistic model, that it reduces illness to low-level processes such as disordered cells and chemical imbalance rather than recognizing the role of more general, social and psychological processes. It regards mind and body are separate entities. Moreover the biomedical model emphasizes illness over health that is, focusing more attention on aberrations that leads to illness rather than the conditions that might promote health (Angel.G.L.1977)

DIABETES

Diabetes is the third most common chronic illness in most of the developing and developed nations and one of the leading causes of death. An estimated 11 million people in the United States were diagnosed with diabetes in the year 2000 (Boyle *et al*., 2000), and approximately 90% of those individuals were diagnosed with Type 2 diabetes. The number of individuals diagnosed with Type 2 diabetes has been rising at an alarming rate over the past several decades (Harris, 1998). It has been estimated that this figure will increase by 165% to 29 million by the year 2050, reflecting a 7.2% prevalence rate. Such an increase is hypothesized to be the

result of changes in demographic composition of the population, population growth, and increasing prevalence rates (Boyle *et al*., 2001). In modern medical practice a clear depiction of etiology and cure are not given. Many method of diabetes management are elaborated. At the same time holistic therapists claim that diabetes is a curable disease. In the context of its dubious etiology and inconclusive cure method the present study aims at an elaborate investigation on the efficacy of certain cure methods.

Personal and public health consequences associated with Type 2 diabetes are profound. For example, individuals with diabetes experience a greater number of health complication (Harris, 1998) and are at higher risk for depression than are their medically well counterparts (Anderson, Freeland, Clouse, & Lustman, 2001). On a more global scale, the economic impact of diabetes is staggering; in 1997, the direct and indirect costs associated with diabetes in the United States were an estimated $98 billion (Ray, Thamer, Gardner, & Chan, 1998). Thus, the increasing prevalence of diabetes in the United States represents a

critical public health problem with respect to health care use and resources.

Type 2 diabetes is manageable, and many of the serious medical complications that are associated with the illness are preventable through adequate control of blood glucose levels. Therefore, the primary treatment goal for individuals with Type 2 diabetes is to maintain blood glucose levels within a normal range. For many, maintaining this complex treatment regimen is difficult, and assistance with disease management is often warranted. As such, researches and the medical community have recognized the critical role of behavioral sciences in optimizing regimen adherence and health outcomes among patients with Type 2 diabetes (Glasgow *et al*., 1999; Wysocki & Buckloh, 2002).

Structure and Function of Pancreas

Pancreas is an important structure found in the abdomen, which plays a major role in the causation of diabetes mellitus. Pancreas is a soft flat gland, which is 15-20 cm long, 3- 5cm broad, 2-4cm thick and 80-90 gm in weight. It is situated in the posterior part of the abdominal cavity just behind the stomach. Pancreas consist of three parts the head,

the body and tail. The head is enclosed in a 'C' shaped concave structure, the duodenum that lies between the lower end of stomach and the upper end of the small intestine. The tail end in a firm organ, the spleen that is located in the left upper portion of the abdominal cavity, the portion between the head and the tail is the body. Functionally pancreas consists of two parts:

The Digestive Part

About 99% of the pancreas consists of digestive part. It comprises a large number of cells, which produce the digestive enzymes, which are important for the digestion of proteins, carbohydrates and fats in the food.

The Hormonal Part

About 1.2% of the weight of pancreas constitutes the hormonal part. A hormone is a chemical substance, which is produced by an organ or a gland and sends to another part of body through the blood where it increases the functional activity of that part. The hormonal part of the pancreas consist of large clusters of cells called the islets of Langerhans, named after the discoverer Paul Langerhans,

who discovered them in 1869. There are about 2 million islets in the pancreas. The islets consist of four types of cells:

- A or alpha cells produce the hormone glucagons

- B or beta cells produce the hormone insulin

- D or delta cells produce the hormone stomatostatin

- F cells produce pancreatic polypeptide.

The Role of Insulin

Mechanism of insulin release in normal pancreatic beta cells (i.e., glucose dependence). Insulin production does not depend on blood glucose levels; insulin is stored pending release.

Since insulin is the principal hormone that regulates uptake of glucose into cells (primarily muscle and fat cells) from the blood, deficiency of insulin or its action plays a central role in all forms of diabetes.

Most of the carbohydrates in food are rapidly converted to glucose, the principal sugar in blood. Insulin is produced by beta cells in the pancreas in response to rising levels of glucose in the blood, as occurs after a meal. Insulin makes it possible for most body tissues to remove glucose from the blood for use as fuel, for conversion to other needed molecules, or for storage. Insulin is also the principal control signal for conversion of glucose (the basic sugar unit) to glycogen for storage in liver and muscle cells. Lowered insulin levels result in the reverse conversion of glycogen to glucose when glucose levels fall — though only in the liver not muscle tissue. Higher insulin levels increase many anabolic (building

up) processes such as cell growth, cellular protein synthesis, and fat storage. Insulin is the principal signal in converting many of the bidirectional processes of metabolism from a catabolic to an anabolic direction.

If the amount of insulin produced is insufficient, if cells respond poorly to the effects of insulin (insulin insensitivity or resistance), or if the insulin itself is defective, glucose is not handled properly by body cells (about 2/3 require it) nor stored appropriately in the liver and muscles. The net effect is persistent high levels of blood glucose, poor protein synthesis, and other metabolic derangements.

Background and Etiology

There are two primary types of diabetes: type 1 and type 2. Type 1 diabetes (often referred to in the past as juvenile diabetes or insulin dependent diabetes mellitus) occurs when the islet cells of the pancreas are destroyed and cannot produce insulin. Consequently, exogenous insulin is required for survival. In contrast, Type 2 diabetes is characterized by chronic hyperglycemia due to impaired insulin secretion and increased insulin resistance in the body cells. Insulin resistance refers to a defect in glucose transport

and metabolism. As a result, glucose does not enter the body's cells where it can be used as fuel, and subsequently, a higher level of glucose remains in the bloodstream. Early in the course of Type 2 diabetes, the pancreas attempts to counteract the high levels of blood glucose by producing increased amounts of insulin. However, because of the sustained need for high amounts of insulin over long periods of time, the pancreas gradually loses its ability to produce sufficient amounts of insulin and so can no longer maintain euglycemia, that is, near-normal glucose levels (De Fronzo, Bonadonna, & Ferrannini, 1992).

Another type is Gestational diabetes mellitus, it appears in about 2%–5% of all pregnancies. It is temporary and fully treatable, but, if untreated, it may cause problems with the pregnancy, including macrosomia (high birth weight) of the child. It requires careful medical supervision during the pregnancy. In addition, about 20%–50% of these women go on to develop Type-2 diabetes.

There are several causes of diabetes that do not fit into Type-1, Type-2, or gestational diabetes:

✓   Genetic defects in beta cells

✓   Genetically-related insulin resistance

✓   Diseases of the pancreas

✓   Hormonal defects

✓   Chemicals or drugs.

"Malnutrition-related diabetes mellitus" (MRDM or MMDM) was introduced by the WHO as the third major category of diabetes in the 1980s. However, in 1999, a WHO working group recommended that MRDM be deprecated, and proposed a new taxonomy for alternative forms of diabetes. Classification of non-Type-1, non-Type-2, and non-gestational diabetes remains controversial.

Signs and Symptoms of Diabetes

The features (sign and symptoms) of diabetes are variable and depend on the following factors:

- Type of diabetes

- Stages of diabetes

- How it presents itself-abruptly or gradually

- Age of the patient

- Presence or absence of complications of the disease

Symptoms

- Passage of large volume of urine, which is dilute and pale in colour.

- Passage of urine at night even in the absence of high fluid intake.

- Urine may contain sugar (glucose) which is not present in non-diabetic individuals.

- Abnormally intense thirst, which leads to drinking of large quantity of water and fluids, irrespective of weather condition.

- Sudden development of a voracious appetite.

- Complain of getting tired and feeling of weakness

- In spite of increased appetite, loss of weight.

- White mark of urine on the cloth which are not easily washed off

- Itching and redness around the genitals.

- Diminished vision with frequent changes of spectacles due to short sight.

- Slow healing of wounds as compared to normal people.

- Tingling and numbness in hands and feet.

- Pain in the lower limbs especially in the calf muzzles which is not relieved by medication

- Repeated infections of the skin, respiratory tract or urinary tract.

- Impotence.

Short- Term Complications

Hypoglycemia and hyperglycemia are two short-term complications that result from Type 2 diabetes. Hypoglycemia occurs when blood glucose declines to less than 60 milligrams per deciliter (mg/dl). Symptoms include shakiness, perspiration, rapid heartbeat, hunger, headache, mood changes, confusion, and attention difficulties. If hypoglycemia is left untreated, seizures of loss of consciousness may eventually occur. Conversely, hyperglycemia is defined as a blood glucose level greater than 140 mg/dl. Symptoms include increased thirst, frequent urination, and glucose in the urine. The majority of ling-term complications associated with Type 2 diabetes are the result of recurrent hyperglycemia (American Diabetes Association [ADA], 1998).

Long-Term Complications

Long-term complication can be classified into two types: macro vascular and micro vascular. Macro vascular diseases include heart disease, stroke, and other circulatory disorders. The leading causes of diabetes-related deaths are heart disease. Adults with diabetes are two to four times more likely to die from heart disease than are adults without diabetes (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2000). Individuals with Type 2 diabetes are also at two to four times grater risk for stroke than are their medically well counterparts. Furthermore, approximately 73% of adults with diabetes have circulatory disorders (e.g., high blood pressure), (NIDDK, 2000).

Micro vascular complications constitute some of the most debilitating complication associated with Type 2 diabetes. Micro vascular complications include retinopathy, nephropathy, and neuropathy. Diabetic retinopathy is caused by changes in the tiny vessels that supply the retina with blood. It is the leading cause of visual impairment among adults' ages 20 to 74 years, resulting in an estimated 12,000 to 24,000 new cases of blindness in the United States each year (NIDDK, 2000). Nephropathy, another micro vascular

complication associated with diabetes, is the result of damage to the blood vessels of the kidneys. In severe cases, it can result in kidney failure, a condition referred to as end stage renal disease (ESRD) which can be a life-threatening complication. The relationship between diabetes and ESRD is clear; diabetes accounts for 43% of new cases of ESRD (NIDDK, 2000).

Neuropathy (neuronal disease) is a common micro vascular complication affecting approximately 60% to 70% of individuals with mild to severe forms of nervous system damage (NIDDK, 2000). Characteristic symptoms include pain, numbing, burning, loss of feeling, and (in more severe cases) paralysis in the extremities. Neuropathy may also cause digestive problems, impotence, and incontinence. Severe forms of nerve damage are a major cause of lower extremity amputations.

Epidemiology of Diabetes

A number of epidemiological studies are available and have been used for diabetes researches. The following reports deal with epidemiological studies that have been used in

diabetes research and point out the pros and cons of each study

It is calculated that, worldwide, there are now 150 million people with diabetes, and that this number will rise to 300 million by 2025. In Australia, the AusDiab study reported in 2000 that 7.4% of the population aged 25 or over had diabetes (Type-2 in 90%), and that about 50% were undiagnosed. Prevalence increases progressively with age; so that more than 20% of the population aged over 60 has Type-2 diabetes. The prevalence of Type-2 diabetes has more than doubled in Australia since 1981, and the total number of cases has increased threefold. As the prevalence of Type-1 diabetes is low in Asian, Indian, Middle Eastern and African populations, Type-2 diabetes would constitute well over 90% of diabetes cases worldwide

Epidemiological data suggest that lifestyle changes involving increased physical activity and reduced energy intake will at least partially prevent Type-2 diabetes. It is only very recently that prospective intervention studies have clearly confirmed the efficacy of such measures. The American and Finnish prevention studies illustrate the

benefits in a developed country. Participants in both studies were people who already had IGT and were overweight or obese (thus a very high-risk group). With a mean follow-up of about 3 years, the two studies had remarkably concordant outcomes, with a 58% reduction in incidence of Type-2 diabetes, resulting from a reduction in energy intake targeted to achieve weight reductions of 7% and 5%, respectively, and an exercise regimen targeted to achieve moderate levels of exercise for 150 and 210 minutes per week, respectively. Of course, adherence to the recommendations was not perfect in either study, but it was impressive that, among participants in the Finnish study who adhered to all components of the recommended regimen, not a single case of Type-2 diabetes appeared during 4 years. In a developing country, China, the Da Qing study also showed substantial preventive benefit of exercise, diet, or a combination of the two.

Etiological Risk Factors.

Causes of Diabetes

Diabetes can be caused by viral or bacterial damage to the pancreas and the insulin producing cells and may result

from an autoimmune dysfunction. It also has a substantial hereditary component, but other factors which are unknown must be implicated in the onset of diabetes such as dietary factors.

Since the early dates of psychosomatic medicines, there has been a suspicious that psychological factors predispose diabetes, in particular, prolonged depression and anxiety. The diabetic personality was up to be characterized by diminished alertness, apathy, hypo-chondriasis, depression; these interns were believed to be caused by immaturity, passivity, masochism, sexual identity conflict, and oral dependence. The later researchers believed that these are consequences not causes of diabetes.

Research on sympathetic nervous system activity among diabetic has begun to suggest some mechanism through which stress may aggravate the disease. It is becoming increasingly clear that sympathetic nervous system activity is involved in pathophysiology of Type 2 diabetes. This group appears to be characterized by a hyperresponsivity to epinephrine, higher levels of circulating catecholamine and elevated levels of endogenous opoid

peptides that may also be an indication of abnormal sympathetic nervous system activity. Thus, theoretically, as is the case with heart disease and hyper tension, interventions to reduce sympathetic nervous system activity may, in theory, be useful in modulating hyperglycemia.

Diabetes care needs more than drugs. There is a holistic approach for diabetics living with their illness. Holistic treatment deals with the entire person. In the health care field, holistic treatment involves integrating the patient's mind, body and spirit in the healing process. Patients are encouraged to maintain a positive attitude and use physical activity, spirituality, visualization, aromatherapy, music, art as tools to help them cope with their condition. With non-infectious diseases such as diabetes, there is evidence that shows how a healthy lifestyle and mindset can have a positive impact on how people deal with their diagnosis. The motivation to seek help and understand diabetes begins in the mind. One of the components of Holistic Therapy is being able to mentally grasp how the thought and healing processes are interrelated. After the initial shock of being a diabetic has lessened, the choice to educate oneself and

make appropriate lifestyle changes — or wallow in self-pity — can have a major impact on one's quality of life.

A number of demographic and genetic factors are associated with Type 2 diabetes, including age, race, prior history of gestational diabetes, family history of diabetes, and obesity. In terms of age, those over age 45 years are at the highest risk for developing Type 2 diabetes, and approximately 20% of individuals over age 65 years have diabetes (NIDDK, 2000). Similarly, differential rates of Type 2 diabetes are found among various ethnic groups. For example, African Americans, Native Americans, and Hispanic/Latino Americans have demonstrably higher prevalence rates for Type 2 diabetes than do other ethnic groups (Harris, 1998). Furthermore, women who experience gestational diabetes during one or more of their pregnancies are at greater risk for developing Type 2 diabetes later in life than are women who do not (NIDDK, 2000). Finally, those with a family history of diabetes are also heightened risk. Indeed, first-degree relatives of individuals with early-onset Type 2 diabetes are 40% more likely to develop diabetes than are individuals with no family history of the disease (Owen, Ayers,

Corbett & Hattersley, 2002). Thus, there are a number of demographic factors that are associated with a heightened risk for Type 2 diabetes.

Obesity and Diabetes.

The previously mentioned risk factors can be mitigated by the most critical and modifiable risk factors for Type 2 diabetes, that is, obesity. It is estimated that up to 75% of the risk for Type 2 diabetes is directly attributable to obesity (Manson & Spelsberg, 1994). For example, Hillier and Pedula (2001) demonstrated an inverse linear relationship between the Body Mass Index (weight in kilograms divided by height in squared meters) and age at diagnosis of Type 2 diabetes. In other words, those who are more overweight are more likely to be diagnosed with Type 2 diabetes. In other works, those who are more overweight are more likely to be diagnosed with Type 2 diabetes at a younger age. Although the mechanisms responsible for the relationship between weight and Type 2 diabetes are not entirely clear, recent evidence suggests that body weight is associated with insulin resistance and subsequently glycemic control (Maggio & Pi-Sunyer, 1997). Consequently, the majority of Type 2 diabetes

prevention and intervention programs target weight loss (Wing et al., 2001). Such weight loss efforts have been shown to be effective in preventing the onset of Type 2 diabetes (Diabetes Prevention Program Research Group (DPPRG), 2002). A primary challenge for behavioral researches and those at risk for diabetes is to determine effective methods to maintain long-term weight loss given that it is well known that maintenance of weight loss is difficult to achieve (Wing et al., 2001). In summary, the most influential risk factor for Type 2 diabetes is also potentially the most modifiable.

PSYCHOLOGICAL FACTORS AND TYPE 2 DIABETES

Psycho-nuero immunology and Diabetes

It is a well-known fact that stress is one of the causative factors in diabetes. It is often observed that stressful state aggravates diabetes. The psycho-nuero immune system will be adversely affected in such conditions. The immune system consists of several types of white blood cells that produce both non-specific and specific responses to invading microorganisms. The non-specific responses include the inflammatory response, the anti viral effect of interferon and the action of national killer cells calls against viruses. The

specific response include chemically mediated and cell mediated responses, chemically mediated responses are carried out by B-lymphocytes, which relieve the antibodies that bind with the antigen on micro organism and kill them directly or target them for attack by other white blood cells, whose antibodies remain attached to their membranes.

In diabetes, wounds are not healed in some specific chronic stage. This is also contributed by the failure of the immune system. The most important mechanism by which stress impairs immune function is the increased blood levels of glucocorticoids. In addition the neural input to the bone marrow, lymph nodes, and thymus gland may also play a role and the endogenous opioids appear to suppress the activity of natural killer cells.

Factors

Individuals with Type 2 diabetes constitute a population at risk for experiencing both illness-related and general distress. Many individuals experience sub clinical adjustment problems directly related to living with diabetes, including distress associated with the onset of diabetes, diabetes complications, and the treatment regimen. Still others

experience clinically significant levels of psychological distress, including depression and anxiety. Diabetes specific distress, as outlined by Rubin and Peyrot (2001), and more general distress, such as depression and anxiety. One study found that children judged to have a Type A personality structure had an increased blood sugar elevation in response to stress. Children with a calmer disposition had a smaller glucose rise when stressed. (Stabler *et al*., 1987) A 1997 study suggested that Type-1 patients with a history of a psychiatric illness might be at increased risk for developing diabetic retinopathy. Those patients with a psychiatric history were found to have higher average glycosylated hemoglobin. (A measure of long-term diabetic control) (Cohen *et al*., 1997) Children whose relatives made more critical comments had significantly poorer glucose control. Interestingly enough, emotional overinvolvement between family members was not correlated with poor diabetic control. (Koenigsberg *et al*., 1993) Diabetic adolescents had a higher incidence of suicidal ideation than expected. Those with suicidal ideation took poorer care of themselves. Not living in a two-parent home was associated with poorer long-term diabetes control. (Goldston, *et al.* 1997) Recent studies have suggested that

effective treatment of depression can improve diabetic control. In a study by Lustman and colleagues, glucose levels were shown to improve as depression lifted. The better the improvement, the better the diabetic control. (Lustman *et al*. 1997a)

For over three hundred years, physicians have suspected an interaction between the emotions and the course of diabetes mellitus. Studies have examined whether stressful events or psychiatric illness might precipitate either Type-1 (insulin-dependent) or Type-2 (Non-insulin dependent) diabetes. So far, the study results are not conclusive.

Now that we have more accurate methods of measuring glucose control, it has become easier to measure both short-term and long-term effects of emotional factors on blood glucose level.

Being diagnosed with diabetes is a major life stress. It requires a large number of physical and mental accommodations. The individual must learn about a complex system of dietary and interventions. Lifestyle, work, and school schedules may have to be altered. This can consume a lot of energy for both the individual and his or her family. Just

as important, are the psychological adjustments. One must adjust to a new view of oneself. For those who liked to see themselves as invincible, this may be particularly difficult. However, it's not clear how eating affects glucose levels when people with diabetes are under stress. In one study, people with diabetes performed a stressful task after eating, and this study showed that stress did not affect glucose levels very much. Another study tested people with diabetes who had not eaten. In this study, performing a stressful task resulted in a rise in glucose levels. Those people could have had lower glucose levels because they had not yet eaten. (Wiesli, P. *et. al* 2005.)

Many newly diagnosed diabetics go through the typical stages of mourning. These are denial, anger, depression and acceptance.

- Denial: This can be one of the more dangerous stages of the grief process. It may not occur only once. Many individuals cycle back to this phase several times. The honeymoon phase, associated with early Type-1 diabetes may reinforce denial.

Denial is a common stance for adolescent diabetics.

- Anger: It really does seem unfair. The Type-2 diabetic, trying to lose weight, may envy heavier people who seem to enjoy good health. One might erupt at someone who innocently offers a desert. Unfortunately, anger can drastically affect glucose levels.

- Depression: Mild depressive feelings are a normal part of grieving and adaptation. As long as they are not pervasive or prolonged, they may not be harmful. However, when the depression lasts a long time, becomes severe or interferes with diabetic management, one should seek prompt treatment.

