Effects of Traditional Yoga Among Diabetic Women in India

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Abstract

Health is the level of functional or metabolic efficiency of a living being. In humans, it is the general condition of a person's mind, body and spirit, usually meaning to be free from illness, injury or pain. In addition to health care interventions and a person's surroundings, a number of other factors are known to influence the health status of individuals, including their background, lifestyle, and economic and social conditions. These are referred to as "determinants of health". Generally, the context in which an individual lives is of great importance on health status and quality of life. It is increasingly recognized that health is maintained and improved not only through the advancement and application of health science, but also through the efforts and intelligent lifestyle choices of the individual and society. According to the World Health Organization, the main determinants of health include the social and economic environment, the physical environment and the person's individual characteristics and behaviors. Physical environments Focusing more on lifestyle issues and their relationships with functional health, data from the Alameda County Study suggested that people can improve their health via exercise, enough sleep, maintaining a healthy body weight, limiting alcohol use, and avoiding smoking. The ability to adopt and to self-manage has been suggested as core components of human health. Genetics or inherited traits from parents also play a role in determining the health status of individuals and populations. This can encompass both the predisposition to certain diseases and health conditions, as well as the habits and behaviors individuals develop through the lifestyle of their families. For example, genetics may play a role in the manner in which people cope with stress, mental, emotional or physical.

Keywords: *Traditional Yoga, Health, Physical environments, Genetics*

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1. INTRODUCTION

Health is the general condition of a person in all aspects. It is also a level of functional and/or metabolic efficiency of an organism, often implicitly human (Jadad, AR and O'Grady L. (2008) At the time of the creation of the World Health Organization (WHO), in 1948, health was defined as being "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity". Only a handful of publications have focused specifically on the definition of health and its evolution in the first 6 decades. Some of them highlight its lack of operational value and the problem created by use of the word "complete." Others declare the definition, which has not been modified since 1948, "simply a bad one." (WHO, 1980) In 1986, the WHO, in the Ottawa Charter for Health Promotion, said that health is "a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities." Classification systems such as the WHO Family of International Classifications (WHO-FIC), which is composed of the International Classification of Functioning, Disability, and Health (ICF) and the International Classification of Diseases (ICD) also define health. (WHO, 1986) Overall health is achieved through a combination of physical, mental, emotional, and social well-being, which, together is commonly referred to as the Health Triangle.

2. PHYSICAL INACTIVITY

Physical inactivity is inactive lifestyle and a growing medical concern. Physical inactivity is a major risk to health both physical and mental aspects of our health. Recent studies have shown that physical inactivity is worse than obesity or being overweight. Physical inactivity causes an increasing incidence of chronic disease, not just for the elderly but for younger people and adults. Being physical inactive, in the long run, reduces your self esteem and affects your outlook towards life.

In children, physical inactivity hampers general growth and development. Physically inactive adults have difficulty in finishing regular tasks without fatigue. Physical inactivity leads to a lot of complications, secondary condition, symptoms and other disorders. In most cases the symptoms and complications of physical inactivity are not distinct and overlap each other. Physical inactivity leads to numerous health conditions like hypertension, heart disease, diabetes, high blood pressure, high cholesterol, overweight, obesity, weaker bones, osteoporosis, hypertension and numerous health risks. When prolonged to extended time period physical inactivity leads to premature death.

3. DIABETES

"Life is an adventure and diabetes is just something that makes the adventure more complicated"(Hawier, 1989) Diabetes Mellitus is a constitutional disease with heritable tendencies. A disorder caused by decreased production of insulin, or by decreased ability to use insulin. Insulin is a hormone produced by the pancreas that is necessary for cells to be able to use blood sugar.