- Acceptance: Individuals achieve different degrees of acceptance and inner peace. Some will need to experience the denial, anger and depression several times as they move through different phases of life and different stages of diabetes. Some people move through a chronic disease to a

state of much greater self-knowledge. They may actually say that the diabetes was, in part, a blessing. Through their close attention to diet and exercise, and their close monitoring of stress levels, they have arrived at a deeper understanding of themselves and their relations to others. They realize that for all human beings, life is vulnerable and precious.

Often, individuals with depression do not realize that they are depressed. It is easy to attribute the symptoms of depression to the diabetes. This is particularly difficult since depressed diabetics may have poorer glucose control. Sometimes a spouse or close friend can give good feedback. However, medical professionals or mental health clinicians may be the best judges to determine what the diabetes is and what is due to depression. A psychiatrist has had medical training before specializing in mental health. He or she can sort out the diagnosis, communicate with your regular doctor and help coordinate the treatment of the depression with treatment of the diabetes.

Many people do not like the idea that they may have emotional difficulties. Some find it easier to attribute everything to physical problems or life circumstances. However, good diabetic management is dependent on the development of self-knowledge. Many of the things that other people's bodies do automatically, diabetics must do consciously. This includes closer monitoring of both one's blood glucose and one's emotional state. Ultimately, the years of deliberately imitating natures beautiful and complex feedback systems can lead to a greater understanding and appreciation of body and mind.

COMMON ASSESSMENTS AND TREATMENTS.

The substantial role of modifiable risk factors in the etiology of Type 2 diabetes makes prevention efforts a primary health care objective. The majority of prevention efforts involve lifestyle interventions, targeting factors such as obesity, overeating, and physical inactivity. For example, two recent large scale prevention studies highlight the critical role of behavioral change in diabetes care. The first, the Diabetes prevention program (DPP), involved a multi center study of individuals at risk for diabetes conducted by the

National Institute of Health (Diabetes Prevention Program Research Group [DPPRG], 1999). Participants were randomly assigned to one of three groups, including a drug intervention (metformin vs. placebo) or an intensive lifestyle intervention. Participants receiving the intensive lifestyle intervention met for at least 16 sessions with case managers trained in nutrition, exercise, and behavioral modification over the first 24 weeks of the study and monthly thereafter. The curriculum consisted of general information about diet , exercise and behavioral interventions, including self-monitoring, goal setting, stimulus control, problem solving, and relapse prevention training. Participant in the lifestyle intervention also attended group courses that focused on exercise, weight loss, and behavioral issues. Group courses lasted 4 to 6 weeks, with additional optional groups offered quarterly. Those in the drug intervention took metformin, which is designed to promote glucose homeostasis, or were administered a placebo. Overall, results for the lifestyle intervention were promising (DPPRG, 2000). At follow-up (average 2.8 years), the lifestyle intervention group demonstrated a 58% reduction in diabetes development, and the drug intervention demonstrated a 31% reduction in

diabetes development, relative to the placebo group (DPPRG, 2002).

Similar results were found in the Finnish Diabetes Prevention study (FDPS) (Tuomilehto et al., 2001), which randomized 522 overweight individuals with impaired glucose tolerance to an intensive lifestyle intervention (targeting weight loss, food intake, and physical activity) or to a control group (brief diet and exercise counseling). As in the DPP, Finnish participants in the lifestyle intervention group showed a 58% reduction in the incidence of diabetes as compared with the control group. Clearly, both the DPP and FDPS provide evidence for the impact of influential changes in eating and exercise habits on the development of diabetes.

The Robust's findings of the two large-scale prevention studies just described are reflected in the ADA's 2002 position statement on the prevention or delay of Type 2 diabetes. The ADA's statement consists of recommendations for health care providers to (a) increase patient awareness of the benefits of modest weight loss and regular exercise, (b) conduct regular screening on high-risk populations, and (c) provide weight loss and exercise counseling for those who are found to have

impaired glucose tolerance (ADA, 2002c). Although the ADA's recommendations clearly acknowledge the importance of lifestyle interventions in the prevention of Type 2 diabetes, the feasibility of large scale implementation of these interventions may take strain full effort within the existing health care system. For example, use of an effective lifestyle intervention program requires a large number of well-coordinated resourced over an extended period of time. Often, such resources do not exist or are not accessible.

Different Types of Interventions

To prevent diabetes related complications, individuals with Type 2 diabetes must manage a complicated treatment regimen on a daily basis. Such treatment regimens are individualized according to patients' medical needs and resources. They typically consist of a nutritional regimen, an exercise program, and oral medication (NIDDK, 2000). Nutritional plans generally consist of eating prescribed proportions of protein, fat, and carbohydrates as well as fiber, cholesterol, and sodium. It is also recommended that a regular exercise plan involve aerobic and muscle strengthening exercises. For many individuals with diabetes,

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changes in diet and exercise are sufficient to achieve euglycemia (near-normal glucose levels).

 Metabolic Control. The fundamental purpose of a diabetes treatment regimen is to achieve near-normal metabolic control. Thus, individuals with diabetes must frequently self-monitor blood glucose. For individuals with Type 2 diabetes, glucose levels should fall between 80 and 120 mg/dl before meals and between 100 and 140 mg/dl at bedtime (ADA, 1998). It is also recommended that physicians check HbA$_{1c}$ is an average measure of blood glucose for the previous 3 months and is an important indicator of metabolic control. Individuals who do not have diabetes typically have an HbA1c percentage of less than 6% (ADA, 1998). It is recommended that individuals with Type 2 diabetes maintain an HbA$_{1c}$ of between 7% and 8%. Diabetes-related complications are greatly reduced though good metabolic control; for every 0.9% reduction in HbA1c, the risk of developing micro vascular diabetic complication (eye, kidney, and nerve disease) is reduced by approximately 25% (ADA, 2002a).

Preventive Screening of Diabetes Complications. Preventive screening and practices is one of the common interventions which also a vital component of the diabetes treatment regimen, particularly as it concerns diabetes complications. Hypertension is common among individuals with diabetes. Adequate blood pressure control can subsequently reduce cardiovascular disease, such as heart disease and stroke, by approximately 33% to 50% and can reduce micro vascular disease by approximately 33% (NIDDK, 2000). Cholesterol and lipids must also be monitored among individuals with Type 2 diabetes; cardiovascular complications can be reduced by 20% TO 50% through improved control of cholesterol and lipids. In addition, preventive screenings for diabetic eye disease are important. In this treatment early treatment of diabetic eye disease can reduce the development of severe vision loss by an estimated 50% to 60%. Similarly, early treatment of diabetic kidney disease can reduce the development of kidney failure by 30% to 70%. Finally, comprehensive foot care programs can reduce amputation rates by 45% to 85% (NIDDK, 2000). Given the multi systemic nature of DM2, regular screenings for these

difficulties are clearly an essential component of the treatment regimen.

Difficulties with the Medical Regimen.

There are a number of diabetes-related adjustment problems that are directly associated with attempts at treatment adherence. One such frustration commonly expressed by individuals with diabetes is the sense of being food deprived (Rubin & Peyrot, 2001). Some individuals my subsequently develop poor eating habits, whereas others report that they do not monitor their glucose as often as indicated. Adhering to monitoring glucose levels is also problematic. Two commonly cited reasons for not monitoring blood glucose are the pain associated with drawing blood and the inconvenience of monitoring in certain settings. Still other individuals have negative responses to excessively low or high blood glucose readings (Rubin & Peyrot, 2001). Motivation to adhere to the monitoring portion of the treatment regimen is difficult to maintain when the feedback is often negative in nature.

An additional problem often encountered by individuals with Type 2 diabetes is the frustration associated with

unpredictable blood glucose levels, often leading to less active self-care. To help alleviate frustration, individuals are encouraged to develop realistic standards and expectations regarding diabetes outcomes. Finally, the fear of taking insulin can prevent optimal management of blood glucose level. Clinicians should attempt to identify specific fears related to taking insulin, including the pain associated with the injection, interference with lifestyle, experiencing hypoglycemia, and being treated differently by others (Rubin & Peyrot, 2001). They (Rubin & Peyrot, 2001) given a more thorough description of the fears related to taking insulin.

It is important to recognize that diabetes self-management is a complex, multidimensional construct. Typically, individuals are adherent to certain components of their treatment regimens but not to others. Indeed, perfect adherence to every aspect of the treatment regimen is extremely rare and (for many) unrealistic (Wyscocki & Buckloh, 2002). Therefore, clinicians should identify the components of the treatment regimen to which they are not adherent. It is common for individuals frustrated with one aspect of their treatment regimen to generalize and conclude

that they are "bad patients" or are "nonadherent" patients. Clinicians can help such individuals by identifying small specific goals to work toward. Subsequently, the treatment regimen will appear much more manageable (Rubin & Peyrot, 2001).

Diabetes Self-Management Education.

Diabetes self-management education (DSME) equips individuals with the knowledge and skills to manage their diabetes successfully. Metabolic control is potentially optimized, when the following information and skills are taught: nutritional information and skills are taught: nutritional information, exercise recommendation, self-monitoring of blood glucose (SMBG), insulin administration, and managing of hypoglycemic and hyperglycemic events. Given that patients perform approximately 95% of this daily care independently (Anderson, 1985), DSME is considered to be the central component of the treatment for those with diabetes. Despite the central nature of DSME, only 40% of individuals with diabetes receive formal diabetes management education (Department of Health and Human Services, 1998), and 50% to 80% of individuals have severe

deficits in their diabetes self-care knowledge (Clement, 1995).

Those estimates indicate that many individuals do not receive

adequate DSME and suggest that the method and delivery of

DSME require improvement.

There is an extensive body of literature that evaluates

various methods of delivery and outcomes related to DSME

still, no particular intervention method has been identified as

optimally efficacious. Because of the multidimensionality of

diabetes treatment regimens, DSME interventions are

differentially effective depending on the aspects of the

regimens that are assessed (Norris, Engelgau, & Narayan,

2001). In other words, interventions are generally effective in

changing certain outcomes but not others. However, a recent

review article by Norris and colleagues (2001) outlined

several consistent findings that have emerged from the DSME

literature and are summarized here.

Specifically, short-term DSME interventions have been

found to be fairly effective in yielding improvements in

knowledge levels, SMBG skills, and dietary habits but not in

yielding improvements in weight loss and physical activity

levels (Norris *et al*., 2001). Group intervention formats are

effective in improving knowledge and SMBG and may be more effective than individual formats for lifestyle interventions. However, it is important to note that improvements in knowledge or SMBG do not necessarily translate into improvements in glycemic control. Notably, interactive, individualized, repetitive interventions are more effective in improving lipid levels than are single-session or short-term interventions. In addition, programs that promote patient participation or take a collaborative approach to instruction appear to be more effective than didactic approaches in affecting outcomes such as glycemic control, weight loss, and lipid profiles. Finally, Norris and colleagues (2001) concluded that, by and large, self-management interventions that have consistent reinforcement over long periods of time are more effective than single-session or short-term intervention.

Norris and colleagues (2001) also pointed out limitations in the existing DSME literature. They recognized that the dearth of research examining psychological outcomes makes it quite difficult to determine specific psychological factors that influence self-management behaviors. Furthermore, very few studies have reported long-term treatment outcomes.

This is noteworthy given that long-term follow-up studies are less likely to find positive outcomes regarding glycemic behavioral outcomes than are those with short-term follow-ups (Norris *et al*., 2001). It may be that program interventions lead to short-term behavioral change but that the newly acquired behaviors do not necessarily persist. Consequently, refresher sessions over the course of the illness may be warranted. It is unlikely that one intervention that improves all self-management behaviors, and that is appropriate throughout the course of the illness, will be found. Therefore, future research needs to determine which types of interventions, or combination of interventions, are most effective for specific outcomes. Moreover, virtually no research has examined how adherence changes over time for adults with diabetes. Thus, longitudinal studies are needed to determine whether self-management behaviors follow a developmental pattern.

Psychological Interventions for Diabetes-Specific Problems

Over the past 20 years, behavioral interventions for diabetes-specific problems have shifted from knowledge and

educations based interventions to patient-centered interventions emphasizing patient efficacy, esteem, and control (Glasgow *et al*., 1999). Patient-centered interventions appear to be effective in improving both physical and psychological health outcomes. Three empirically supported examples of patient cantered interventions-diabetes specific coping skills training, empowerment, and stress management interventions-are discussed here.

Diabetes-specific coping skills training: Diabetes specific coping skills training (DSCST) is a cognitive behavioral, psycho educational group intervention designed to optimize emotional functioning, diabetes self-management, and metabolic control (Rubin & Peyrot, 2001). During the intervention, individuals are encouraged to identify patterns of self-care and barriers to self-care and, subsequently, to problem solve strategies to address identified problems. A series of studies evaluating DSCST have found the program to be effective in improving psychological outcomes such as depression, anxiety, self –esteem, and diabetes self-efficacy. Moreover, improvements have been observed in diabetes self-care(e.g., diet, exercise, diabetes knowledge, SMBG) and

metabolic control (Rubin, Peyrot, & Saudek, 1989, 1991, 1993; Rubin, Waller, & Ellis, 1990). Several key elements of diabetes-specific coping skills training were outlined by Rubin (2000), including individualized treatment plans, problem specificity, goal setting, reinforcement, problem solving, emotional coping skills, and family involvement (Rubin, 2000).

Empowerment. Patient empowerment interventions also appear to be effective in addressing many of the diabetes-specific difficulties that frequently accompany type 2 diabetes. Empowerment interventions are designed to enhance goal setting, problem solving, coping, stress management, social support, and self-motivation. Anderson *et al*. (1995) evaluated an empowerment intervention that consisted of six 2-hour group sessions. At a 6 month follow up, the treatment group demonstrated significant increases in self-efficacy (Setting goals, solving problems, emotional coping, obtaining support, self-motivation, and decision making) and positive diabetes-specific attitudes as well as decreases in negative diabetes-specific attitudes. Small improvements were also observed in glycemic control. This study lends further support to the value of patient-centered

care that addresses the psychological aspects of living with diabetes.

   Stress Management. A number of stress management interventions have been developed based on the strong theoretical link between stress and metabolic control. A variety of techniques aimed at decreasing stress have been evaluated, including biofeedback (Surwit & Feinglos, 1988), relaxation training (Surwit *et al*., 2002), and cognitive behavioral strategies (Henry, *et al.,* 1997).For instance, studies examining the efficacy of biofeedback-assisted relaxation training found significant improvements in various measures of metabolic control, including improved glucose tolerance, reduced long-team hyperglycemia (Lammers, naliboff & Straatmeyer, 1984; Surwit & Feinglos, 1988; Surwit, *et al*., 1989), postprandial (i.e., after eating) blood glucose levels, and plasma cortisol, as compared with control participants (Surwit & Feinglos,1983). Overall, stress management intervention show improvements in metabolic control parameters but have not been consistent at reducing psychological distress (Henry et al., 1997; Surwit *et al*., 2002). Future studies need to determine whether some individuals

are more susceptible to the effects of stress than are others and which types of intervention effect specific stress-related outcomes.

Technology-Based Interventions: Currently, greater attention has been directed toward developing cost-effective interventions that can be easily disseminated. To this end, Glasgow, Toobert, and Hampson (1996) evaluated a brief office-based computer intervention aimed at improving diabetes self management. Individuals in the intervention completed a computerized assessment of self management behaviors and then were provided feedback on self-management, participated in goal-setting exercises, and selected individualized intervention. Participants also received a one-page feedback form outlining individualized obstacles to self-management. The computer-assisted intervention was fairly successful in producing dietary improvements and serum cholesterol levels but did not yield significant improvements in glycemic control or QOL (Glasgow *et al*., 1996). A later study by Glasgow and Toobert (2002) examined the effects of a telephone follow-up on providing community resource information to the patient in addition to

the computer-assisted intervention. Neither strategy improved the outcomes of the computer-based intervention. Given these findings, the expanding use of home computers, and the increasing need or cost-effective health care, it is likely that use of computer-based intervention will continue to increase (Gonder-Frederic, Cox, & Ritterband, 2002).

Treating Psychological Distress

There is high comorbidity between diabetes and psychological distress, especially depression and anxiety. Recommended treatment approaches for depression and anxiety in the context of type 2 diabetes are discussed here.

Depression. Despite the high prevalence of clinically significant depressive symptoms among individuals with diabetes, few treatment outcome studies have been conducted. A notable exception is Lustman *et al* (1998) study, which compared the efficacy of cognitive-behavioral therapy (CBT) plus self-management training alone in decreasing depressive symptoms among individuals with diabetes (Lustman, *et al*., 1998). Remission of depression was observed at a 10 week follow-up; at that time, 85% of those in the CBT group had remitted as compared with 25% of those

in the self-management group. Moreover, treatment effects persisted; at the 6-month follow-up, the rates of depression remission were 70% for CBT group and 33% for the self management group. The CBT group also showed greater improvements in glycemic control than did the self-management group. Thus, CBT appears to be an effective treatment for depression for those with diabetes (Lustman *et al*., 1998).

Although CBT has been shown to be effective in treating depression, the combination of behavioral intervention with antidepressant medication may be clinically indicated in some cases. Selective serotonin reuptake inhibitors such as fluoxitine are effective in treating depressive symptoms and are associated with improvements in glycemic control (Rubin & Peyrot, 1994). Furthermore, fewer than 10% of patients with diabetes taking fluoxitine experience significant side effects (Lustman *et al*., 2000). Tricyclic medications have also been shown to decrease depressive symptoms (Turkinton, 1980); however, the use of tricyclic medication among those with type 2 diabetes has been associated with adverse side effects, including hyperglycemia, weight gain, orthostatic

hyperglycemia, weight gain, orthostatic hypotension, and other cardiovascular events (Lustman, Griffith, Gavard, & Clouse, 1992).

Although the treatments for depression just described appear to be effective, the constellation of organic and psychosocial factors contributing to depression among those with diabetes may well be unique. Therefore, researchers and clinicians should not assume that the research finding in medically well populations generalize to those with diabetes. Future research should focus on how cognitive processing mechanisms interface with diabetes-specific experiences and subsequently influence psychological distress. During the interim, it is recommended that clinicians use treatments for depression that are empirically supported among medically well population (e.g., CBT, interpersonal therapy). Such interventions might be tailored to diabetes by including the identification and modification of thoughts and beliefs related to DM2 (for a review of empirically supported treatments.

NUTRITIONAL INFLUENCE IN DIABETES CARE

Good nutrition is the first step in diabetes care. A balanced meal plan can help one stay at a healthy weight,

avoid high blood glucose, manage high blood pressure or high cholesterol--and simply look and feel better. Nutrition researchers are learning more and more about what makes up a healthy diet for people with diabetes.

More foods contain refined carbohydrates, which reduce the nutrients in the foods and add calories. In addition, more people are getting Type-2 diabetes. People should eat fewer refined carbohydrates and eat more fiber and whole grains to reduce their chance of getting Type-2 diabetes. Obesity is a growing problem around the world. Obesity causes many health problems, such as Type-2 diabetes, high blood pressure, heart disease, and several kinds of cancer.

Some researchers believe breast-feeding may protect children from developing diabetes. It also suggests that breast-feeding might also be correlated with the prevention of the disease in mothers. The study found that the women's risk of developing diabetes was reduced the longer they breast fed their child.

It is thought that the Mediterranean-style diet (a diet that includes fruits, vegetables, beans, nuts, seeds, fish, olive oil, and other foods) may help people maintain a healthy

weight and avoid health problems related to obesity. (Schröder H, *et al*., 2004): The researchers wanted to study people in Spain who ate a traditional Mediterranean diet to see how it affected their weight

Metabolic syndrome is a group of conditions including insulin resistance, obesity, high levels of blood fats, and high blood pressure. Other studies have suggested that what people eat can change the risk factors linked with getting metabolic syndrome

People with diabetes often have trouble keeping their blood glucose at a steady level. Studies have shown that stress can cause glucose levels to rise or fall.

THE PHILOSOPHY OF PSYCHO NUTRITIONAL CURE

Whatever may be the disease its cause would be faulty nutrition. All the ancient medical concepts existing in various parts of the world agree to this. Nutrition does not confine to food alone. All the elements (panchabhoothas), which constitute the body, are included in nutrition. The calorie theories on nutrition are mostly half-truth and untruth as the calorie estimate methods have several limitations. The

philosophy of nature cure summarized is an article entitled 'Correct nutrients cure disease' (Baby, J.2004)

Causes of disease: The body is made up of protoplasm which is evolved from a few elements. The proportion of the constituent elements (the *panchaboothas*) out of which the body is made up is the secret of health. When this proportion is perfect we experience constant happiness (*niranthara ananda*) and that is defined as health. When there is an imbalance in the constituent elements in a body, then the body experiences illhealth. The cause of this imbalance is often by the entry of harmful non-food substances in the body. Such unassimilated and harmful substances are toxins (*dusht*). We are aware of about 108 elements in the world out of which only about 25 are found in our body. When such nonfood foreign substances enter the body through air, water or food, the body will try to eliminate it through the nine outlets and the skin. Such eliminations are called disease symptoms.

There are thousands of disease symptoms due to one reason that is toxicity. Vomiting, diarrhea, ulcers, fever, bleeding, pussing, headache, anxiety and even psychoses are

all due to one reason that is the body's toxemic condition. Sometimes the toxins may be deposited in the body in the form of tumor. Those toxins, which are more harmful to body cells, are often chemical toxins. For example the body does not assimilate the roughages in certain fruits and vegetables but they are not harmful, on the other hand they are necessary for peristalsis in digestion. But the chemical pesticides are harmful.

Similar to the harmful effect of non nutrient substances, nutritional deficiency also is a cause of disease. Remember the living body is highly creative in manufacturing all necessary ingredients from the nutrients available in the body. For example the wild elephants and goats in the forest usually do not eat any fat food. But there are lorry loads of fat in a dead elephant. The body manufactures its essential ingredients through synthesis.

The living bodies evolved or created out of the physical elements (*panchabhoothas*) are to be in constant interaction with its constituent elements in order to sustain life. Once it keeps away from *panchabhoothas* (due to modern artificial living) it becomes ill. We cannot live without breathing for

more than one or two minutes. The brain stops all its functions and dies when supply of oxygen is stopped. Think about the inseparable relationship of the living body with air (*vayu*). We need air not only through nose or mouth; we need it through water also. Oxygen (*pranavayu*) is plenty in ground water and rainwater. By boiling we destroy the oxygen. Many people collapse due to the deficiency of oxygen; unboiled and untreated water may be a remedy for such deficiency. Drinking unboiled water is essential in curing diseases. The most impure water is the chemically treated or chlorinated water. (Chlorinated water if kept in a mud pot with cloth cover on top for a few days much of the chlorine will be lost). The food which contains maximum pranavayu is the unboiled one. Unboiled fruits, nuts vegetables pulses and grains are the most *sathwic* food as they contain maximum oxygen. They are living cells which are the most appropriate nutrients for other living bodies. The boiled dead cells or cooked food is slowly harming the body. As the intake of air through nose, mouth and through food, the living body should always be immersed in the air. If the living body cells are kept air tight it starts decomposing. If we keep a body part airtight with a plastic sheet for a few weeks we can see a reaction similar to

lukoderma (white patches on skin). Minute level of breathing is taking place even through the skin.

Another nutrient essential for life is the earth. We cannot eat the earth directly rather we have to eat that grows on the earth (or eat the flesh of animals which live upon plants, though animal food is not the ideal human food). No nutrient can be manufactured in the laboratory. Living body will accept only organic nutrients. The most appropriate human food is the fruits, nuts, seeds, sprouted pulses, grains and vegetables in the uncooked form. Those who resort to such a diet style of raw food and raw water gets cured of all diseases. It seems very necessary for a living organism to have a tactile contact to the earth, for the efficient functioning of the brain, heart, pancreas, etc. Shoes, synthetic floor etc. prevents our contact with the earth. For better health of our internal organs we have to walk through terrain (not cemented or tarred) without chappals or shoes as much as possible. Perhaps the brain and such organs may need some kind of earthing similar to that of electronic equipments. Unnecessary cleanliness also is harmful to health.

Direct reception of moderate sunlight or diffused sunlight also is necessary for life. It is highly unhygienic to live in dark rooms. For the cure of several diseases sunbath is essential. There are *yogies* who can directly convert nutrients from sunlight and such *yogies* live without food for several years. The need for space inside the body (the *upasana* of *akasha*) is essential for health, which is accomplished through fasting (*upvas*). *Akasha* is believed to be ether. The proportionate combination of the bodily elements (*Panchabhootha*) is health, and the excess or deficiency of any of such element leads to disease. This holistic concept is imbibed in all ancient systems of medicine.

Germs are not the direct cause of disease: Great microbiologists who were more eminent than the germ theorists had questioned germ theory even at the time of its emergence. But their arguments were against lucrative medical business and so they were not propagated. The holistic health theorists believe that perhaps the most foolish and dangerous theory in modern medical practice is the theory that germs are the cause of diseases. The germs cannot attack a pure healthy body. When prana or the

bioenergy gets depleted the germs overpower and disease symptoms are manifested. Germs themselves are not the primary cause of any disease; they are only an aftereffect of the depletion of bioenergy. We cannot germicide our body completely. There are many microbes useful and essential for our body such as those essential in the digestive process. If we remove the entire microbes from our stomach using insecticides or drugs (both are almost the same) we may even die. The medical business is thriving through inducing fear about the germs. For a natural cure or restoration of health, destruction of the germs is irrelevant. Once the vital power is restored the germs will disappear. However the internal (bodily) and external environment should not be contaminated enabling the multiplication of such microbes which can endanger health

What should be our food? The modern sciences like Anatomy, Philosophy, Morphology, Biochemistry etc. provide us with hundreds of evidences that man is a vegetarian animal. Those who seek natural cure should get convinced clearly the following findings by Harriwad Carrington (1964) a famous biologist.

The average length of the digestive canal (from mouth to anus) of an ordinary medium size cow is about 32 feet. A tiger longer than a cow has a digestive canal of 12 feet length only. What about human beings? If we are carnivorous our digestive canal should have been 12 feet or less. But the human digestive canal is between 24 and 30 feet length. The carnivorous animals eat flesh and bones along with skin hairs and blood of prey animals. Man cannot eat raw flesh. The digestive enzymes of carnivorous animals are drastically different from that of vegetarian animals. Human digestive enzymes are similar to that of the vegetarian animals.

The human blood is about 80 percent alkaline and 20 percent acidic, which is very similar to that of vegetarian animals. The lower jaws of vegetarian animals are movable towards left and right. eg. cow, horse, elephant and man while the carnivorous animals just bite cut and swallow the flesh, bone, skin etc. without chewing. They have very strong digestive enzymes, mostly of acidic contents.

Vegetarian animals drink water by sipping while the carnivorous animals drink by licking. Vegetarian animals are active during daytime and they sleep during night while the

carnivorous animals are active during night and sleep during daytime. The sweat glands or the sebaceous are present only in vegetarian animals. The vegetarian animals at the time of their birth open their eyes while for the carnivorous animals the eyes open after several days. Their retinal chemistry is drastically different from that of the vegetarian animals.

Disease symptoms are warning signals*:* Man dies due to the deficiency of bioenergy or *prana*. Disease symptoms are warning signals of the body about the depletion of bioenergy. There is either a cause or many causes for any disease. Stop the causes and the disease will disappear. The cure is a bodily process. Neither a chemical nor an intervention by an external expert can cure diseases. The cure is possible by the body only, what we can do is to help the ill person by providing opportunity for his/her body to rectify the defects by itself. In this context the correct knowledge about illness, its etiology and cure of symptoms is necessary. The wrong concepts propagated through commercialized medical field are to be kept aside in holistic cure procedures.

How do the drugs work? Drugs mostly are chemicals or non-nutrients and they are not assimilated by the body. Drugs

stimulate the body never gets assimilated. When we drink alcohol glands in the stomach walls overwork to resist the alcohol in order to eliminate it, as alcohol is unbearable to the body. Sometimes it is eliminated through diarrhea in the next morning. Some people feel to have more energy and even more sexual energy, when consume alcohol. But in the long run alcohols like tobacco may cause impotency. It is the same way almost all drugs work. Alcohol is the base for many drugs to initiate stimulation. Stimulation is not cure. It is suppression of symptoms. A cure is possible with nutrients only. Hippocrates the father of Modern Medicine had insisted that anything that is assimilated as nutrients alone should be our medicine. Nutrients are not food alone but, air, water, sunlight, earth and *akasha*. Alcohol and drugs do not work in the body but the body or life force in the body works against the drugs and alcohol. Because, if we pump drug or alcohol in the stomach of a dead body it remains without any reactions in the dead body. So it is the bioenergy reacting against the drug not the drug's working.

Suppression is not cure: Drugs suppress the symptoms temporarily and they will reappear later with more severity.

Those who have taken more severe drugs face more risks. For a real cure the best way is to stop the cause. Once the cause is not there the body will rectify the defects. The cure is possible only by the body and never by an expert or a chemical from outside. Drugs are not nutrients but stimulants not assimilated by the body which adversely affects cure.

Identify the negative substances entering through food: It is the toxious substances mostly the chemical toxins that are the major cause of diseases. Chemical poisons are present in the form of preservatives in preserved and processed food (bottled, tinned and packed food substances and bakery items) and they are highly hazardous to health. Salt and sugar are chemical poisons to which we are addicted. We eat cooked food as an addiction to salt, sugar, spices, heat, cold etc.

The topmost cause of human death in the world is heart attack and the second top cause of human death is cancer. Animal fat is believed to be the main cause of all such diseases. Animal fat enter our body mostly through animal milk and milk products. Those who take dairy products cannot be considered a vegetarian. 95% of the diseases of children

are due to the intake of animal milk. We have hundreds of nutritive fruit juices to substitute milk. Hydrogenated vegetable oils and most of the palm oils contain chemical poisons. Meat, fish and egg contains more percentage of harmful substances than nutrients. The quality of a food should be judged by the proportion of nutrients and non nutrient harmful stimulants in it.

Raw food – how much and when? When we eat only raw food (fruits, nuts and vegetables) the body eliminates all toxious substances from the body which leads to cure of diseases. When boil food, almost 80% of its food value is lost by decomposition and so when we eat only raw food we need eat only one fifth of the amount of cooked food we usually eat. Which food should we eat? The fruits, nuts and vegetables that you like the most, the natural food, which you like, will be the correct requirement for your body. How much we should eat? You should eat until your hunger is over. When should we eat? Eat only when you are hungry - no time specification. Do not mix too many varieties at a time. Two or three items at a time is sufficient. When you are fed up with certain items go for varieties. The natural food, which grows

in our locality, is the best food for us. Food which is produced in a different climate is not suitable for us as we live in a different climate. Drink unboiled ground water or rainwater kept in earthen pots when you are thirsty. If you are not thirsty do not drink water and do not burden your kidney. While we are on natural food we have to satisfy our natural urges and preference.

Physical and mental changes in raw eating: The following are the experiences reported by the people who were on raw food alone. Toxious substances get eliminated through the nine excretory outlets and the skin. Urine and the stools will loose its foul smell. Increases relaxation of the body and mind. Disease symptoms will disappear. Sometimes certain suppressed symptoms may reappear and then disappear - this is called the healing crises. In such situation we have to rest calmly until the body restores health by itself. We may reduce weight in the beginning but if we continue raw diet we are likely to gain weight. At the beginning of raw diet we will experience tiredness sometimes extreme tiredness. Please remember then that our effort is successful. When our entire energy is being used to correct the bodily

defects or diseases and that is why we are tired. It may continue for a few days as per the severity of our illness. We have to take rest patiently until the tiredness disappears naturally. Once the tiredness is over we will experience the constant bliss of health. We will be happy and alert all the time. The efficiency of your sensory organs improves considerably.

Hot sun and winter will not be unpleasant to us. We may require less climatic protection for our body. Perhaps salt and animal fat in our body causes bodily discomforts in extreme climates. Once our body is free from toxins we feel free from fear responses. Please think of the fear responses of various animals and the type of food they are used to. The psychological well being when we are on raw food alone is indescribable.

Quality of food: Fruits are the best food for human beings especially the fruits which are top in their evolution - which receives more sunlight and more tasty (often sweet). They are of high *swatic* nature as they are more non violent (*ahimsatmak*) as they do not destroy an offspring in the nut.

Nuts can be considered next to fruits. Sprouted cereals and pulses contain more vitamins. In Kerala coconut is plenty and that can be eaten along with any fruit or vegetable.

The third quality food is vegetables. In order to avoid insecticides wash your fruits and vegetables in a bucket of water. Most insecticides dissolve in water.

Mixed eating of fruits, nuts and vegetables can be done according to your preference. Unsuitable combination you can decide from your own taste preference.

The secrets of health: Having an abundance of vital power by birth is the primary requirement of health. People who are blessed with such vital power or *prana sakthi* are healthy and are having a lot of resistance to disease. The second reason for health is related to the first, that is having a very powerful excretory system. The third ingredient of health is to have a happy balanced mind with a lot of compassion for fellow beings and the nature free from greed, power, craze and envy.

The primary cause of all diseases, according to psycho nutritional cure, is a conscious or unconscious violation of

Nature's laws. This may be in thinking, breathing, eating, drinking, dressing, working, and resting, as well as in moral, social and sexual conduct.

Lindlahr stated: 'every acute disease is the result of the cleansing and healing effect of Nature. If you suppress the acute disease conditions by drugs or by any other means, you are simply laying the foundation for chronic disease. All diseases from simple cold to skin eruptions, diarrhea, fever, and so on, represent Nature's effort to remove from the system some of the morbid matter, some poison dangerous to health and life.'

Nutritional cure procedures accomplish this aim by assisting nature in removing the accumulated waste products from the body. They stimulate the organs of elimination towards better functioning and thus restores the diseased and disordered organs their normal tone, blood supply, glandular activity and so on. They also intend to bring back to normal, the abnormal physical and mental habits of the patients so as to stop further harm to the body and to teach live in harmony with nature, not in opposition to it.

Psycho nutritional methods comprise a variety of healing strategies that include nutritional correction, yoga, meditation, psychotherapy and so on. The experts are trained to deal with all aspects of health and to tailor their treatments to suit each individual needs.

Basic assumptions are:

- All diseases have the same fundamental cause i.e., accumulation of toxic waste substances in the body and sometimes deficiency of certain nutrients.

- Disease is nothing but the body's attempt to eliminate (or store in a place in the form of a tumor) the toxic substances.

- The body contains the power to heal itself; one only has to provide the conditions for the body for self correction (Carrington, 1961).

According to this theory, health is natural; disease is caused by violation of natural laws or deviating from natural habitat of the organism. Animals in its natural or true habitat seldom fall ill. Disease is due to the intake of substances that cannot be assimilated or absorbed by the body. Such toxemia

leads to depletion of bioenergy or *prana* which leads to unsatisfactory elimination. Detoxification can occur only through dietary correction, and living with nature. Cure is self-rectification of the body. If the body is incapable, no chemical or expert can do any miracle. The eliminating processes are called disease symptoms that include running nose, pussing, bleeding, diarrhea, vomiting, ulcers and tumors. Suppression of symptoms using drugs and chemicals will only cause reoccurrence of the same symptom later in more violent form. All psychotherapies, yoga, meditations and fasting facilitate the detoxification process. Nutritional cure aims at helping the body purify itself of waste materials using the curative and nutritional properties of the sun, earth water, air and so on (Streit, 1938).

All healing comes from within the body itself. There are self-curative forces inherent in the human body working towards health and healing, the physicians through their nutritional cure techniques lend only an intelligent assistance.

Fresh air and sunshine, use of unboiled water, so on were used as agents to promote health or to cure disease in ancient India, Egypt and Greece. The great Bath of the Indus

civilization at Mohenjo-daro, the elaborate baths during the Roman times, and of the Mughal period in India are witnesses to the popularity of such methods.

The nutritional cure movement found support from Germany and some other countries of Europe in the latter half of the 19th century. Priessenitz, Schroth, Kuhni, Father Kneippe, Bilz, Ehret and Planton were pioneers in this field. America also made contributions in this direction through the efforts and enthusiasm of men like Lindlahr and Kellogg. While pioneers like Priessnitz in Europe relied mainly on physical exercise, fresh air and water from the brooks. Lindlahr of America used some other methods so as to give nutritional cure the shape of a system of Medicine.

Indian ancient texts like the Vedas and Upanishads lay the greatest importance on living in harmony with nature and making use of natural stimuli for promotion of health and cure of disease. Later Gandhiji was one of the prominent proponents of nature cure. He experimented with these methods whenever he had illness and succeeded.

Lindlaher stated: every acute disease is the result of the cleaning and healing effect of Nature. If you suppress the

acute conditions by drugs or by any other means, you are simply laying the foundation for chronic disease. Disease will represent Nature's efforts to remove from the system some poison dangerous to health and life (Jaggi, 1998).

PILOT STUDY

The investigator had visited several holistic health camps held as an extension work of data collection of the Health Psychology researchers of the Psychology Department of Calicut University. Diabetic patients also participated in such camps. The investigator also associated with organizing such camps, designing and implementing the cure methods. The investigator was staying along with the participants throughout the camps. Nutritional correction, *yogasana,* and other psychological interventions were the major cure methods followed in the camps. Patients were found to get a normal sugar level at the end of the camps, lead the investigator to make an elaborate study of this cure process of Type 2 diabetes mellitus.

REVIEW OF RELATED STUDIES

In this chapter, a review of literature pertaining to distress related to diabetes, its onset, distress related to medical complications, psychosocial stress, depression, anxiety, other psychological factors, ethnic and cultural considerations, nutrition, psychosomatic illnesses, effect of yoga, meditation and artistic expressions are presented. Studies conducted both in western and Indian contexts have been reviewed.

Distress Related to Diabetes Onset.

The diagnosis of diabetes represents a period of crisis for many. Unfortunately, few empirical studies have examined levels of distress immediately following diagnosis of Type 2 diabetes among adults. However, increased levels of distress immediately following diagnosis is common among children diagnosed with type 1 diabetes. For most, this distress then dissipates over the first year following diagnosis (Kovacs, Brent, Steinberg, Paulauskas, & Reid, 1986). Thus, Rubin and Peyrot (1994) recommended regular monitoring of patients

distress levels following diagnosis. Individuals experiencing clinically significant distress should be referred for intervention as a means of minimizing the impact on diabetes management.

Distress Related to Medical Complications.

The onset of medical complications can trigger a crisis for many individuals, and health care providers should not underestimate the potential emotional impact of new complications. However, research examining the impact of specific diabetes complications is quite limited and has primarily examined psychological correlates of sexual dysfunction and visual impairment. Sexual dysfunction is a prevalent problem among men with diabetes; approximately 50% of men with diabetes experience impotence. Although the prevalence of sexual dysfunction is not known for women, one study reported that women with DM2 reported significantly lower levels of sexual desire or orgasmic capacity, lubrication, and sexual satisfaction in their relationships than did nondiabetic control participants (Schreiner-Engel, Schiavi, Vietorisz, & Smith, 1987). To date, little research has specifically examined the treatment of

impotence among those with diabetes (McCulloch, Hosking.,
& Tobert, 1986). As such, it has been recommended that
treatment for impotence proceed in accordance with the
standards established for medically well individuals (Rubin &
Peyrot, 2001).

Visual impairment due to diabetic retinopathy is another
complication that appears to have profound psychological
consequences for the patient. Individuals diagnosed with
progressive diabetic retinopathy (PDR) reported a greater
number of negative life experiences and psychiatric distress
during the 2 years following diagnosis with PDR (Wulsin &
jacobson, 1989; Wulsin, Jacobson & Rand, 1987). Moreover,
individuals who experienced fluctuating levels of visual did
those with more stable and severe visual impairment
experienced more distress than did those with more stable
and severe visual impairment (Bernbaum, Alpert, & Duckro,
1988). Common feelings related to vision loss include failure,
uncertainty, and fear. Nevertheless, few studies have
examined interventions to address the emotional
consequences of PDR onset (Bernbaum *et al*., 1988).
Therefore, it is recommended that clinicians regularly assess

psychological distress, especially among patients who have been diagnosed with PDR.

Little is currently known about the psychological sequelae of other diabetes specific complications. However, it has been demonstrated that the more likely he or she is to manifest psychological distress (Trief, Grant, Elbert, & Weinstock, 1998). The author urges that the health care professionals should remain cognizant of the psychological consequences of new or accruing diabetes complications for their patients.

Psychosocial Stress

Stress, often conceptualized as the interaction between an event and an individual's response to that event, is one of the most widely studied psychosocial factors associated with Type 2 diabetes (Goetsch & Wiebe, 1995). It has been hypothesized that stress affects metabolic control both directly and indirectly (Peyrot & McMurry, 1985). First, stress is believed to directly affect metabolic control through physiological mechanisms. Theoretically, stress triggers the natural physiological responses (fight or flight response), resulting in the release of counter regulatory hormones. The

release of these hormones triggers an increase in sympathetic activity to the pancreas, thereby inhibiting insulin and simulating the release of glucagons (Goetsch &Wiebe, 1995). Glucagon then stimulates the liver to convert glycogen to glucose and release hepatic glucose stores into the bloodstream. As a result, there can be increases in blood glucose levels independent of consistent diabetic regimen adherence. A number of animal models have supported the link between acute stressors and metabolic control (Kuhn, Cochrane, Feinglos, & Surwit, (1987); Surwit *et al.*, 1984). However, generalization of these results to humans has been difficult. Although some studies have reported significant associations between life stress and hemoglobin A1c (HbA1c) independent of regimen adherence among adults with diabetes (Demmers, Neale, Wensloff, Gronsman, & Jaber, 1989), while other studies have not (Griffith, Field, & Lustman, 1990). The equivocal findings are likely due in part to the wide variety of methodologies employed; including types of stressors targeted, durations of the stressors, measures of subjective stress, interval between the stressors and the blood glucose tests, and baseline blood glucose levels. Obviously, the relationship between stress and blood glucose

is a complex one that involves multiple variables, including cognitive and physiological factors.

Indirectly, stress is thought to adversely influence metabolic control through changes in self-management behaviour. The ability to maintain the demands of a complex treatment regimen may be compromised by the demands of daily life (e.g., eating fast food instead of taking the time to prepare a proper meal, skipping regular exercise to catch up on work) (Marlat & Gordon, 1985). Future research studies are needed to identify psychological and physiological markers of individuals who are more susceptible to stress and to shed light on appropriate interventions.