The medical name for diabetes, diabetes mellitus, comes with Greek and Latin roots. Diabetes comes from a Greek word that means to `Siphon'. The most obvious sign of diabetes is excessive urination. Water passes through the body of a person with diabetes as if it were being siphoned from the mouth through the urinary system out of the body. Mellitus comes from a Latin word that means "sweet like honey". (Strukic, 1981)

The cause of diabetes mellitus is unknown, but heredity and diet are believed to play a role in its development. Diabetes results when the pancreas produces insufficient amounts of insulin to meet the body's needs. It can also result when the pancreas produces insulin, but the cells are unable to efficiently use it that is, the cells have insulin resistance. Insulin is necessary for blood sugar (glucose) to go from the blood to the inside of the cells and unless the sugar enters into the cells, the body cannot produce energy. The excess sugar remains in the blood. Diabetes mellitus is the commonest endocrine disorder. (Strukic, 1981)

Eating sugar increases sugar levels in the blood. It has been documented that diabetes can be controlled by proper diet. All the sugar in the blood do not form sugar that is consumed. Because sugar in the blood is necessary for cells, there is a backup source of sugar while food is not consumed. (Whichester, 1969) The liver is like a big factory that makes many of the things that is need to live, blood sugar being an important chemical compound. The excess blood sugar is stored in the liver as glycogen and released when the blood sugar level lowers.

4. DIABETES MELLITUS

Diabetes mellitus often referred to simply as diabetes (Ancient Greek: meaning "to pass through"), is a syndrome of disordered metabolism, usually due to a combination of hereditary and environmental causes, resulting in abnormally high blood sugar levels (hyperglycemia). Blood glucose levels are controlled by a complex interaction of multiple chemicals and hormones in the body, including the hormone insulin made in the beta cells of the pancreas. Diabetes mellitus refers to the group of diseases that lead to high blood glucose levels due to defects in either insulin secretion or insulin action. (Rother, 2007)

Diabetes develops due to a diminished production of insulin (in type 1) or resistance to its effects (in type 2 and gestational). Both lead to hyperglycemia, which largely causes the acute signs of diabetes excessive urine production, resulting compensatory thirst and increased fluid intake, blurred vision, unexplained weight loss, lethargy, and changes in energy metabolism.

All forms of diabetes have been treatable since insulin became medically available in 1921, but there is no cure. The injections by a syringe, insulin pump, or insulin pen deliver insulin, which is a basic treatment of type 1 diabetes. Type 2 is managed with a combination of dietary treatment, exercise, medications and insulin supplementation.

Diabetes and its treatments can cause many complications. Acute complications (hypoglycemia, ketoacidosis, or nonketotic hyperosmolar coma) may occur if the disease is not adequately controlled. Serious long-term complications include cardiovascular disease, doubled risk, chronic renal failure, retinal damage, which can lead to blindness, nerve damage of several kinds, and micro vascular damage, which may cause erectile dysfunction and poor wound healing. Poor healing of wounds, particularly of the feet, can lead to gangrene, and possibly to amputation. Adequate treatment of diabetes, as well as increased emphasis on blood pressure control and lifestyle factors (such as not smoking and maintaining a healthy body weight), may improve the risk profile of most of the chronic complications. In the developed world, diabetes is the most significant cause of adult blindness in the non-elderly and the leading cause of non-traumatic amputation in adults, and diabetic nephropathy is the main illness requiring renal dialysis in the United States. (Mailloux, Lionel 2007) In diabetes patients sugar can be mobilised from the liver, kidneys and also from proteins by “cori cycle” which is the cause for high blood sugar in the blood even when food is not consumed.

5. PHYSIOLOGY

Physiology is the science of functioning of all the organs and systems of an organism. For the physiological system of the body to be fit, they must function well enough to support to specific activity that the individual is performing more over different activity make different demands upon the organism with respect to circulatory, respiratory, metabolic and neurologic process which are specific to the activity.

In physiology, one learn how the organs, systems, tissues, cells and molecules within cells work and how their functions are put together to maintain the internal environment. Physiology is the science dealing with the study of human body functions. Exercise physiology is the study of how body’s structures and functions are changed as a result of exercise. It applies the concept of exercise physiology to training the athlete and enhancing the athlete’s sports performance. (Ajmer Singh, 2005).