Depression

Empirical research indicates that depression is quite prevalent among individuals with diabetes. Meta-analytic data indicate that approximately 31% of individuals with diabetes report clinically elevated depressive symptoms. Furthermore, the accrued lifetime prevalence of major depression among individuals with diabetes is estimated to be 28.5% (Anderson *et al.,* 2001). Similarly, Egede, Zheng, and Simpson (2002) fond that individuals with diabetes (type 1 or

type 2), when compared with a healthy control group, are twice as likely to be diagnosed with depression. Depressive episodes also tend to occur more frequently and last longer among individuals with Type 2 diabetes than among those without Type 2 diabetes (Lustman, Close, Alrakawi, Rubin, & Gelenberg., 1997). Finally, consistent with the general population, the prevalence of depression is greater among women with diabetes than among men with diabetes (Anderson *et al.,* 2001)

The demonstrated association between depression and diabetes provides the most striking example of the interwoven relationship between psychological functioning and diabetes outcome. Depression is strongly associated with metabolic control among individuals with Type 2 diabetes (Lustman *et al.,* 2000). In their meta analysis, Lustman and colleagues (2000) found that depression accounted for approximately 3% of variance in glycated hemoglobin, a salient finding given that a 1% decrease in glycate hemoglobin results in a 33% decrease in the progression rate of retinopathy (Morisaki *et al.,* 1994). Further more, treatment of depression could potentially increase the proportion of

individuals in good glycemic control from 41% to 58% in the diabetic population (Lustman *et al.,* 2000). Thus, psychological functioning has direct implications for illness outcomes.

There also appears to be a relationship between health care use and depressive symptoms among patients with diabetes. For example, individuals with depression and diabetes has higher ambulatory care use (12vs. 7 visits) and filled more prescriptions (43 vs. 21) than did their counterparts without a diagnosis of depression. Among individuals with diabetes, total health care expenditures for individuals with depression and diabetes were four and a half times higher than those for individuals without depression ($247 million vs. $55 million) (Egede *et al.*, 2002).

Despite the influence of depression on Type 2 diabetes outcome and health care use, two of three cases of depression go undiagnosed. Undiagnosed depression is likely due to the fact that many of the symptoms for depression and diabetes overlap (e.g., fatigue [Lustman *et al.,* 1997]). In fact, the prevalence of depressive symptoms among those with diabetes argues for the routine integration of screening for

mood disorders by primary health care providers into their patients' treatment plans as a means of improving their patients' psychological and physical health.

Anxiety

As with depression, rates of anxiety are significantly higher among individuals with diabetes than among the general population. In fact, rates of clinically significant anxiety among those with diabetes may be as high as 49% (Peyrot & Rubin, 1997). Gender, age, and education were variables that predicted greater anxiety symptoms (Peyrot & Rubin, 1997),in particular, females, individuals between ages 40 and 49 years and individuals with likely to report symptoms of anxiety. Individuals who had more diabetes complications also reported more anxiety symptoms. Not surprisingly, 38% of those reporting anxiety also reported co-morbid depression (Peyrot & Rubin, 1997). Thus, regular screening for anxiety among patients with diabetes is also recommended, especially among those with a greater number of diabetes-related complications.

Other Psychological Factors

Social Support. Social support has been associated with psychological health among those with Type 2 diabetes. Individuals with Type 2 diabetes who perceive more social support from friends and family engage in more diabetes self-care than do those who perceive less social support (Garay-Sevilla *et al.,* 1995). In fact, social support may account for as much as 17% of the variance in self-reported diabetes self-care behaviors (Wang & Fenske, 1996). Social support has also been consistently associated with decreased psychological distress among medically well and diabetes populations (Connell, Davis, Gallant, & Sharpe, 1994). Those who report more general social support are more likely to have more diabetes-specific social support and subsequently less depressive symptomatology (Littlefield, Rodin, Murray, & Craven, 1990). As such, social support appears to serve a protective function against depressive symptoms in the context of diabetes.

Illness Intrusiveness. Illness intrusiveness, which refers to the perception of the extent to which an illness constrains and disrupts valued activities, has also been associated with depressive symptoms among individuals with

diabetes (Devins, Hunsley, Mandin, Taub, & Paul, 1997). To illustrate, Talbot, *et al.,* (1999) examined depressive symptoms in a sample of 237 individuals with Type 2 diabetes cross-sectionally and found that illness intrusiveness accounted for 61% of the variance in depressive symptoms. Such findings suggest that individuals who tend to perceive their diabetes as restricting activities in valued domains (e.g., family, relationship, spirituality) are at greater risk for depression than are those who do not. To date, relatively little research has been conducted examining cognitive factors such as intrusiveness and their relationship to depression in the context of diabetes.

Perceived Control. Another cognitive appraisal variable, perceived control, has also been related to levels of psychological distress among individuals with diabetes. Using a measure of diabetes-specific control, Peyrot and Rubin (1994) found that the type of locus of control resulted in either positive or negative health outcomes. Their work suggests that there are two types of internal control: autonomous and self-blaming. Autonomous internal locus of control orientation (i.e., the belief that a person can manage

his or her illness) was significantly associated with fewer symptoms of depression and anxiety. Conversely, a self-blaming internal locus of control (i.e., the belief that a person is responsible for his or her negative illness outcomes such as poor metabolic control) was associated with high blood glucose levels and binge eating. In addition, participants who thought that diabetes control was a matter of chance of fate were more likely to be depressed and anxious and to have lower self-esteem (Peyrot & Rubin, 1994). Certainly, more research is needed to determine how perceived control and health outcomes are causally related. However, it appears that health-related perceptions of control are important cognitive mechanisms to assess and are potentially effective targets for treatment.

Coping Style. The inconsistent findings regarding the relationship between stress and glycemic control may be partially due to differences in how individuals cope with stress. Stress has been significantly associated with higher HbA1c values among those individuals who reported ineffective coping styles (i.e., emotional or angry responses to stress) (Peyrot & McMurry, 1992). Coping styles showed

better glycemic control. Such findings suggest that changing the manner in which individuals respond to stressors may mitigate the impact that stress has on glycemic control of those with Type 2 diabetes.

Ethnic and Cultural Considerations

Samuel-Hodge and colleagues (2000) found that African American women reported that they often feel nervous and tired and worry about diabetes complications. Furthermore, many African American women tend to respond to the needs of others and neglect their own care in accordance with their caretaking role within the family. Coping methods may also substantially differ given that African American women tend to rely on spirituality and their belief in god to provide the strength to cope with diabetes (Samuel-Hodge *et al.,* 2000). The aforementioned factors are just a few examples of potential ethnic and cultural differences in psychological adjustment and coping style that may exist and so should be considered in treatment plan development.

Unfortunately only a limited number of studies have examined the effectiveness of interventions designed for specific ethnic groups. The few that have been conducted

demonstrate improvements in glycemic control, blood pressure control (Agurs-Collins, Kumanyika, Ten Have, & Adams-Campbell, 1997), and weight loss (Mayer-Davis et al., 2001). Such positive outcomes underscore the importance of developing culture-specific intervention. The relevance of these findings is also reflected in culturally centered diabetes outreach programs (e.g., African American, Native American, Latino) recently developed by the ADA (2002b).

Nutritional Related Studies

Marshall, *et al.* (2005) found that the children who ate more dairy foods and drank fewer sugary drinks got more calcium, vitamin D, and other nutrients. Children who drank more 100% fruit juice got more vitamin C, but didn't get some of the other nutrients they needed. Between the ages of 1 and 2 years, children drank mostly 100% fruit juice. After age 2, they gradually drank less. They gradually had more drinks with added sugar between 1 and 4 years. They also drank more soda. The more juice or soda they drank, the less milk they drank.

Gross, *et al*. (2004) conducted an ecologic assessment on increased consumption of refined carbohydrates and the

increased scope of Type-2 diabetes. According to the study, today's carbohydrates are very different from those in the early 1900s. For example, turning whole grains into white flour increases calories, reduces the amount of fiber (by 80%), and reduces protein. More foods include white flour now than in the early 1900s. In this study, they revealed that, people ate a lot of refined carbohydrates and little fibre had a higher chance of getting Type 2 diabetes. The more refined carbohydrates a person eats, the more likely to be obese and diabetic.

According to Pereira, *et al.* (2004), low-glycemic-load diet can help dieters get past plateau. The study showed that people on the low-glycemic-load diet burned more calories, even at rest, than people on the low-fat diet. Also, people in the low-glycemic-load group reported less hunger than those in the low-fat group. Although people in both groups lost about the same amount of weight, the low-glycemic-load diet had other benefits: less heart disease risk, lower insulin resistance, lower lipids, and fewer signs of inflammation

The study of Schulze, *et al.* (2004) revealed that sugar-sweetened soda and fruit drinks are linked to weight gain and

Type 2 diabetes in women. Women who drank more sugar-sweetened soft drinks as the study went on gained the most weight. Women who cut down on soft drinks as the study went on gained less weight. Researchers found the opposite results for diet of soft drinks. Women who drank more diet of soft drinks as the study went on gained less weight than women who cut down on diet of soft drinks. Women who drank more fruit punch, as the study went on, gained more weight than those who cut down on fruit punch. Participants reported 741 new cases of Type 2 diabetes during the study. Drinking more sugar-sweetened soft drinks was linked to higher risk of diabetes.

Utzschneider, *et al.* (2004) conducted a study about weight loss linked to better beta-cell function. According to this study **diet-induced weight loss is associated with an improvement in B-cell function in older men**. The men met with a dietician, at least once a week and were shown how to follow a 1,200 calorie-per-day diet consisting of 50% carbohydrates, 30% fat and 20% protein. They also took vitamin and mineral supplements. The men were weighed three times per week. It shows that the men in the study lost

an average of nine pounds. All the men lost weight, with fat making up 84% of the weight loss. Fasting blood glucose levels were lower after the weight loss. Insulin sensitivity improved, resulting in an improvement in beta-cell function

Volek, *et al*. (2004) comparing very low-carbohydrate and low-fat diets. In this comparison of very low-carbohydrate and low-fat diet on fasting blood lipids, LDL subclasses, insulin resistance, and postprandial lipemic response (elevated postprandial triacylglycerol-rich plasma lipoproteins and suppressed HDL-cholesterol concentrations which increases the risk of coronary artery disease (CAD), which is the main cause of early death in patients with type 2 diabetes) in overweight women. The women went on two weight-loss diets for 4 weeks each. One diet was low fat; the other was a very low-carbohydrate diet. All participants received instructions and guidance at the beginning of the study and had follow-up meetings with registered dietitians. The very low-carbohydrate diet included beef, fish, oils, nuts and seeds, peanut butter, some vegetables, salads with low-carbohydrate dressing, some cheese, eggs, protein powder, and water or low-carbohydrate diet drinks. Fasting blood

samples (taken before they ate) were taken two days before each 4-week diet plan. Blood fats, glucose, and insulin also were tested. The study shows that the women lost much more weight on the very low-carbohydrate diet than on the low-fat diet. The women's cholesterol (measured before they ate) was lower in the low-fat diet. The women's glucose (measured before they ate), insulin, and insulin resistance levels were lower after the very low-carbohydrate diet.

Waller, *et al*. (2004) found that a cup of healthy cereal after dinner helps night snackers lose weight. It reveals that people in the cereal group ate fewer calories after dinner. Those who followed the plan at least 5 days per week lost weight. The average weight loss for this group was 1.85 pounds.

Schroder, *et al*. (2004) argue that Mediterranean diet helps people avoid obesity. The participants were surveyed to see how well they followed the traditional Mediterranean-style diet (a diet that includes fruits, vegetables, beans, nuts, seeds, fish, olive oil, and other foods). The height and weight of each participant was measured to calculate body mass index (a measure of weight in relation to height). In their

study they found out that the more the participants stuck to the Mediterranean diet, the lower their body mass index was and the lower their risk of becoming obese.

A study by Yancy, *et al*. (2004) found that low-carbohydrate diet shows more weight loss than low-fat diet. The study showed that during the 24-week, the low-carbohydrate group lost more weight and reduced blood fat levels more than the low-fat group.

Another study by Yoo, *et al*. (2004) dealt about food group and metabolic syndrome that young adults with no risk factors for metabolic syndrome drank more alcohol and ate more low-fat dairy products, fruits, and vegetables than those in the other two groups. The study was put into three groups: those with no risk factors for metabolic syndrome; those with one or two risk factors; and those with three or more risk factors. All participants were asked their age, whether they smoked, their physical activity level, and the number of hours they watched television each day. The participants were asked not to eat for 12 hours. Researchers then took blood samples to determine their glucose and blood fat levels. They also took blood pressure readings and measured height,

weight, and waist size. The group with no risk factors also drank fewer sweetened beverages than the other two groups.

Women who had more calcium in their diets were more likely not to have the metabolic syndrome (Liu, *et al*. 2005). These women were also slightly older and thinner and were less likely to smoke, drink alcohol, or have a history of high blood pressure, and they were more likely to exercise and use multivitamins. Calcium was also linked with lower fat and lower cholesterol in these women. These results were similar for vitamin D; however, vitamin D was not related to having lower cholesterol. Overall, the women who had more calcium and vitamin D in their diets had a lower chance of having any one of the five symptoms of the metabolic syndrome. Women with lower amounts of calcium and vitamin D in their diets were more likely to have high glucose levels and diabetes, and lower amounts of vitamin D were shown to affect the body's ability to produce and secrete insulin.

An important observation by Azadbakht *et al*. (2005) is that, a diet higher in fruits, vegetables, and whole grains can help prevent symptoms of the metabolic syndrome. The patients went on one of the three diets for six months: a

control diet, a weight-reducing diet that emphasizes healthy food choices, and the DASH diet. The DASH diet emphasizes reduced calories and more servings of fruit, vegetables, low-fat dairy, and whole grains. Compared to the other diets, the DASH eating plan is lower in saturated fat, total fat, cholesterol, and sodium. The DASH diet resulted in higher HDL cholesterol (the good cholesterol) and lower triglycerides (fats in the blood), blood pressure, weight, and blood glucose levels, as compared to the other two diets, in both men and women. The weight-reducing diet also resulted in benefits, but the benefits were greater among those who were on the DASH eating plan.

Kant, *et al*. (2005) revealed that high energy density foods are less nutritious and lead to weight gain. They calculated the amount of calories in participants' diets and put them into one of three categories: all foods and beverages, foods and energy-containing beverages (not to include water and diet soda), and food by itself. In general, researchers found that the amount of calories in a diet was highest when food was consumed by itself and lower when beverages were included. Participants with the highest calorie

diets ate the least amount of fruits and vegetables, had higher levels of fat in their bodies, and had high body mass indices (a measure of weight in relation to height)

Songet, *et al*. (2005) found that women who got more magnesium in their diet were less likely to have the metabolic syndrome, inflammation in the body, and heart and blood vessel disease. Most women got magnesium from the foods they ate rather than from supplements. Overweight women and smokers benefited the most from magnesium. Women who ate more foods with magnesium were older, had a healthier weight, were more likely to exercise, and were less likely to have high blood pressure or smoke cigarettes. Their diets were lower in fat and cholesterol, and they ate more fibre. Inflammation in the body was less common in women who got more magnesium. Women who had the highest magnesium intake had 12% lower C-reactive protein levels than women with the lowest magnesium intake. Again, the benefits of magnesium were more obvious in overweight women and smokers.

A note worthy study by Huerta, *et al*. (2005) shows that 55% of obese children did not get enough magnesium from

the foods they ate, compared with only 27% of lean children. Obese children had much lower magnesium levels in their blood than lean children. Children with lower magnesium levels had a higher insulin resistance. The above study showed that obese children got 14.4% less magnesium from the foods they ate than lean children. An important finding was that even though obese and lean children ate about the same number of calories per day, obese children ate more calories from fatty foods than lean children. Researchers found that lean children were more likely to have higher magnesium levels because they were more likely to eat low-fat foods that contain magnesium, such as fruits, vegetables, and high-fiber grains. In addition to not eating enough foods that have a lot of magnesium, obese children might also have problems using magnesium from the foods they eat. Extra body fat can prevent the body cells from using magnesium to break down carbohydrates.

Anderson, *et al*. (2004) argue that high-carbohydrate and high-fiber meals improved blood glucose and glycated hemoglobin (A1C) levels (a measure of long-term blood glucose control). These diets also improved blood lipid (fat)

levels. Low glycemic-index diets (including foods such as yams, bananas, prunes, and milk) improved blood glucose levels and insulin response. They also reduced blood cholesterol.

The study of Aude, *et al*. (2004) shows that people will lose more weight with a modified low-carbohydrate diet than a low-fat diet. The result revealed that people on the MLC diet lost more weight than the people on the low fat diet. After 12 weeks, the people on the MLC diet lost 13.6 pounds and the people in the low fat diet lost 7.5 pounds. People on the MLC diet also had healthier lipid levels. A low-fat diet that is high in carbohydrates may increase the level of fat in a person's blood, but lower the person's HDL cholesterol.

A remarkable finding by Drapeau, *et al* (2004) is that eating fruit can help keep weight off. Researchers found that people who reported eating less fat, fewer fatty foods, and more fruit gained less weight and had lower body fat. People who reported eating less sugar and fewer sugary foods also gained less weight.

Esposito, *et al*. (2004) conducted a study about the Mediterranean-style diet and metabolic syndrome. The

intervention group showed a major decrease in body weight, blood pressure, and levels of glucose, insulin, total cholesterol, and triglycerides (fat in the blood). This group also showed a large increase in high-density lipoprotein (the 'good ' cholesterol) levels. This meant that more than half of the intervention group no longer had metabolic syndrome and reduced their chances of getting Type-2 diabetes and heart disease. The control group showed no major improvements in body weight, blood pressure, or the other factors. As a result, 78 of the 90 patients in the control group still had metabolic syndrome and increased risk of getting heart disease and Type 2 diabetes.

Farshchi, *et al*. (2005) proved that meal schedules are linked to insulin response and lipid levels in healthy obese women. The women's weight and other size measurements didn't change no matter when the women ate. Insulin response is a measure of how well the body handles carbohydrates. They found that poor insulin response is a sign that a person is on the way to getting Type-2 diabetes. In this study, blood tests showed that insulin response was better with a regular meal schedule. Fasting blood tests also showed

higher levels of lipids (fat) in the blood with irregular meal schedules.

Farvid, *et al*. (2004) studied the impact of vitamins and/or mineral supplementation on blood pressure in Type-2 diabetes. The researchers found that one receiving zinc sulfate, magnesium oxide, and vitamins C and E—had the greatest reduction of blood pressure after 3 months. None of the other groups showed a significant lowering of blood pressure.

Fung *et al*. (2004) conducted a study about dietary patterns, meat intake, and the risk of Type-2 diabetes in women. They revealed that women who followed the Western-diet had a greater risk of Type-2 diabetes, particularly if they ate processed meats, bacon, and hot dogs. Overall, the Western diet raised the risk of diabetes by nearly 50% among the women in this study.

Psychosomatic Studies

Extensive research, on the relationship between psychological factors and physical illness, is carried out throughout the world. Vagbhada and other ancient Ayurvedic

theoreticians found that there are some psychological factors, which are directly related to diabetes. Some scientific studies are conducted on this topic. The summary of these studies is included here.

Vileikyte, *et al*. (2005) found that diabetic nerve damage linked to symptoms of depression. This study confirms that people who have diabetic nerve damage have an increased risk for symptoms of depression. Unsteadiness on one's feet may be an important symptom that links nerve damage to depression. The study suggests that physicians should actively ask their patients with diabetic nerve damage about unsteadiness, especially since physiotherapy and gait training may help them overcome this disability.

A study by McGinnis *et al*. (2005) conforms that biofeedback and relaxation therapy can help people with Type-2 diabetes manage their blood glucose levels. Better blood glucose management can reduce the chances of suffering from complications from diabetes. Biofeedback and relaxation therapy can also help lower anxiety and improve mental health. Biofeedback and relaxation were associated with significant decrease in average blood glucose, A1C, and

muscle tension compared with the control group. At 3-month follow-up, the treatment group continued to demonstrate lower blood glucose and A1C. Both groups decreased scores on the depression and anxiety inventories. Patients with depression had higher blood glucose levels tended to drop out of the study.

Behavioral and emotional disorders in young people with diabetes are studied by Garrison, *et al* (2005). According to Garrison, having an emotional or behavioral disorder did not seem to make children with diabetes more likely to have to go back to the hospital to treat diabetic problems. Among adolescents, however, having an 'internalizing disorder,' like depression or anxiety, seemed to be linked with repeated admissions to the hospital to treat diabetic problems.

One major study conducted by Engum, *et al.* (2005) tried to find out the link between high blood glucose. There were three main findings in the study. First, long lasting physical illnesses were linked with depression in people who had Type-2 diabetes (depression and physical illnesses were positively correlated) but not in people who had Type-1 diabetes. Second, high blood glucose was not connected with

depression in people with any type of diabetes. Lastly, the factors that were connected with depression in type 1 and Type-2 diabetes were also connected to depression in the general population. The researchers concluded that just having diabetes does not necessarily make a person more likely to be depressed.

Another study about depression and heart diseases in diabetes is conducted by Egede, *et al.* (2005). The samples in the group were also more likely to be poorer, less educated, and less likely to be married than the people in the other three groups. This group also had the highest death rates; people without diabetes and depression had the lowest. They found that depression and heart diseases is positively correlated with diabetes. The people who had diabetes had the highest death rates in general.

Brown, *et al*. (2005) have done a study about depression and Type-2 diabetes in younger adults. It showed that young adults who have a history of depression are more likely to get Type-2 diabetes than people who don't have a history of depression.

Sepa, *et al*. (2005) have found that the babies with stress in their lives had a bigger chance of getting diabetes. It didn't matter if other people in the family had diabetes. Some of the babies' stress had to do with their parents' arguments about taking care of the baby or problems because the mother was born in another country or the father had a low education.

Lidfeldt, *et al*. (2005) argue that living alone increases the risk of diabetes for women. The study shows that living conditions and household status may affect a person's health and how a person responds to diseases. Very few studies have looked at how a person's living situation affects the outcome of having diabetes. Women living alone had a higher risk of having their blood glucose problems turn into diabetes. This is mostly because the women who lived alone smoked and drank more than the women who didn't live alone.

Wiesli, *et al*. (2005) conducted a study entitled 'Acute psychological stress affects glucose concentrations in patients with Type-1 diabetes following food intake but not in the fasting state'. As compared with a 'control day,' when the patients didn't perform any stressful tasks, the glucose levels

of the patients who didn't eat stayed the same during the test day. Their blood pressure and heart rate, however, rose during the tests. Glucose levels also stayed the same between the control day and the test day in the patients who ate a meal. However, after eating, it took longer than normal for glucose levels to go down after taking the tests. Blood pressure and heart rate also rose during the tests. The researchers did not find anything important in the saliva samples for either group of patients.

According to Surwit, *et al*. (2002) stress management improves long-term glycemic control in Type-2 Diabetes. The current results indicated that a cost-effective, group stress management program in a 'real-world' setting can result in clinically significant benefits for patients with Type- 2 diabetes.

Studies Related to Yoga, Meditation and Musical Interventions

Plenty of evidences are available world wide on the beneficiary effect of yoga, meditation and music in the cure processes. Such studies on diabetic patience are rare. Efficacy of such alternative therapy interventions on various

disease symptoms are examined in the following studies. According to the holistic concept all disease symptoms are inter related as the causative factors are almost the same for various symptoms.

Vasudevan *et al.* (1994) studied a sample of 7 subjects with tension headache who went 30 sessions of yogic meditation. Pre, mid and post assessments were made using the psychophysiologic and psycho-behavioural measures. Findings revealed there was a significant reduction in pain perception. Yogic meditation was effective in reducing tension headache.

Sachdeva (1994) studied 26 hypertensive and 20 normotensive subjects and provided 12 weeks yogic life style (Meditation, breathing techniques, postures, a low fat, non spicy, vegetarian diet and behavioural modification). Subjects reported a progressive reduction in systolic and diastolic BP, body weight, serum cholesterol and triglyceride levels.

Krishnan (1995) discussed the scientific and psychological significance of yoga as a means of attaining spiritual emancipation. Within the *yoga* fold, the nature and significance of *raja yoga, hatha yoga, Kriyas, asanas,*

pranayana, bandhas and *mudhras* are studied. Findings from empirical studies on yoga reveal that long-term practitioners of yoga have a remarkable voluntary control over their autonomic process, which helps thenm in coping with psychological stress. They also describe yoga as a system of psychotherapy and calls upon clinician to perfect yoga therapy so as to make its application universal.

Krejci (1998) demonstrated the effectiveness of yoga exercises with mentally retarded children. The yoga programme was run for a 12-week period, 2 hours a week. Findings indicate a distinct improvement in the children's state of health not only of motor abilities but also great mental tranquillity.

Schumacher (1998) suggested Musical dialogue - music therapy on social conduct disorder and communication difficulties. Musical dialogue is a way of leading people incapable of speech out of their isolation and difficulty of expression and of helping early the emotionally disturbed people to get in contact with their feelings. Video excerpts of therapy sessions with 3 autistic children show how basic

capabilities for interpersonal dialogue are made possible through music therapy.

Clark, *et al*. (1998) proposed the use of music to decrease aggressive behaviours in people with dementia. The purpose of this study was to examine the effects of recorded, preferred music in decreasing occurrences of aggressive behaviour among individuals with Alzheimer's type dementia, during bathing episodes. Eighteen older adults, age 55 to 95, with severe levels of cognitive impairment, participated in the study. They were randomly scheduled for observation during bath time under either a control (no music) condition or an experimental condition with which recorded selections of preferred music were played via audiotape recorder during the bathing episode. Following a 2-week (10 episode) observation period, conditions were reversed. A total of 20 observations were recorded for each individual. Results indicated that during the music condition, decreases occurred in 12 of 15 identified aggressive behaviours. Decreases were significant for the total number of observed behavioural and for hitting behaviours. During the music condition caregivers frequently reported improved affect and a general increase in

cooperation with the bathing task. The implications of these findings for improving the overall quality of care for severely cognitive impaired older adults are confirmed in this study.

Lichstein, *et al.* (1999) attempted to prove the need of relaxation to assist sleep medication withdrawal. This study explores the usefulness of relaxation and gradual medication withdrawal in weaning insomniacs from sleep (hypnotic) medication. They recruited 40 volunteers from the community who had insomnia, half of whom were chronic users of hypnotics while the other half were non-medicated. Half of participants (10 medicated & 10 non-medicated) received progressive relaxation. All medicated participants received a standard gradual drug withdrawal program. Medicated participants reduced sleep medication consumption by nearly 80% participants who received relaxation obtained additional benefits in sleep efficiency, rated quality of sleep and reduced withdrawal symptoms. Medicated and non-medicated participants attained comparable, improved sleep by post treatment and follow up. Hypnotic withdrawal was accompanied by serious worsening of insomnia, but this dissipated by the end of the withdrawal period. The

psychological treatment of hypnotic dependent insomnia has high potential for making an important clinical contribution.

Triveni, Aminabhavi and Vijayalakshmi (1999) revealed a significantly lower level of neuroticism in yoga practitioners in comparison to non-practitioners. The practitioners manifested a lower level of anxiety as well as depression.

Veeramanikandan (2002) has conducted a study on 30 patients who were suffering from Asthma. The treatment camp exceeded for seven days. During the camp, they were given raw food to eat. They were trained in *yogasana.* The individual and group psychotherapies were provided. Subjects were asked to follow this life style for 40 days. The subjects who could follow the procedures fully were 28. The recovery was excellent. All the asthmatic patients could breathe without the help of a chemical after 4 days. Complete cure was observed in 40% patients who were not depended to steroid drugs.

A study on the outcome of experiences derived from 24 holistic camps held in various parts of Kerala for the purpose of data collection by holistic health researches in the Psychology Department of Calicut University, deals with the

philosophical foundation of natural cure (not naturopathy) and the procedures to be followed for the cure of diseases. (Baby, J., 2004)

The personality theory of Inertia, Activation and Stability (Mathew, 1995) also proposed that people having heart attack may have higher rates of Activation and Stability (Two component of *trigunas* - the Eastern concept of Personality). A study conducted to explore all the above mentioned psychological factors, namely, hostility, stress and IAS dimensions of personality of heart patients and compared with normals. (Baby Shari, P.A., 2005) The study also found out that psychological analysis of natural cure methods of intervention. This kind of method aims at correcting life style by removing the causal factors of disorders rather than suppressing the symptoms and thereby attain cure of disorders. In this study an intervention of this sort, was given to heart patients to study its efficacy through the psychological analysis of above-mentioned variables. Some of the physiological variables were also studied through the pre and post intervention comparison. The study categorically

concludes that the holistic methods are effective in curing CHD.

Ernet, Rand and Stevinson (1998) claimed the efficacy of complementary therapies for depression. Depression is one of the most common reasons for using complementary and alternative therapies. The aim of this article is to provide an overview of the evidence available on the treatment of depression with complementary therapies. Systematic literature searches were performed using several databases, reference list searching, and inquiry to colleagues. Data extraction followed a predefined protocol. The amount of rigorous scientific data to support the efficacy of complementary therapies in the treatment of depression is extremely limited. The areas with the most evidence for beneficial effects are exercise, herbal therapy (Hypericum perforatum), and to a lesser extent, acupuncture and relaxation therapies. There is a need for further research involving randomized controlled trials into the efficacy of complementary and alternative therapies in the treatment of depression.

An over view of the review studies

Studies reviewed here, mostly are based on conventional calorie theory and calorie estimate methodology which are having a lot of limitations. Holistically oriented researchers do not approve of such studies fully and they give more emphasis to holistic or total experience. The variable based observations are often partial or 'divided knowledge'. Even within the limitations the studies reviewed here propels us for more elaborate investigations considering more relevant variables, Nutritional variables, especially the impact of the most *satwick* or holistic food such as the raw food are the neglected area in the field of medicine and psychology.

There is a severe dearth of studies on the effect of natural raw diet. Very few people have recognized the curative effect of natural raw diet. It is almost unknown to mainstream Medicine. Perhaps the Nature Cure practitioners have such practical knowledge but they usually do not publish research articles.

Studies on alternative therapies and *yoga* are abundant. Modern Medicine is gradually accepting such studies and the same are being incorporated in the mainstream therapies. The curative effect of *yogasana* is accepted worldwide. But

the multiple benefits of *yogasana* when the practitioner is on raw diet (yogic diet) is not very much known to the general public and even to the present day *yoga* propagators and researchers.

METHODOLOGY

RESEARCH DESIGN

The experimental design proposed for the study is a Pretest Post test Design. As the research intended to study the efficacy of a therapy programme, more emphasis was given to holistic approach.

Aim

The study attempts to test the efficacy of psychonutritional intervention for the cure of Type 2 diabetes mellitus. The psychological and physiological variables related to Type 2 diabetes mellitus were identified based on accepted theory and practice. Accordingly the hypotheses are formulated in accordance with the following objectives.

Objectives

1. To study the efficacy of psychonutritional intervention programme on the various physiological variables like blood sugar level, body weight, pulse rate, blood pressure and blood cholesterol of patients with Type 2 diabetes mellitus.

2. To study the efficacy of psychonutritional intervention programme on the memory of patients with Type 2 diabetes mellitus.

3. To study the efficacy of psychonutritional intervention programme on the hostility level of patients with Type 2 diabetes mellitus.

4. To study the efficacy of psychonutritional intervention programme on the virtue of patients with Type 2 diabetes mellitus.

5. To study the efficacy of psychonutritional intervention programme on the stress level of patients with Type 2 diabetes mellitus.

6. To study the efficacy of psychonutritional intervention programme on the health awareness of patients with Type 2 diabetes mellitus.

Hypothesis Formulated:

1 *Blood sugar* level will be normal after the therapy intervention.

2 *Pulse rate* will be normal after the therapy intervention.

3   *Blood pressure* will be normal after the therapy intervention.

4   *Blood cholesterol* will be normal after the therapy intervention.

5   *Body weight* will be normal after the therapy intervention.

6   *Memory scores* will be improved by the therapy intervention.

7   *The hostility scores* will be reduced after the therapy intervention.

8   *Scores* in the *virtue scale* will be improved after therapy intervention.

9   *Stress level* will be reduced by the therapy intervention.

10   *Health awareness* will be improved after the therapy intervention.

Sample:

The sample for the study consists of 40 Type-2 diabetes mellitus cases (24 male and 16 female) who were undergoing a holistic health camp held by a charitable organization in

Cannanore, Calicut, Malappuram and Thrissur districts of Kerala state, a linguistic division of India.

Table 3.1: Demographic variables of the sample

Gender	Number of sample	Average age of sample	Duration of illness	
			years	month
Male	24	53	5	8
Female	16	51	5	7
Total	40	53	5	8

Physiological variables and measures

The physiological variables given are of vital importants in any study on health problems and they are considered inthis investigations.

(1)   Blood sugar

(2)   Pulse rate

(3)   Blood pressure

(4)   Total cholestrol

(5)   Body weight

Descriptions of the physiological variables

(1) Blood sugar

Physiologically, the term means only glucose in the blood. Other sugars are present, sometimes in more than trace amounts, but only glucose serves as a controlling signal for metabolic regulation. Other sugars are, to some extent, inert. Glucose, transported via the bloodstream from the intestines or liver to body cells, is the primary source of energy for the body's cells.

Blood sugar concentration, or glucose level, is tightly regulated in the human body. The total amount of glucose in circulating blood is therefore about 3.3 to 7g (assuming an ordinary adult blood volume of 5 liters, plausible for an average adult male). Glucose levels rise after meals for an hour or two by a few grams and are usually lowest in the morning, before the first meal of the day.

Failure to maintain blood glucose in the normal range leads to conditions of persistently high (hyperglycemia) or low (hypoglycemia) blood sugar. Diabetes mellitus, characterized by persistent hyperglycemia from any of several causes, is

the most prominent disease related to failure of blood sugar regulation.

Despite long intervals between meals or the occasional consumption of meals with a substantial carbohydrate load, human blood glucose levels normally remain within a remarkably narrow range. In most humans this varies from about 80 mg/dl to perhaps 110 mg/dl (3.9 to 6.0 mmol/litre) except shortly after eating when the blood glucose level rises temporarily (up to maybe 140 mg/dl or a bit more in non-diabetics).

Although it is called blood sugar, other simple sugars aside from glucose are found in the blood, such as fructose and galactose. But only glucose levels are used as metabolic regulation signals (via insulin and glucagon).

(2)Pulse rate

Heart rate is the number of heart beats per unit of time, usually expressed as beats per minute.When resting, the average adult human heart beats at about 70 bpm (males) and 75 bpm (females); however, this rate varies among people and can be significantly lower in endurance athletes.

The pulse is the most commonly used method of measuring the heart rate. This method may be inaccurate in cases of low cardiac output, as happens in some arrhythmias, where the heart rate may be considerably higher than the pulse rate.Listening to heart beats using a stethoscope, a process known as auscultation, is a more accurate method of measuring the heart rate.The pulse rate (which in most people is identical to the heart rate) can be measured at any point on the body where an artery's pulsation is transmitted to the surface - often as it is compressed against an underlying structure like bone.

There are a variety of reasons why the pulse rate may be higher than normal. The most common cause of an increased pulse rate is the normal physiological response to physical exertion, i.e. exercise. This change from the average 72 beats per minute in older adults is a normal part of the aging process.

(3) Blood Pressure

Blood pressure refers to the force exerted by circulating blood on the walls of blood vessels, and constitutes one of the principal vital signs. The pressure of the circulating blood

decreases as blood moves through arteries, arterioles, capillaries, and veins; the term *blood pressure* generally refers to arterial pressure, i.e., the pressure in the larger arteries, arteries being the blood vessels which take blood away from the heart. Arterial pressure is most commonly measured via a sphygmomanometer, which historically used the height of a column of mercury to reflect the circulating pressure. Today blood pressure values are reported in millimetres of mercury (mmHg), though aneroid and electronic devices do not use mercury.

The systolic arterial pressure is defined as the peak pressure in the arteries, which occurs near the beginning of the cardiac cycle; the diastolic arterial pressure is the lowest pressure (at the resting phase of the cardiac cycle). The average pressure throughout the cardiac cycle is reported as mean arterial pressure; the pulse pressure reflects the difference between the maximum and minimum pressures measured.

Typical values for a resting, healthy adult human are approximately 120 mmHg systolic and 80 mmHg diastolic (written as $^{120}/_{80}$ mmHg, and spoken as "one twenty over

eighty") with large individual variations. These measures of arterial pressure are not static, but undergo natural variations from one heartbeat to another and throughout the day (in a circadian rhythm); they also change in response to stress, nutritional factors, drugs, or disease. Hypertension refers to arterial pressure being abnormally high, as opposed to hypotension, when it is abnormally low.

(4) Cholesterol

Cholesterol is a lipid found in the cell membranes of all animal tissues, and is transported in the blood plasma of all animals. Cholesterol is also a sterol (a combination steroid and alcohol). Because cholesterol is synthesized by all eukaryotes, trace amounts of cholesterol are also found in membranes of plants and fungi.

The name originates from the Greek *chole-* (bile) and *stereos* (solid), and the chemical suffix *-ol* for an alcohol, as researchers first identified cholesterol in solid form in gallstones by François Poulletier de la Salle in 1769. However, it is only in 1815 that chemist Eugène Chevreul named the compound cholesterine.

Most of the cholesterol in the body is synthesized by the body and some has dietary origin. Cholesterol is more abundant in tissues which either synthesize more or have more abundant densely-packed membranes, for example, the liver, spinal cord and brain. It plays a central role in many biochemical processes, such as the composition of cell membranes and the synthesis of steroid hormones.

Since cholesterol is insoluble in blood, it is transported in the circulatory system within lipoproteins, complex spherical particles which have an exterior composed mainly of water-soluble proteins; fats and cholesterol are carried internally. There is a large range of lipoproteins within blood, generally called, from larger to smaller size: chylomicrons, very low density lipoprotein (VLDL), intermediate density lipoprotein (IDL), low density lipoprotein (LDL) and high density lipoprotein (HDL). The cholesterol within all the various lipoproteins is identical.

According to the lipid hypothesis, abnormally high cholesterol levels (hypercholesterolemia), or, more correctly, higher concentrations of LDL and lower concentrations of functional HDL are strongly associated with cardiovascular

disease because these promote atheroma development in arteries (atherosclerosis). This disease process leads to myocardial infarction (heart attack), stroke and peripheral vascular disease. Since higher blood LDL, especially higher LDL particle concentrations and smaller LDL particle size, contribute to this process more than the cholesterol content of the LDL particles, LDL particles are often termed bad cholesterol because they have been linked to atheroma formation. On the other hand, high concentrations of functional HDL, which can remove cholesterol from cells and atheroma, offer protection and are sometimes referred to colloquially as good cholesterol. These balances are mostly genetically determined but can be changed by body build, medications, food choices and other factors.

Most cells make a little cholesterol. L iver cell make a lot.Cholesterol gives memberane fluidity at body temperature. The more cholesterol a memberane contains ,the more fuid it is. Cholesterol is completely insoluble in water,an advantage in keeping it suspended in blood.It is needed to make and maintain cell memberanes and synthesise steroid hormones and bile salts. It helps to water

proof skin . The derivative dehydrocholesterol is used to synthesise vitamine D. Though human cells can make cholestrol,they lack enzymes to break it down. The body's main means of getting rid of cholesterol is through excretion of bile salts in the feces. This process removes only about one and half grams of cholesterol per day. Even when more cholesterol is lost than is taken in foods ,the liver easily relapses it. LDL cholestrol is cosidered here.

Table 3.2 Interpretation of cholesterol levels

Kind of cholesterol	Low	Normal	Border line	High
Total Cholesterol	<150	150-200	200-240	>240
LDL		<130	130-160	>160
HDL	<35	35 or Above		

(5) Body Weight

Body weight is associated with many pathology conditions. It is inflenced by genitic predisposition, nutritional style ,environmental conditions etc. A normal body weight is often assesed in relation to hight and other physiological and anatomical conditions. A sudden decrease or increase in weight is often associated with pathology. Normal body weight is a primary requirement of health variables which is regulated through various physiological process.

Psychological variables and tools

The following psychological tools were used for the investigation

(1) Span of Memory for Digits,

(2) Hostility Scale,

(3) Virtue Scale,

(4) Shibu's Stress Inventory,

(5) Health Awareness Inventory,

(6) Personal data sheet.

Description of the tools

(1) Span of Memory for Digits

Span of memory for digits consists of digit forward and digit back- ward. A composite score of these two scores constitutes the total digit span memory scores. The test started from oral reproduction of two digits presented in one second interval. One digit each was increased in the subsequent items up to 9 digits. The digit span for each subtest was decided as the score preceding two consecutive failures (see appendix 1)

This test is generally accepted as highly reliable and valid test of memory widely used in psychological tests because of its culture fair characteristics

(2) Hostility Scale

The hostility Scale was developed by Baby Shari and Baby, J. (2000).Hostility is a broad concept that encompasses traits such as anger animosity, cynicism and mistrust (attitudes). It is also important to note the difference between the experiences of hostility a subjective process including angry feelings or cynical thoughts and the experience of hostility a more observable component which includes acts of verbal or physical aggression (Siegman 1994)

Many researchers believe that not all components of Type A behavior are pathogenic, but rather specific personality traits such as hostility and anger may be associated with coronary heart disease.

The onset and experience of hostility are generally found to have a greater correlation with coronary heart disease even after controlling other risk factors (Miller *et al* 1996). Cynicism and mistrust of others was shown to be related to occurrence of coronary disease (Barefoot and Limpkus 1994). Outward experience of hostility, cynical or suspicious mistrust of other are delay emotions which are damaging to health (Williams *et al*., 1980). Cook and Medley

Hostility Scale measures anger, cynicism, suspiciousness and other negative traits. Smith (1992) had pointed out, hostile people will be easily provoked and worsen social conflict, and undermine their social support, social environment will be viewed as less supportive and more stressful by them. Hostile individuals tend to experience, excessive anger, and won't like to seek or accept social support (Houster & Vavak 1991). Iribarren (2000) had found, the hostility include, anger, cynicism, mistrust of other and aggressive behavior, whereas Niaura's study included paranoid alienation, cynicism, aggressive responding etc. Danka *et al*, (2000) argued that hostile behavior include anger out, anger in and negative feelings towards others. Hostility is characterized by suspicious resentment, frequent anger antagonism and mistrust of other (Barefoot *et al*, 1989)

Oxford Dictionary explains hostility as being antagonistic or showing enmity. Webster's Dictionary explains it as a state of being hostile, unfriendliness or animosity.

It may take into the form of direct attack to the enemy or resentment. According to Ramasay, it has got components like anger experience, anger expression, and neurotic

disagreeableness, resentment, suspiciousness, cynical hostility and neurotic hostility.

According to the review of related literature the components selected for the preparation of the scale were hostility, anger, annoyance, resentment, contempt, suspiciousness, mistrust, cynicism, pessimisms, irritation, enmity, antagonism, attack, neurotic hostility social aggression, impatience, opposition, hatred, negative impulses like teasing people, children and animals, lack of cooperation, relating to interpersonal relation, bad tempered, complaining, argumentation, competition etc. By keeping these components as standard, items were prepared, as the preliminary form which was undergone evaluation of experts. Modification, omission, preparation of draft scale, try out, item analysis etc finally after confirming reliabilities and validity the scale was finalized. (see appendix 2)

Validation

The final scale was subjected to the examination of different experts in the field of psychological research. They examined the statements of H.S. On the basis of their thorough examination and judgments, statements related to

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hostility of subjects were selected, and the scale as a whole is sufficient to assess hostility. Hence the face validity of the scale is ensured.

For criterion related validity, the scale was administrated to a representation sample of 60 and the scores ware collected. The sample was administered the Virtue Scale (Baby, J. 1999) measuring virtue the opposite of hostility. First set of scores were correlated, against the set of scores obtained from the same sample by administrating Virtue Scale as an external criterion. The correlation coefficient thus obtained was 0.59.

Reliability

Reliability of Hostility Scale was established through test-retest and odd-even methods; it was worked out on a representation sample of 60, on whom the validation was done. Two consecutive administrations had an interval of 1 month time. The two sets of scores thus obtained were correlated using Pearson's product moment technique, the reliability coefficient obtained are given below.

Alpha coefficient   0.94

Equal length coefficient (Spearman Brown)	0.93
Gutman split half	0.93
Unequal length (Spearman Brown)	0.93

The final scale thus consisted of 36 items. In the preparation of final scale, the selected items were separately given with necessary instructions.

(3) Virtue Scale

The test is a 40 item questionnaire consisting of items describing beliefs and behaviors to measure the value of virtue in individuals (Baby, J.2001). 20 aspects of virtues namely selfless service, peace, motiveless love, happiness, empathy, equality, forgiveness, humility, simplicity, austerity, helpfulness, honesty, greedlessness, giving, sincerity, faith in others (trust), well wishing and nonviolence (see appendix 3). The virtues were selected from a survey of virtues used in common language with the help of a few social science researchers. The positive and negative items were made based on each virtue and their opposite making a total of 40 items. Items were selected based on the criteria of validity index and difficulty index (Anastasi, A 2005).

Validity:

The test is negatively correlated with Inertia (*Thamo Guna*) –0.34 and Activation (*Rajo guna*) –0.30 and has high correlates 0.45 with Stability (*Sathva guna*) dimension of the well known personality test IAS Rating Scale (Mathew, V.G. 1995)

Reliability

Reliability is found to be 0.81 by split half method on a sample of 50 subjects (P.G students) selected randomly.

(4) Shibu's Stress Inventory

While confronting with challenge and controversy the people reacts, is an index of their success in dealing with stress, S.S Inventory is an instrument prepared and standardized by Shibu & Dharmangadan (1992) for assessing stress. The inventory consisted of 30 items capable of assessing stress in 3 different levels, namely (a) family stress (b) social stress and (c) environment stress. There are 10 items to assess each of these sub variables.

a)   Familial stress

If an individual is happy and confident about his own qualities, he is likely to have harmonious family life. It also helps him to be assertive about his needs respect and regard from his family will be more naturally and fully forthcoming sense of humor, consideration for others, and respect for the changing needs of his family are other qualities allow him to be loved by the family members as a person, with his qualities and faults. Accept and like whom he is open about his or her likes, needs and emotions and he/she will encourage an open, honest and understanding family atmosphere built on good communication.

In a similar way it is unfair to make unreasonable demands, high expectations from individuals, because it will cause stress, problems like conflict among family members, lack of responsibility of members will create stress in the individual. The above rational aspects are important in family stress subscale.

b)   Social stress or societal level stress.

Any variable that indicates how much upheaval a society experiencing can potentially be used as a measure of the stress of that society's population. For example stress will

be high due to the increase of unemployment; high geographic mobility and migration have generally been viewed as stressful circumstances because the uprootedness and societal ties will be lead to distress. Culture which experience rapid social technological change may be more vulnerable to stress and certain illness.

c)   Environmental stress.

Cramped or inadequate housing, violence, noise, crowding and over-population are the most obvious sources of environmental stress. The larger a town or a city, the more pervasive and uncontrollable. The irritations and pressures that confront its inhabitants. These will either inhibit privacy or increase loneliness and isolation lead to stress. Dirt, bad smell, chemical pollution from petrol exhaust and cigarette smoke can be equally stress full. Crowding in public places and transportation as well as noise, will arouse nervous system, brining the stress response to play (see appendix 4).

Reliability.

Odd-even correlation of the test was found to be 0.79(N=50). Using spearman-Brown correlation formulas the

correlation for the whole test in the calculated and this was found to be 0.89(N=50).

Validity.

The items of the test have got enough face validity and content validity.

(5) Health Awareness Inventory

A 45 items questionnaire was developed based on the Likert method of scaling. The item statements were written based on fundamental principles of holistic health. The fundamental principles of holistic health based on the concept of health (7 items), etiology (8 items), disease symptoms (6 items), medicine (9 items), cure (5 items) and nutrition (10 items) were developed based on standard books and opinion from experts in the field of holistic health. This item schedule was presented to a sample of eleven expert practitioners in the field of holistic health who were requested to give a scale value for each item out of ten. That is, if the item is a good one to measure health awareness they can give a score of ten, if the item is on average status a score of five and if the item is below average status a score below five can be given. Items that having a mean scale value above five are selected for the final form (Appendix 5).

(6) Personal Data Sheet

The personal data sheet prepared for the study is comprised of all the relevant personal and demographic information about each patient. A brief outline of clinical history and details about the earlier treatments, symptoms and medical interventions were included in the personal data sheet. The investigator was also participating in the camp and the information gathered directly regarding patient's blood sugar level, blood pressure and body weight were noted from their case sheet/doctors' prescription/clinical lab estimate etc. The same measures were noted at the follow ups of the camp. The personal datasheet is appended as Appendix 6.

Administration and scoring of tests

Instruction for Memory scale

The test was administered individually. The subject was instructed to reproduce the digit presented by the investigator. Each digit was presented in an interval of one second. The test started from two digits and then increased one digit each in the subsequent items. The span for digit forward was decided as the score preceding two consecutive

failures. In the digit backward, the subject was instructed to reproduce in reverse. The digit announced by the investigator. The digit span for digit backward was decided as the score preceding two consecutive failures.

Scoring of memory scale

Score of the digit forward and digit backward constitute the span of memory.

Instruction for hostility Scale

Instructions were printed in the scale and the subjects could make their responses for each item directly in the right hand side of the scale. Oral instruction were given as follows, "thirty-six statements are given in this questionnaire. They are statements about our feeling and reactions, when one face unpleasant behavior from others or unpleasant situations. See, how far those statements are true about you. Your answer may be marked in the columns. You can put '√' mark in the column for 'always true', some times true, 'rarely true' and 'never true'. You need not write your name or address in this questionnaire. Try to give your true responses.

Scoring of hostility scale.

Scores of 4, 3, 2 and 1 were provided for responses, 'always true', 'sometime true', rarely true', and 'never true' respectively, for positive items and scores were given in reverse order for negative items. The totals of scores for all items provide the total hostility score. There was 36 items, so that the scores will range from 36 to 144. Items 6, 7, 9, 10, 11,13,15,16,17,22,28 and 36 were negative items.

Instruction for Virtue scale

Investigator approached the samples as individual in the camps. Rapport was established in the samples .They were given general information about the test and its purpose. Then the virtue scale was given. The instructions were also given. They were asked to read the instructions in the questionnaire and they were asked to clarify their doubts. After completing the questionnaires by the subjects, it was collected checking that the personal datas requires are filled properly.

Scoring of virtue scale

The virtue scale was scored in positive direction. For a positive item a score of 3 for 'always right',2 for 'some times right',1 for 'undecided' and 0 for 'not right' were given. For a negative item this scores were reversed. Total for all the items was the virtue score.

Instruction for S.S. Inventory

The following instruction were given to the subjects, individually, "In our daily life we have to face difficult circumstances, at different spheres of life when we face these situations, we experience stress and tension. But the degree of stress may be varied from person to person. Here, some statements or events are given to know the degree of stress experience when you face such situations. You carefully read each statement and indicate the intensity of stress you might have experienced during the situation described in each statement".

"If you experienced too much stress when facing a situation put a circle around 'A'. Encircle 'E' if you do not experience stress. If your state of stress is mild (cannot differentiate) put a circle around 'C'. You should encircle 'B' or

"D' based on the intensity of stress. Please remember to answer all these statements"

Scoring of S.S. Inventory.

Scores 4, 3, 2, 1 and 0 was given against the responses A, B, C, D and E respectively. The total of all these scores provided the overall stress score; whereas separated total was bound to assess familial, social and environmental stress. There was 10 items each in each of these dimensions.

Instructions for health awareness inventory

The Test was administered individually to each sample after the establishments of rapport .They were given general information about the test and its purpose. Then the Health Awareness Inventory scale was given. The instructions were also given. They were asked to read the instructions in the questionnaire and they were asked to clarify their doubts. After completing the questionnaires by the subjects, it was collected checking that the personal datas requires are filled properly.

Scoring of health awareness inventory

Scores 4, 3, 2, 1 and 0 was given against the responses strongly agree, agree, undecided, disagree, strongly disagree

respectively. The total of all these scores provided the overall score.

Collection of Personal information

The investigator was also participating in the camp and the information was gathered directly from patients. Their blood sugar levels, blood pressure, body weight, etc. were noted from the case sheets, doctors' prescription and clinical lab estimate etc. The same measures were noted at subsequent follow ups of the camp.

Rationale behind the intervention procedures

The psychological atmosphere of the camp was highly peaceful, relaxed, friendly and helping. The atmosphere was brought by the organizers. Regimentation and strictness in the camp procedure was considerably discouraged in the camp atmosphere as it can adversely affect well being. However self induced discipline was encouraged. The individual consultation and counseling were employed to bring the participants in to a relaxed and happy atmosphere. The classes were made with an aim to provide all scientific and holistic information regarding diseases in a counseling

language in order to eradicate the fear and anxiety of participants about the disease.

Raw diet is believed to be of high 'satwik or yogic quality. Probably the digestive enzymes utilised in raw diet and cooked food may be different. The raw diet brings in humoural balance; eliminate toxic substances from body and rectifiers problems of internal organs. The balanced and stressfree psychological state is the most conspicuous effect of raw food. The same is reported by almost all participants in the holistic health camp. The investigator also has firsthand experience of the same while staying along with the subjects in the camp. It is important to note that eating only raw food will bring in this change. When mixing with cooked food, these changes will be less. The camp atmosphere is brought in such a way.

Practice of *yogasanas* and medication are regarded as highly useful psychotherapeutic techniques by holistic health researchers. The *yogasana* and meditation brings down all metabolic activities and gives rest and vital power to the brain and associated nervous system. *Yogasanas* and meditation brings down the thought rate,(the state of *dhyana*)

balances the humors and eliminates toxic substances from the body.

These rationales are derived from previous experiences in the pilot study.

Procedure

Data were collected from the holistic health camps organized at Calicut and Thrissur districts of Kerala State. The subjects were clinically diagnosed patients from all over Kerala suffering from Type-2 diabetes who voluntarily sought admission in the camp for psycho-nutritional cure for Type-2 diabetes mellitus.

The holistic health camps were conducted by voluntary organisations. Raw diets, *yogasana,* social games, individual and group psychotherapy, music (community singing) etc. were the cure methods followed in the camps. Simple group living for seven days was practiced in the residential camp. Experts from nature cure, psychology, organic farming and other volunteers took lead in the sessions. Patients were taught the theory, principles and practical aspects of psycho nutritional cure methods. A calm, loving and friendly atmosphere of mutual help and cooperation was ensured in the camp atmosphere. Strict regimentation was avoided. The camp organisers and campers lived together for all the seven days in simple dormitory accommodation. Separate

accommodation was provided for women participants and severe patients.

Diet followed in the Camps

Subjects were provided with raw food throughout the package period. Effort was taken to avoid commercial food as far as possible. Commercially available foods are often low in nutritional value as they are artificially produced. Chemical fertilizers and pesticides pollute such foods, which is highly hazardous to health. So naturally cultivated fruits, vegetables and other raw foods, especially the seasonally available fruits and nuts such as mango, jackfruits etc., fruits which are available in all seasons such as coconut, banana, dates, ground nuts etc. were preferred. Fruits available in all seasons contain more nutrients.

The personally preferred natural food of each subject was given priority as the personal liking is very much related to bodily requirements especially in the case of natural uncooked diet.

The campers were advised to go home and practice the diet and yogasana at home for a total of 40 days. A follow up

after 20 days was made. Campers gathered together on the 41st day and were advised to partially begin spice less and salt less cooked vegetarian food.

Holistic health classes

Every day two or three holistic health classes were given. The classes were taken by holistic health experts and psychologists. The content of the classes were on natural health philosophy, natural diet, disease symptoms, etiology, nutritional cure (*Panchabhoothas*), yoga, health psychology and natural farming and simple living.

Counseling

The subjects were given individual and group counseling. The emotional problems and adjustment problems were relieved in the individual and group counseling.

Artistic expressions

Artistic expressions were mainly intended for relaxing and bringing in a meditative atmosphere. Devotional types of soft music and light and semi-classical film songs were used by expert singers. Group singing also was held. The film songs, which are rich in literary and musical qualities comprehensive, even to lay public were preferred. Such songs were used for emotional catharsis. Participants were

encouraged to perform individually and ingroup folk songs, folk dance, skits etc. Without compelling them to participate. Most of the participants voluntarily took part.

Yoga and Meditation

Every morning and evening during the camp period a basic course in *yogasana* training was given to patients. The course contained 23 *yogasana* postures including *savasana* and meditation based on empirical and experiential insights derived from various *yogasana* courses held in University of Calicut. This yoga course was derived after discussing about the course content with yoga experts in international yoga centers in India. The same was presented in a national seminar of clinical psychologists to ascertain its clinical value. The procedure and course content of the *yogasana* programme is appended as Appendix 7. The salient features of *yogasana* were that it was more therapeutic in its purpose. Participants were advice to do an *asanam* within their capability. Struggling for a final posture was discouraged all the time, only what the patient could do was permitted. Relaxing in *savasana* was encouraged in between all the postures. And a long *savasanas* for five minutes was gives at

the end of each session. Specific instruction for breathing was not given, except a general instruction of deep breathing, steady breathing and slow breathing. Exercises were not mixed with *yogasanas*, as exercises are more '*rajasic*' in character. Also the system followed in *yogasana* training does not approve of mixing *yogasana* and exercises.

A Buddhist type of meditation technique of observing breath was instructed throughout the sessions. That is watching or paying attention to the air entering the lungs and the air going out of the lungs. This can result into a no mind state (*chitta vritti nirodham*) according to Pathanjaly the compiler of *Astanga Yoga Suthra*. Another feature of the meditation-training course was that the participants were instructed to observe silence throughout the session in order to bring inner silence and self-control.

All the above programs were held in a very co-operative and participatory manner. No regimentation was enforced in the camp. The participants were allowed to associate with the routine organizational activities of the camp.

Statistical Analysis

The statistical technique selected was based on the objective set forth and hypothesis formulated for the study. The important statistical technique used in the present investigation to facilitate the analysis and interpretation of the data is the test of significant difference between the mean scores of the variables in pre intervention and post intervention.

It is the ratio of a statistic to its standard error. The statistical significance of t is dependent upon its size and the number of degrees of freedom, or the number of observations minus the number of independent restrictions on the sample. A common use of t is in the determination of the significance of differences between two means. The t test is then stated in terms of the probability, or 'p' value, with which it may be expected that additional samples of data would yield by chance differences just as large as those obtained. For differences to be significantly greater than 'p' values of .01 to .05 are conventionally accepted as highly significant (Garrett 1969).

RESULT AND DISCUSSIONS

The present study is mostly of a qualitative research emphasising the experiential and holistic effects on questions regarding the curative aspects of type 2 diabetes mellitus. The work was crucially examining their rate of cure as indicated by the normalcy in sugar level, and its resultant well being of participants. So the first attempt was to analyze the difference of mean sugar level before intervention and later follow ups. Table 4.1 depicts the significance of difference between the mean sugar level in milligrams before intervention and after seven days of intervention.

Table 4.1 Significance of difference between the mean sugar level (in mgs) before intervention and after seven days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	315.03	40	50.77	20.76**
	After seven days	198.60	40	28.63	

**Significant at 0.01 level

The mean sugar level of the 40 subjects 315 mg was brought down to 198.60 mg with in a week. The difference

was significant at 0.01 levels. After 20 days it was further reduced to an average of 136.33 mg (See table 4.2).

Table 4.2

Significance of difference between the mean sugar level (in mgs) before intervention and after 21 days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	
Pair 1	Pre Intervention	315.03	40	50.77	23.83**
	After 21 days	136.33	40	7.54	

**Significant at 0.01 level

After 40 days of intervention the mean sugar level was brought down to normalcy. (119.05 mg). All the differences are highly significant. All the subjects could attain a normalcy in blood sugar level. (See table 4.3)

Table 4.3
Significance of difference between the mean sugar level (in mgs)
before intervention and after 40 days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	315.03	40	50.77	23.67**
	After 40 days	119.05	40	6.78	

**Significant at 0.01 level

Usually it is a general observation by physicians that the sugar level can be brought down by diet management. But physicians prescribe some drugs also along with the diet restrictions. Here the diets given are sometimes restricted by physicians in their general practice. Many doctors do not advice sweet fruits and other sweet items such as tender coconut, sugar cane juice etc. But in this intervention the subject were given only fruits, nuts and vegetables in uncooked form. There was no restriction in sweet items, but cooked items were strictly restricted as salt and condiments adversely affect the cure rate of diabetic patients. Mixing of cooked items along with raw food item is not advisable. However the subjects were advised to take a little cooked item at the instance of extreme craving for cooked food. This was intended to get rid off their stress on craving for cooked item. They were also advised to take spiceless and saltless cooked food amounting to 30 or 40 grams, that too once or twice with in 40 days. Only few subjects took such cooked food during the 40 days of intervention.

The very high and fast rate of cure was really astonishing to general people as the cure rate was high compared to the cure rate of general practice.

Subjects who followed the procedures of raw food 40 days and continued the instructions of intervention (raw food plus spice less, salt less cooked food) for 180 days were found to have a mean significantly low blood sugar level, of 147.21 mg (See table 4.4)

Table 4.4

**Significance of difference between the mean sugar level (in mgs)
before intervention and after 180 days of intervention**

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	317.82	28	50.69	12.17**
	After 180 days completed	147.21	28	50.11	

**Significant at 0.01 level

At the same time those who dropped the intervention after 40 days and resorted to their previous ordinary diet (salty and spicy cooked food) had a mean blood sugar level of 251.5 mg after 180 days (See table 4.5).

Table 4.5

**Significance of difference between the mean sugar
level (in mgs)
before intervention of dropout cases and after 40 days
of intervention**

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	308.50	12	52.59	4.67**
	After 180 days	251.25	12	57.53	

**Significant at 0.01 level

Though their reduction was significantly low from previous state, they could not attain the low sugar status attained by those who followed the intervention 180 days. This clearly indicates the impact of spicy and salty cooked food in the increase of sugar level. However they did not came to the previous high sugar level status.

Significance of difference between the mean sugar level (mg) of cases who completed 180 days and dropouts after 40 days are found to be significant with a low mean for the intervention completed group. (See table 4.6). All this findings

clearly indicate food has tremendous influence in reducing sugar level.

Table 4.6

**Significance of difference between the mean sugar level (in mgs)
of completed and dropouts after 180 days of intervention**

Paired Samples Statistics		N	Mean	Std. Deviation	t
Pair 1	180 days completed	28	147.21	50.11	5.76 **
	Dropouts	12	251.25	57.53	

**Significant at 0.01 level

However it should be considered the practice of yogic relaxation and other camp procedures contribute to the reduction in sugar level and cure process. The dropouts have stopped with all such procedures. So the influence of not following such procedures other than the diet also might have caused the high sugar level compared to their counterparts. However it is to be noted that they have not returned to their before intervention sugar level status.

The pulse variation rate was estimated from the normal rate (72). High variation and low variation from normal pulse

rate were not considered separately as both variations are equally pathological. A significantly low mean pulse variation rate was observed in subjects after 20 days of intervention (pre intervention variation 6.83 after 20 days 1.13 (Table 4.7).

Table 4.7

Significance of difference between the mean pulse rate before intervention and after 21 days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	6.83	40	5.31	6.47**
	After 21 days	1.13	40	1.14	

**Significant at 0.01 level

The pulse variation rate was further reduced significantly to 0.85 after 40 days of intervention (See table 4.8).

Table 4.8

Significance of difference between the mean pulse rate before intervention and after 40 days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	6.83	40	5.31	7.51**
	After 40 days	.85	40	.86	

**Significant at 0.01 level

In the follow up after 180 days the pulse variation rate found to be 1.04 (significantly low) (See table 4.9) the above finding clearly indicate highly significant reduction in pulse variation rate due to the intervention.

Table 4.9

Significance of difference between the mean Pulse rate before intervention and after 180 days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	6.89	28	5.69	4.72**
	After 180 days	1.04	28	1.29	

**Significant at 0.01 level

The dropouts after 40 days are found to have a significantly (7.33) high pulse variation rate in follow up after

180 days (Tables 4.10) compared to their pre intervention
pulse variations rate (6.67).

Table 4.10

**Significance of difference between the mean Pulse
rate of dropout cases before intervention and after 40
days of intervention**

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	6.67	12	4.50	3.14*
	After 180 days	7.33	12	6.89	

**Significant at 0.01 level

Subjects who have completed 180 days of intervention
have a significantly low pulse variation rate compared to the
drop outs after 40 days. (Table 4.11)

Table 4.11
**Significance of difference between the mean
Pulse rate of completed and dropouts after 180 days of**

intervention

Paired Samples Statistics		N	Mean	Std. Deviation	t
Pair 1	180 days completed	28	1.04	1.29	4.72**
	Dropouts	12	7.33	6.89	

**Significant at 0.01 level

The violation of the intervention procedures results in to a significant increase in pulse variation rate. Perhaps the body may require more time to come down to their pre intervention status of pulse rate.

Usually diabetic patients manifest a lot of variation from normal blood pressure that is 120 systolic and 80 diastolic. In their analysis of blood pressure, systolic BP and diastolic BP were considered separately. The significance of difference between the mean systolic BP before treatment and after treatment was estimated and significant reduction was discovered. The pre intervention mean systolic BP was 159 which was reduced to 128 (Table 4.12).

Table 4.12
Significance of difference between the mean scores obtained in
Systolic BP before treatment and after Seven days

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	159.00	40	39.54	6.40**
	After seven days	127.88	40	15.81	

**Significant at 0.01 level

It was found reduced further after 21 days with a mean of 123. (Table 4.13)

Table 4.13

Significance of difference between the mean scores obtained in
Systolic BP before treatment and after 21days

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	159.00	40	39.54	5.67**
	After 21 days	122.50	40	6.60	

**Significant at 0.01 level

After 40 days it was again reduced to 118 which is in the normal range (Table 4.14)

Table 4.14
Significance of difference between the mean scores obtained in Systolic BP before treatment and after 40 days

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	159.00	40	39.54	6.84**
	After 40 days	118.00	40	7.49	

**Significant at 0.01 level

An overall reduction in toxin level and improved psychological well being and hormonal balance due to psychological relaxation and cognitive level improvements

would have contributed to the normal blood pressure level. Even after the 40 days intervention when patients resorted to cooked eating (without salt and spices) they could maintain the same systolic BP status (123 mean) (Table 4.15).

Table 4.15

**Significance of difference between the mean scores obtained in
Systolic BP before intervention and after 180 days of intervention**

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	123.21	28	9.15	5.24**
	After 180 days	160.36	28	39.86	

**Significant at 0.01 level

The dropouts could not maintain that status. And actually they had an increase (mean 156) compared to their pre intervention score (mean 140) (See table 4.16) this increase may be due to fluctuation in diet pattern.

Table 4.16

Significance of difference between the mean scores obtained in Systolic BP of dropout cases before intervention and after 40 days of intervention

Paired Samples Statistics	Mean	N	Std. Deviatio	t

	Paired Samples Statistics			n	
Pair 1	Pre Intervention	139.58	12	23.59	1.84**
	After 180 days	155.83	12	40.33	

**Significant at 0.01 level

The same trend of reduction was observed in diastolic BP. The pre intervention mean was 91 which were reduced to 82 after seven days (Table 4.17).

Table 4.17

Significance of difference between the mean scores obtained in Diastolic BP before treatment and after Seven days

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	90.50	40	11.54	4.82**
	After seven days	82.38	40	5.19	

**Significant at 0.01 level

After 20 days it further reduced (mean 81) (See table 4.18).

Table 4.18

Significance of difference between the mean scores obtained in Diastolic BP before treatment and after 21 days

Paired Samples	Mean	N	Std.	t

Statistics				Deviation	
Pair 1	Pre Intervention	90.50	40	11.54	5.45**
	After 21 days	80.63	40	4.11	

**Significant at 0.01 level

After 40 days of intervention it was brought to normalcy (mean 80) (See table 4.19).

Table 4.19

**Significance of difference between the mean scores obtained in
Diastolic BP before treatment and after 40 days**

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	90.50	40	11.54	5.66**
	After 40days	79.75	40	3.39	

**Significant at 0.01 level

All the procedures in the intervention package such as psychological intervention, relaxation, diet control etc. must have contributed in normalising diastolic BP. The intervention group who were followed up after 180 days were found to maintain the same normal BP status (mean 81) (See table 4.20).

Table 4.20

Significance of difference between the mean scores obtained in Diastolic BP before intervention and after 180 days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	90.36	28	10.71	4.26**
	After 180 days	81.43	28	5.07	

**Significant at 0.01 level

The normal diastolic Bp status even in the dropouts (mean 80) after this variation from intervention procedures of diet control etc they could maintain the normal diastolic BP (Table 4.21).

Table 4.21

Significance of difference between the mean scores obtained in Diastolic BP of dropout cases before intervention and after 40 days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	90.83	12	13.79	2.493**
	After 180 days	80.00	12	8.57	

**Significant at 0.01 level

A significant reduction in LDL cholesterol level was observed with a pre intervention mean of 190 and a mean of 151 after seven days of intervention (Table 4.22).

Table 4.22

Significance of difference between the mean scores obtained in Cholesterol (LDL) before treatment and after 7 days

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	189.77	13	7.49	16.53**
	After 7 days	151.3	13	10.96	

		8			

**Significant at 0.01 level

After 20 days it was further reduced to the mean of 133 (see

table 4.23)

Table 4.23

**Significance of difference between the mean scores
obtained in Cholesterol(LDL) before treatment and
after 21 days**

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	189.77	13	7.49	25.34
	After 21 days	133.54	13	7.80	

**Significant at 0.01 level

and after 40 days of intervention it was again reduced to 116

(table 4.24). Those who completed 180 days intervention had

a mean of 136(see table 4.25).

Table 4.24

**Significance of difference between the mean scores
obtained in Cholesterol (LDL) before treatment and
after 40days**

Paired Samples Statistics	Mean	N	Std. Deviation	t

Pair 1	Pre Intervention	189.77	13	7.49	26.83
	After 40days	115.92	13	6.06	

**Significant at 0.01 level

Table 4.25

Significance of difference between the mean scores obtained in Cholesterol (LDL) before intervention and after 180 days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	192.22	9	4.18	6.43**
	After 180days	137.78	9	23.48	

**Significant at 0.01 level

The least cholesterol of 40 days of intervention gradually increased to 138 probably due to resorting to partially cooked eating. The drop outs after 40 days of intervention had a mean of 161 after 180 days. The increase in cholesterol level of drop outs did not come up to their pre intervention status that is 184. That means the effect of intervention sustained even at 180 days (see table 4.26).

Table 4.26

Significance of difference between the mean scores obtained in Cholesterol (LDL) of dropout cases before intervention and after 40 days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	184.25	4	10.91	3.43**
	After 180days	160.5	4	23.69	

		0			

**Significant at 0.01 level

Significant reductions in body weight was observed after seven days of therapy intervention pre intervention mean is 60kg and after seven day mean 58 kg (See table 4.27).

Table 4.27

Significance of difference between the mean scores obtained in Body Weight before treatment and after 7 days

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	60.30	40	8.75	14.98**
	After 7 days	57.89	40	8.26	

**Significant at 0.01 level

A drastic reduction of body weight was observed after 20 days. The mean is 54 (Table 4.28)

Table 4.28

Significance of difference between the mean scores obtained in Body Weight before treatment and after 21 days

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	60.30	40	8.75	12.23**
	After 21 days	54.19	40	7.06	

169

**Significant at 0.01 level

And the participants were maintained the same reduced body weight in a follow up study at the 41st day of intervention, mean is 54(Table 4.29).

Table 4.29

Significance of difference between the mean scores obtained in Body Weight before treatment and after 40days

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	60.30	40	8.75	9.96**
	After 40days	54.15	40	6.75	

**Significant at 0.01 level

In dietary correction cure methods it is generally observed that there will be a reduction in body weight. Here the mean reduction is found to be 6 kg. It varies with people. Excess fat and other toxins will be eliminated as correct nutrients have a tendency to eliminate toxins from the body. 180 days follow up found that the successfully completed group could maintain the reduced body weight status, mean is 57 (table 4.30).

Table 4.30

Significance of difference between the mean scores obtained in Body Weight before intervention and after 180 days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	60.64	28	8.64	7.21**
	After 180 days	56.61	28	6.92	

**Significant at 0.01 level

But the drop out had a slight increase from their previous state. Mean is 61 (Table 4.31).

Table 4.31

Significance of difference between the mean scores obtained in Body Weight of dropout cases before intervention and after 40 days of intervention

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	59.50	12	9.33	2.24*
	After 180 days	60.67	12	8.88	

**Significant at 0.01 level

Analysis of Psychological Variables:

The psychological variables considered in the investigation are memory, hostility, personal stress, social

stress, family stress, total stress health awareness and virtue. Major psychological symptoms associated with type 2 diabetes are anxiety and depression. A cognitive variable which is likely to be affected by these two psychological symptoms is memory. A classic test of memory namely the digit span test used in this investigation reveals a highly significant improvement in memory.

The average improvement score was found to be 2 digit spans. Pre intervention mean digit span 8.49 and after intervention mean was 10.34 which is statistically significant at 0.01 level (table 4.32).

Table 4.32

Significance of difference between the mean scores obtained in Memory Digital Forward before treatment and after treatment

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	4.91	32	.69	5.79
	After Intervention	6.03	32	1.09	

**Significant at 0.01 level

The memory score was a composite score of digit forward and digit backward. The significance of difference between the

mean digit forward and the mean digit backward were

separately analysed. And the same trend of improvement was

seen in both the analyses. (See table 4.33 and 4.34).

Table 4.33

**Significance of difference between the mean scores
obtained in Memory Digital Backward before treatment
and after treatment**

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	3.56	32	.50	5.90
	After Intervention	4.31	32	.64	

**Significant at 0.01 level

Table 4.34

**Significance of difference between the mean scores
obtained in Total Memory before treatment and after
treatment**

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	8.49	32	.92	7.08**
	After Intervention	10.34	32	1.54	

**Significant at 0.01 level

As per the theory of intelligence and cognition memory

is a fundamental cognitive ability which is generally accepted

as a constant variable. Here the improvement can be interpreted as an improvement from deteriorated state due to the disease condition. Further follow up after one eighty day could not be done in this study.

The hostility dimension of personality was measured before intervention and after 40 days of intervention. A statistically significant reduction in hostility was found. Pre interventions mean score is 75 and after intervention mean 68 (See table 4.35).

Table 4.35

Significance of difference between the mean scores obtained in Hostility before treatment and after treatment

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	75.20	40	9.99	4.28**
	After Intervention	68.08	40	9.08	

**Significant at 0.01 level

Hostility is very much associated with disease conditions. It is well known that type 'A' behavior is very much associated with cardio vascular disease. Many later studies have proved that hostility is a more detrimental factor with cardio vascular disease condition. It should be remembered that the type 2 diabetes mellitus condition is very much associated with cardio vascular diseases.

Virtue is a variable opposite to hostility. A general conviction of health psychology reflects that the primary facet of personality namely the value of virtue is positively associated with well-being and resistance to disease. A statistically significant increase in the mean virtue score is

demonstrated in this study. (Pre interventions mean 129, after intervention 137) (See table 4.36).

Table 4.36

Significance of difference between the mean scores obtained in Virtue before treatment and after treatment

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	129.15	40	16.29	4.84**
	After Intervention	137.10	40	13.03	

**Significant at 0.01 level

A gross change in personality orientation is possible in this therapy intervention procedure. The counseling, yogic relaxation, community singing, group discussions, holistic health classes etc might have influenced the improvement of virtue scores of the participants.

A highly significant reduction in stress level is found in the participants. Pre intervention mean is 70.18 and after intervention is 59.60 (Table 4.37).

Table 4.37

Significance of difference between the mean scores obtained in Total Stress before treatment and after treatment

Paired Samples Statistics	Mean	N	Std. Deviation	't'

Pair 1	Pre Intervention	70.18	40	17.86	2.75**
	After Intervention	59.63	40	13.76	

**Significant at 0.01 level

The sub factors of total stress namely personal stress, family stress and social stress were analysed. Significant reduction was found in all the sub factors of total stress (see table 4.38, 4.39 and 4.40).

Table 4.38

**Significance of difference between the mean scores obtained in
Personal Stress before treatment and after treatment**

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	19.98	40	8.76	-1.39*
	After Intervention	17.48	40	7.06	

**Significant at 0.01 level

Table 4.39

**Significance of difference between the mean scores
obtained in Family Stress before treatment and after
treatment**

Paired Samples Statistics		Mean	N	Std. Deviation	t
Pair 1	Pre Intervention	26.68	40	7.07	3.07*

		21.43	40	7.09	*
	After Intervention	21.43	40	7.09	*

**Significant at 0.01 level

Table 4.40

Significance of difference between the mean scores obtained in
Social Stress before treatment and after treatment

Paired Samples Statistics		Mean	N	Std. Deviation	't'
Pair 1	Pre Intervention	23.53	40	10.96	1.26**
	After Intervention	20.70	40	7.31	

**Significant at 0.01 level

All the therapy procedures in the intervention package are stress reducing in physical and cognitive level. The meditation-imbibed yogic relaxation seems to be influencing this stress reduction and its resultant cure process. This was opined by experts in health research who visited the therapy intervention camps.

The health awareness score is a composite score on overall health awareness which is based own holistic health philosophy. Fundamental definitions based on holistic health according to experts' opinion expressed in standard books are furnished as 45 items in the test. These fundamental

principles are about health, etiology, disease syndrome, drugs, food and cure. Each item was selected based on the mean scale value given by experts in holistic health. The Likert type of scaling was employed in selecting the final items. The entire therapy procedures are based on these fundamental principles. So a conviction of this principle will definitely give a measure of understanding and acceptance of the therapy procedures. A highly significant increase in the health awareness is found in this study. Pre intervention mean was 157.03 and after intervention mean was 180.34(Table 4.41).

Table 4.41

Significance of difference between the mean scores obtained in Health Awareness before treatment and after treatment

Paired Samples Statistics		Mean	N	Std. Deviation	't'
Pair 1	Pre Intervention	157.03	32	20.86	3.42**
	After Intervention	180.34	32	33.91	

**Significant at 0.01 level

The high score difference in health awareness indicates a drastic cognitive restructuring. Much of the holistic health principles are different and sometimes antagonistic to the popular concepts about drugs nutrition and disease.

DISCUSSION

The most outstanding positive effect of the therapeutic intervention is reduction in sugar level bringing it into normalcy. This is a clear indication that the therapy package is efficient in the cure of type 2 diabetes mellitus. The possible reason for the normal sugar level should be due to the increase of beta cells in pancreas. Another aspect of this procedure is that an overall revitalization of the body is possible through detoxification and proper nutrition. The

study also indicates significant reduction in stress and feeling of hostility. Virtue scores, which is a primary facet of personality and positive health, are found to be significantly increased. The psychological well being may be a parallel effect along with the cure process. The same is manifested in the improved health awareness. Memory impairment often is associated with diabetes. A significant improvement in memory score is found in this study. The therapy intervention package was introduced with an aim to take place a considerable cognitive restructuring in patents with regards to the concept of health, disease, etiology, disease symptoms and curative aspects. In this holistic therapy intervention the participants/patients were required to have awareness, insight and knowledge about the cure methods, its rationale and science behind it. The therapy package urges the full cooperation and involvement in the therapy procedures which is not usual in other medical practices where everything is left as confidential with the expert physician. It was the observation of the investigator that this total awareness about the therapy procedures brings considerable relaxation and psychological balance in patients. This relaxed state is a

major reason for the positive results in psychological and physiological variables.

A reduction in the body weight was observed in the beginning of therapy intervention and a steadiness was maintained after 21 days. However the reduced body weight state was maintained even after the therapy intervention probably due to the elimination of toxic substances including unnecessary fat. A normal body weight is a primary requirement in all health assessment. Overweight is a major problem of modern man. Many weight reduction procedures are subjected for researches in health. The present study has demonstrated an easily workable method of weight reduction, which is the method of being completely on raw diet for a specific period along with a positive environment.

The physiological variables such as pulse rate, blood pressure, and blood cholesterol level were brought to normalcy along with the blood sugar level. These variables are of vital importance in health variables as their interactions are mutual and reciprocal. A normal status in pulse rate, blood pressure and blood cholesterol can be brought in very easily by chemical or drug intervention. In order to sustain

such status, continued intake of such drugs are necessary along with dietary correction, exercise etc. But here it is to be remembered that the normal status of this physiological variables is attained without the use of any drugs. Here in this psychonutritional intervention, nutrition is the most important corrective ingredient and nutrition does not confine to food alone and air ,water, sunlight and other such physical ingredients also are considered nutrition in holistic philosophy. Some earlier studies also agree to this finding. Peyrot and Rubin (1994) had shown that perceived locus of control and health outcomes are usually related. But the exact inter relationship between body and mind has not been established precisely. Body and mind work reciprocally and in the ultimate analysis it is to be regarded that body itself is mind. Here in this therapy intervention multiphasic physiological and psychological variables were influencing mutually. So to pinpoint the effect of one variable on the other is a difficult task and sometimes it does not go along with the holistic concept of health, because the body functions as a whole and not on the basis of separate variables. Another important point to be noted is that there are many many unanswered questions and unidentified

physiological variables are existing in science. As an example there are lots of unidentified amino acids and other such biochemical and organic variables are yet to be identified in the human body. But they also have their holistic effect in this type of researches where variables are controlled. Being the study aimed at therapy efficacy, the holistic effects are given more emphasis. The normal sugar level attained by all the patients studied here may be due to an overall influence of all the psychological and physiological variables, which would have been due to the rejuvenation of beta cells in pancreas and other related bodily functions. The rejuvenation of beta cells may be only an expression of the total cure process. Diet- induced weight loss is associated with improvement in beta cells function was established by Utzschneider (2004). The same phenomenon is established in this study also. Volek (2004) had demonstrated that elevated postprandial triacylglycerol-rich plasma lipoproteins and suppressed HDL-cholesterol concentrations, which increase the risk of coronary artery disease (CAD), which is the main cause of early death in patients with type 2 diabetes. Many other studies refered in this thesis are in agreement with the present findings. But one observation to be stressed in this

investigation is that when the patients were on completely raw food all the curative effects took place. Probably this results are beyond the practice of many other diabetic therapies. Many patients reported that the cure rate is considerably slow when cooke food also is taken along with raw food.

The investigator believes this effect of completely on raw food is an important therapy technique. A second important aspect is the influence of psychological interventions especially *yogasana*. The investigator could make several casual observations that patients who were not motivated to do psychological interventions had shown less improvement in blood sugar level.The two variables that are being completely on raw diet and yogasana practice has resulted its holistic influence on all other variables.

Almost all the patients were overwhelmed with joy at the self discovery that they are all cured of their long dreaded diseases. Each one of them gave a self report of their experience of well being orally in the concluding session of the camp on the 41st day.

CONCLUSIONS

The following conclusions are made based on the above discussions of the verifications of the hypotheses formulated

1. Blood sugar level came down to normal level after the therapy intervention. So the first hypothesis is verified.

2. Pulse rate came down to normal level after the therapy intervention. So the second hypothesis is affirmed.

3. Blood pressure became normal after the therapy intervention. So the third hypothesis is verified.

4. Blood cholesterol level came down to normal level after the therapy intervention. So the fourth hypothesis is proved.

5. Body weight was significantly reduced after the therapy intervention. So the fifth hypothesis is affirmed.

6. A significant improvement in memory score was observed. So the sixth hypothesis is proved.

7. A significant reduction in hostility score was found. So the seventh hypothesis is accepted.

8. Scores in the virtue scale was improved after therapy intervention. So the eighth hypothesis is verified.

9. Stress level was significantly reduced after the therapy intervention. So the ninth hypothesis is accepted.

10. Health awareness was improved after the therapy intervention. So the tenth hypothesis was confirmed.

All the hypotheses are proved with positive results confirming that the therapy intervention procedures are effective in curing type 2 diabetes mellitus.

Limitations of the Study

1) Physiological variables are taken from medical reports from various medical/clinical centers where the patients' had their previous treatment .The later estimates also taken from various clinical laboratories. A uniform investigation of physiological variables in a single laboratory could not be made.

2) More elaborate analysis of physiological variables was not done in order to avoid strain and stress of patients by way of taking blood and subjecting them to prolonged investigations.

Scope for further study

1)   The study should be repeated in Type 1 diabetes mellitus.

2)   The changes in the body chemistry when completely on raw food should be studied elaborately using more psycho physiological variables.

3)   The efficacy of this therapy intervention should be tested in other diseases categories as the philosophy of holistic cure methods are the same for all disease categories.

4)   This therapy intervention package can be used as a training content for training clinical and counseling psychologists.

Graphical representation of sugar level (in mgs) before intervention and after 7, 21, 40 and 180days of intervention

Treatment periods
— Pre Inter
— After 7Days
— After 21Days
— After40Days
— After180Days

Sugar Level

Participants

Graphical representation of sugar levels (in mgs) of patients who completed 180 days and dropout after 40 days of intervention

Participants

Graphical representation of pulse rate before intervention and after 21, 40 and 180days of intervention

Graphical representation of Systolic BP of patients who completed 180days and dropout after 40 days of intervention

Graphical representation of systolic BP before intervention and after 7, 21, 40 and 180days of intervention

Participants

Graphical representation of Diastolic BP before intervention and after 7, 21, 40 and 180 days of intervention

Graphical representation of diastolic BP of patients who completed 180days and dropout after 40 days of intervention

Graphical representation of cholesterol before intervention and after 7, 21, 40 and 180days of intervention

Participants

Graphical representation of body weight before intervention and after 7, 21, 40 and 180days of intervention

Participants

RELAXATION: THE YOGASANAWAY

A SELF HELP MANUAL FOR THERAPISTS AND TRAINERS

There are altogether about 108 methods of yogasana training. Only slight variations are observed in these methods. One asana can have various versions. The present self help manual describes 23 postures of a basic course. The course is designed based on empirical and experiential foundations. The following are the salient features of the course.

1. The participants are instructed to observe silence (*mouna*) during the entire session.

2. Participants are allowed to breath according to their requirement. Slow deep and steady breathing is encouraged. No any specific instruction for inhale or exhale.

3. A zen meditation technique of observing breath is merged in the asanas.

4. Mixing of bodily exercises with yogasanas is not allowed.

Introduction

Yoga is derived from TANTRA an ancient time-tested science describing different systems for increasing the speed of human evolution. The Sanskrit word '*Tan*' means 'expansion of consciousness' and '*tra*' means 'liberation of energy'. The merge of tantra with the philosophy of Vedanta formed the system of Yoga (Saraswathi, S.S., 1983). Yoga and tantra do not belong to India, but a common inheritance of all mankind. The tantric philosophy and belief is to let the mind be, for what it is and where it is, not to interfere. There is no need to fight with the mind, follow it and know it well.

According to tantra and psychology we must observe analyse and respect whatever thoughts or experiences come to our mind. The aim of *tantra* is to liberate the mind from the bonds of matter *prakrithi* that is from patterns, formations and impressions. Religions restrict us from 'bhoga' but tantra says *yoga* and *bhoga* should be integrated.

Yogasanas lead us to *Dhyana* (meditation) through the stages of *Prathyahara* and *Dharana*. The classical definition of meditation in Patanjali's *Yoga Sutra* is that 'when the mind has been able to transcend the knowledge of smell, sound, touch, form and taste and at the same time when the consciousness is functioning around one point'. Concentration is not *dhyana* but the way to *dhyana*. There are no techniques for dhyana. It is a state that arises spontaneously. Yogasanas and meditation are intended to bring about that spontaneous state of *dhyana*.

Yoga is union – the integration of body mind and psyche through heumoural and hormonal balance, elimination of toxic substances from body, increased blood circulation, and alerted immune functions through proper dispersion of *prana* all over the body. Individual transformation through experiencing is more important than intellectual reading or discussing on yoga.

It is always better to learn yogasanas from a teacher (*guru*). But it is not impossible to learn Yoga from properly prepared audio, video and print media devices. The success depends on your motivation and enthusiasm. Be very *careful* about the following:

1.   Judge a teacher for his yogic personality. Avoid professional *gurus* and showmanship groups.

2.   All movements should be slow and steady (as if the slow motion in movie) without any jerking, shivering and wavy motions. Excess, sweating, reddning of eyes, back pain, cramps and unhappiness after doing asanas are indicative of wrong-doing. However such problems are likely in the initial stages of training.

3.   An asana should be done in physical and mental relaxation. More relaxation leads to more perfection in postures.

4.   Yoga is opposite of ego. So the psychological transformation is more important than bodily postures. Do not approach yoga as a bodily exercise.

GENERAL INSTRUCTIONS

1.   Do yogasanas on a mat or sheet (non synthetic) in order to avoid earthing of the energy converged in body.

2.   While practicing asanas in group, please do not look at other participants and make comparisons. Follow instructions from the teacher and see demonstrations.

3.   Do not do asanas when you are ill, extremely tired or upset. However tiredness and mental upset can be relieved by Savasanam and meditation. Avoid asanas during menstrual periods.

4.   Avoid asanas after a heavy meal. Practice asanas at least 4 hours after a meal. This restriction is not applicable for those who live on raw food alone (fruits, nuts and vegetables in the uncooked form).

5.   Morning around 5 to 6 is an ideal time for yogasanas. Evening sessions also can be held.

6. Yogasanas should not be a torture or violence on body and mind. Limit practice according to your mental setting.

7. Practice nonviolence (*ahimsa*) on all creatures and extend awareness to immediate and distant surroundings and nature.

8. Reading the writings on the Budha and the works by Jiddu Krishnamurthy, OSHO, Remana Maharshi, etc will accelerate the transformation in us.

9. Practice yogasanas in empty stomach after defecation. But if you have problem of constipation, do not bother, yogasanas will rectify the problem.

10. Avoid animal food, stimulants and intoxicants. If you find it difficult, do not worry. Yogasana practice will help you to avoid them.

11. The effect of yoga in you can be realised by the development of virtues in you along with the improvement of postural perfection.

12. Many people ask whether stopping yogasana practice will adversely affect their health. No. No harmful effects. But you will not get the benefit of it. That is all.

13. You can limit your asanas to a few which you like the most, especially when you have less time for practice. However in such situations the number of forward-bending asanas and backward-bending asanas should be almost equal. The sequence of yogasanas in this is made accordingly.

INSTRUCTIONS FOR INSTRUCTORS

1. The instructor should sit in Padmasana while giving instructions. He should be very alert, calm and relaxed. He should be visible to all participants and all participants should be visible to him.

2. The tone of instruction should be pleasing and gentle. Harsh tone and words should not be used. Instructions should be natural and genuine. Elongating a word may induce hypnotic trance (especially in Savasana) which should be avoided. Hypnosis is anti-yogic (Refer Swami Vivekananda for details).

3. Your instructions should be minimum and well edited. Too much of talking should be avoided. After the first three or four sesions instructions should be the bare minimum so as to enable the participants to experience silence. Once they have grasped the details you need announce the name of the asana by 5th or 6th session onwards.

4. Silence should be induced throughout the session. Tell the participants that talking and doing asanam is harmful. Discourage a participant if he indulges in conversation. Request him to voluntarily control his tendency to talk.

5. Request the participants not to look at others (including the instructor) while doing an asana. In a posture if you turn your head to look at another person it becomes a wrong posture which may be harmful.

6.	The demonstration of postures whenever necessary can be done by the instructor or another expert in front of the instructor. You can make use of a participant who is good in postures for demonstration. If the instructor himself is demonstrating he should avoid talking while demonstrating.

7.	Usually this basic course should be held for 10 continuous days. The 23 postures should be taught in the first 6 sessions and the next 4 sessions should be used for corrections of postures. *First Session* - postures 1 to 6. *Second session* - postures 1 to 8. *Third session* - 1 to 12. *Fourth session* - 1 to 16. *Fifth session* - 1 to 18. Sixth session 1-23. Before closing each session Savasanam should be given for 3 to 5 minutes followed by the zen meditation for 2 minutes and then chanting the OMKARA Manthra three times.

8.	This course can also be held in 3 days or in 5 days camps. If so there should be evening sessions too. Postures may be taught in the first 5 sesions and follow up sessions may be held afterwards for corrections of postures (Courses can be held for two day's sessions per week for 5 weeks).

9.	During the first two-three sessions each asana can be repeated twice or thrice. But by the third session learnt asanas need be done only once in order to keep up time.

10.	Yogasana postures should be self-initiated movements. The instructor should not support or lift any body part of the practitioner. As far as possible, the instructor should not touch a practitioner except on falling or locked up position. (Supporting body on wall also is wrong).

BEGIN THE YOGA SESSION

Arrange the Yoga session in a calm, airy and safety-feeling place where all the participants should be visible to the instructor.

INSTRUCTIONS

This is a basic course of 23 postures. We will begin with a ZEN meditation for calming down. We will not be mixing any bodily exercises in this course. Exercises are predominantly for muscles for *warming up* but yoga is for the mind and is aimed at *calming down*.

Sit in Padmasana or Vajrasana (need not be in its perfect posture in the beginning) or sit cross legged comfortably and relaxed. Spine erect. Have a pleasant face which indicates relaxation. Slowly you close your eyes. Deep breathing long steady breathing without making noise audible to others and without too much stretching of the chest. When you sit in such silence all sorts of thoughts may come to your mind. Please do not try to control your thoughts. Let the thoughts come and

go. You pay attention (not concentration) to the air entering your lungs and going out of the lungs. Continue observing this breathing in relaxed body for about two minutes. (Always practice asanas only after this ZEN meditation).

1. ARDHA HALASANAM - A
(one leg each)

Do yogasanas with pleasant face and relaxed body

Lie on your back (supine position) legs close ... hands stretched close to body ... palms down towards floor ... head straight. All movements should be slow and uniform. No wavy motions shivering and jerks. Slowly raise right leg without bending the knee and stretching the toes forward. Raise only upto 45 or 50 degrees . . . not more than that (while raising the right leg, your left leg and other parts of the body should be relaxed). Remain in that position for a while and slowly bring down the right leg. All movements should be slow and steady. Now slowly raise the left leg without bending the knees and stretching its toes forward. Remain in that position for a while and bring down slowly. Keep the right leg and others part of the body relaxed while raising the left leg. Let your face be pleasant. Breathing slow and steady without much noise as per your requirements.

BRIEF SAVASANAM TO BE DONE IN BETWEEN EVERY POSTURE

Lie on supine position .... legs a little apart .... hands apart .... palms upward .... turn your head to left or right. Slowly close your eyes. Relax your entire body ... no tension anywhere in the body ... loosen every part of the body. Breath slowly and deeply and steadily (without making noise audible to person sitting near you). Take long breaths and observe breathing. Pay attention to air entering the lungs and going out of your lungs. Do not control your thoughts ... observe breathing ... feel the air entering and going out of your lungs in complete relaxation. You can avoid thoughts by observing breaths.

Note: The duration of this brief Savasanam after every posture may be limited according to the availability of time for you. In the initial stages of practice you may require one or two minutes and after attaining mastery you may need less time.

2. ARDHA HALASANAM - B

(Both the legs together)

Lie down on back … legs close … hands close to body …. palms down. Head straight. Slowly raise both the legs together without bending the knees and keeping the toes stretched forward. Raise only upto 45 or 50 degrees … not more than that. Remain in that position for a while and bring down very slowly. Now relax in savasana. While raising the legs all other parts of the body should be relaxed.

Breathing slow and steady as per your requirements. All movements should be slow and uniform without waving shivering or jerking.

Relax in Savasanam.

3. POORNA HALASANAM

Lie on back, hands close to body palms down … legs close … raise both the legs without benting the knees and stretching the toes forward … and bring the legs behind your head by raising the buttock and bending the spine. Do not struggle for the final posture. Do only up to what you can do. Overstraining is harmful. Now remain in savasana.

The instructor in group session should be vigilant and should help if any individual is unable to bring back his body to the earlier position. Instances of participants struggling in locked up condition may happen.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

4. CHAKRASANAM

Lie on back. Keep your legs slightly apart and fold them bringing the heels near your buttok. Raise your hands and place it behind shoulders keeping the palms on floor … fingers towards the shoulders. Slowly raise your buttok first then abdomen, chest and shoulder area and then your

head. Remain like an arc and loosen the neck and keep the head hung. Remain in this final posture for a while and come down very slowly ... bring down the head and touch it the floor and then the shoulder and chest area, the abdominal area and finally the butok. Unfold the legs and bring back the hands.

Breathing slow and steady without making noise as per your requirements. Relax in Savasanam.

5. ARDHA SALABHASANAM

(one leg each)

Lie on stomach stretching the entire body ... hands close to body ... palms upward tuck below your thighs. Rest your head on chin. Straighten your head so as to bring your gaze parallel to the floor. Slowly raise your right leg (45 or 50 degree only) without bending the knees and keeping the toes stretched back. Remain in this final position for a while and bring down the leg slowly. When the leg is raised all other parts of the body should be relaxed. Repeat the same with the left leg.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

6. SALABHASANAM

(both the legs together)

Lie on stomach stretching the entire body ... hands close to body ... palms upward, tuck below your thighs. Rest your head on chin. Straighten your head so as to bring your gaze parallel to the floor. Slowly raise both the legs together without bending the knees and keeping the toes stretched back. Remain in this final position for a while and bring down the legs slowly. When the legs are raised all other parts of the body should be relaxed.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

7. BHUJANGASANAM

Lie on your stomach. Fold your hands and place the palm just in front of the shoulders ... arms close to body. Keep your forehead on the floor and bent the head backward and slowly raise the head and spine upwards *without exerting force on the hands.* Keep your legs relaxed (do not keep them raised on the toes). Remain in this final posture for some time and come down to earlier stage by bringing down the spine and head and bent down the head until it toches the floor. Unfold the hands.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

8. DHANURASANAM

Lie on stomach. Fold your legs and hold them by hands just below the heads. Slowly pull the legs backward (do not pull by hands) so as to raise the leg region and the head region simultaneously of the same height and the hands remain parallel to the ground. Remain in the final position for a few seconds and come back to earlier position.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

9. SARVANGASANAM

Lie on safine position. Slowly raise your legs and buttock and bring the legs behind the head (as in poorna halasan) and slowly raise it upwards and remain on the back of the head neck, shoulder too and hands keeping the knees and toes stretched upard at 90°. Support your body with hands holding at the sides of the abdomen. Remain in this final posture for a while and back to earlier position by unfolding the hands and keeping it on floor fold the legs ... bring it behind your head ... then slowly come down and rest the back, buttock and then the legs on the floor.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

10. MALSYASANAM

Sit in padmasan – that is keep your right leg on the left thigh (close to naval region) and the left leg on the right thigh. Then slowly lie down supporting your body on each ankles one after another. Raise your hands upwards and bring them behind your shoulders ... keep the palm on floor (fingers towards the shoulders). Supporting on the hands raise the chest part and bend the head backward and rest the head on head-top. Bring forward the hands and rest it on thighs and ankles on floor.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

11. NAUKASANAM

Lie on your back stretched, legs together hands close to body and head straight. Slowly raise your legs without bending the knees and keeping the toes stretched forward and simultaneously raise the spine area keeping the head straight and stretch the hands forward. Keep the hands parallel to the floor. Now body rests on buttock alone remain in that final posture for a few seconds and come back to earlier lying position.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

12. VIPARITHA KARANI

Lie on your back stretched. Legs together, hands close to body palm downward. Bring your legs back to your head as in Poornahalasana and lift your legs and buttock upward without bending the knees and not stretching the toes. Support your buttock with the hands. Keep the legs at 90° upwards and remain in this final posture for a while and then come back to earlier position by folding the legs and bringing them back at

your head ... keep your hands on the floor ... bring down buttock and then the legs to the floor.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

13. BHADRASANAM

Sit on the floor. Keep your legs facing its bottoms each other and hold them by your hands locking the fingers. Now sit errect, pull the heels towards your anal area and bring down the thighs towards the floor. Remain in this final posture and come back to earlier position.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

14. YOGAMUDRA - 1

(in Padmasanam)

Sit in Padmasana – that is – keep your right leg over the left thigh and the left leg over the right thigh ... sit straight ... spine errect. Bring lyour hands behind and hold the right ancle with the left hand and the left

ancle with theright hand tightly. Then slowly bent forward lso as to touch the forehead on the floor. Remain in this final posture for a few seconds and come back to earlier position. Do only as much you can. Do not struggle to touch forehead on floor if you cannot.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

15. YOGAMUDRA - 2

(In Vajrasanam)

Sit on legs. The right buttock on the right leg and the left buttock on the left leg.The big toes should touch each other while the right heel should be bent towards the right and the left heal towards the left so as to contain the buttocks comfortably on. Now fold your hands to make fists and place the right fist at the right bottom side of the abdomen and the left fist at the left bottom side of the abdomen. Now slowly bent forward and touch the forehead on the floor. Keep the ancles close to body without raising the buttock from the heel. Remain in the final posture for some time and come back.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

16. VAKRASANAM

Sit streaching both the legs forward. Fold the right leg and place the right heel adjacent to the left knee. Lift the right hand bring it back and place it on the floor behind (right hand fingers directing toward back). Raise your left hand up and bring it upward the right knee and clutch the right leg at its ankle. Now bring the spine errect and slowly turn your head through the right side towards back upto 180 degrees. Feel the twisting of each vertebral column. Remain in that final posture for a while and come back very slowly, bringing back the head to earlier position.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

17. ARDHA MALSENDRASANAM

Sit stretching both the legs forward. Fold the right leg and bring it beneath the left thigh. Bend the left leg and place the left foot at the right side of the right leg. Fold the left hand and keep it across the back touching the dorsal palm tight at the left side. Bring the right hand up and move it towards right down and hold the left leg just above the feet. Now turn the head towards left and look back the head turning upto 180°. Remain in this final posture for some time and then come back to earlier state of sitting with legs stretched forward. Bend the left leg and bring it beneath the right thigh. Fold the right leg and place the right foot at the left side of the left leg. Fold the right hand and keep it across the back touching the dorsal palm tight at the right side. Bring the left hand up and move it towards left down and hold the right leg just above the feet. Now turn the head towards right and look back turning the head upto 180°. Remain in this final posture for some time and then come back to the earlier position.

18. PACHIMOTHAMASANAM

Sit stretching the legs forward. Raise your hands and bent forward until your forehead touches the knees. Hold your toes with both hands

touching the ankles on the floor. Remain in the final posture for a few seconds and then come back to earlier position.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

19. VRIKSHASANAM

Remain standing legs close. Lift your right leg and hold it and pull the heel upward so as the heal should touch the anal region. Sole touching right at the left ventral thigh. Remain in the left leg properly balancing the body raise your hands up and join the palms above your head and bring the hands down at the middle of the chest. Slowly close the eyes and balance the body. Remain in that final posture for a while and come back to the initial standing position.

Repeat the same procedure for the left leg also. Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

20. ARDHAKADI CHAKRASANAM

Remain standing, legs close. Hands close to body, head straight and spine errect. Slowly lift your right hand up to 90°, turn the palm upward

and raise it further until the arm touches your right ear and still further applying force with the hand turn the head and spine towards left while the left hand is gliding down tightly through the left side. Remain in this final posture for a while and slowly bring back the right hand ... at 90° turn the palm downward and then bring down the right hand. Similarly lift the left hand ... turn the palm up at 90° ... touch the left arm at the left of your head. Turn the head and spine towards right with the force of the left hand while the right hand is tightly gliding down the right side. Remain in this final posture for a while and come back to earlier position by bringing back the left hand ... at 90° turn the left palm downward and bring down.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

21. SAVASANAM

Lie in supine ... legs apart ... hands apart palms up ... turn your head to left or right ... slowly close the eyes. Relax your body completely ... no tension anywhere in the body ... deep breathing – without making noise ... slow and steady breathing ...

Now bring your awareness to the particular body parts I announce and relax that part (without any movement at that part) with more awareness.

Now bring your awareness to your heels ... relax the heels ... relax the upper part of the feet ... bring your awareness to the knees ... relax them ... relax your thighs ... Be aware of your buttock area ... relax that area.

Relax your abdominal area .. be aware of the chest area and relax that area. Now bring your awareness to your hands ... relax the fingers ... the forearm and the upper arm ... be aware of the shoulders ... relax them ... loosen your neck ... relax your neck ... bring your awareness to

your cheeks ... relax your cheeks ... relax your glotis ... and the tongue ... do not hold the teeth clenched, relax them ... relax the lips ... be aware of the nose area ... relax ... loosen your eyelids ... relax them ... relax the eyebrows ... relax your forehead.

Now your entire body is completely relaxed ... no tension anywhere in your body ... deep breathing ... you be aware of the complete relaxation of your body ... deep breathing. Relax further and further as I count from one to ten ... one ... two ... three ... more and more relaxation ... four ... five ... six ... more and more relaxation ... seven ... eight ... nine ... more and more relaxation ... ten .... Now your body is completely relaxed ... deep breathing ... slow and steady long breaths ... be aware of the breathing ... pay attention to air coming in your lungs and air going out of your lungs ... feel the air coming in and going out. Remain in this complete relaxation for 5 minutes in silence ... decide not to fall asleep. Observe your breathing for 5 minutes in silence. (After 5 minutes) ... Now slowly ... very slowly open your eyes and sit in Padmasanam and continue the observation of breathing ... the zen meditation ... we did at the beginning.

22. VAJRASANAM

Sit on legs. Keep the knees close The right buttock on the right leg and the left buttock on the left leg. The big toes should touch each other while the right heal should be bent towards the right and the left heel towards the left so as to contain the buttocks comfortably on. Spine erect and place your hands on the knees stretched. Remain in that final position for some time and then come back.

Breathing slow and steady without much noise as per your requirements. Relax in Savasanam.

23. PADMASANAM

Sit cross legged. Keep your right leg over your left thigh and the left leg over the right thigh. Spine errect. Stretch your hands and keep them on your knees – ventral side upward. Make a circle touching the tip of the index finger and the thump of each hand.

CONTINUE MEDITATION FOR TWO OR THREE MINUTES. PAY ATTENTION TO BREATHING.

FEEL THE AIR COMING INTO YOUR LUNGS AND GOING OUT OF YOUR LUNGS. SLOW DEEP AND STEADY BREATHING.

HAVE A PLEASANT FACE (not to smile).

NOW CHANT OMKAR (OR ANY OTHER MANTHRA OF YOUR PREFERENCE LIKE 'ALLAH' OR 'HALELUYYA') THREE TIMES

Chant together when I say 'Start'.

Take a deep breath .... start .... OM ....

Take a deep breath .... start .... OM ....

Take a deep breath .... Start .... OM ....

Now slowly open your eyes.

Now it is time for you to ask doubts about any aspects of Yogasanam.

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Note: This Yogasana course was designed by Sri. Sreenivasan, a close associate of Jiddu Krishnamoorthi. This self-help manual was presented in a workshop at a national seminar of clinical psychologists at Ayodhya and the same is published in the Journal of Community Psychology (Baby, J., 2004). The manual is based on the experiential insights derived from training programme for about two decades held in the Calicut University

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