6. RESTING PULSE RATE

Pulse rate which is the number of beats felt exactly one minute. The average ragte of the pulse in a healthy adult is 72 beats in each minute. There may be variation of up to five beats per minute within the normal range. The number of beats of a pulse per minute or the number of beats of the heart. The total number of beats of heart per minute is called heart rate. The automatic nervous system which supplies para sympathetic or vagus nerves and the sympathetic or acceleratory nerves to the Sino-vial artery node play a prime role in regulating the heart rate (Larry, 1982)

The pulse rate or heart rate varies greatly among different people and in the same person under different situations. The American Heart Rate Association accepts as normal range from 50 to 100 beats per minute. The average rate is 72 beats per minute but the rate can accelerate to 220 per minute. The lesser pulse rate given good performance for all the sports and games

7. BREATH HOLDING TIME

Breath holding time is defined as the duration of time through which one can hold his / her breath without inhaling and exhaling after a deep inhalation.

There are two types of breath hold time:

¬ Positive Breath holding time

¬ Negative Breath holding time

Endurance type of training will improve the breath holding time. Breath holding time also plays a vital role in the sports performance. (P.J.Strukic, 1981)

8. DIASTOLIC BLOOD PRESSURE

As blood drains form the arteries during ventricular diastolic, the pressure decrease to minimum called diastolic blood pressure. Diastolic blood pressure is the lowest arterial blood pressure of the cardiac cycle occurring during diastolic of the heart. Systolic pressure is the maximum lateral pressure of blood on the wall of the blood vessels during the systole of the heart. Diastolic pressure is the lateral pressure of blood on the wall of the blood vessel during the period of diastolic.

9. SYSTOLIC BLOOD PRESSURE

As blood is ejected in to the aorta and other arteries during ventricular systole the pressure increased to a maximum called systolic blood pressure. The pumping rate of the heart varies under conditions to long working, food intake, age and emotion. The pulse rate corresponds with cardiac cycle. If the pulse count is 72, the cardiac cycle will occur 72 times in a minute. As blood drains from the arteries during ventricular diastole the pressure decreases to a minimum called diastolic blood pressure. Diastolic blood pressure is the lowest arterial blood pressure to the cardiac cycle occurring, during diastolic of the heart.

10. MEAN ARTERIAL PRESSURE

Mean arterial blood pressure is defined as the average arterial pressure during a single cardiac cycle. As blood is pumped out of the left ventricle into the arteries, pressure is generated. The mean arterial pressure (MAP) is determined by the cardiac output, systematic vascular resistance and central venous pressure according to the following relationship, which is based upon the relationship between flow, pressure and resistance. (Edward and Mathews, 1981).

11. BIOCHEMICAL VARIABLES AND ITS IMPORTANCE

The exercises produces biochemical changes in the cardiorespiratory system and other important alterations in body composition such as High Density Lipoprotein, Low Density Lipoprotein, blood cholesterol, blood glucose and triglyceride levels (Fox and Mathews, 1981).

12. BLOOD GLUCOSE

Blood glucose, otherwise known as blood sugar concentration, or glucose level, refers to the amount of glucose present in the blood of a human or animal. Normally, in mammals the blood glucose level is maintained at a reference range between about 3.6 and 5.8 mm (mmol/l). It is tightly regulated as a part of metabolic homeostasis.

Mean normal blood glucose levels in humans are about 90 mg/dl, equivalent to 5mm (mmol/l) (since the molecular weight of glucose, $C_6H_{12}O_6$, is about 180 g/mol). The total amount of glucose normally in circulating human 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. Transported via the bloodstream from the intestines or liver to body cells, glucose is the primary source of energy for body's cells, fats and oils (i.e., lipids) being primarily a compact energy store. 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.

13. URIC ACID

Uric acid is a heterocyclic compound of carbon, nitrogen, oxygen, and hydrogen with the formula $C_5H_4N_4O_3$. It forms ions and salts known as urates and acid urates such as ammonium acid urate. Uric acid is a product of the metabolic breakdown of purine nucleotides. High blood concentrations of uric acid can lead to gout. The chemical is associated with other medical conditions including diabetes and the formation of ammonium acid urate kidney stones.

Uric acid is a diprotic acid with $pK_{a1}=5.4$ and $pK_{a2}=10.3$. (McCrudden, Francis H. (2008). Thus in strong alkali at high pH, it forms the dually charged full urate ion, but at biological pH or in the presence of carbonic acid or carbonate ions, it forms the singly charged hydrogen or acid urate ion as its pK_{a1} is lower than the pK_{a1} of carbonic acid. As its second ionization is so weak, the full urate salts tend to hydrolyze back to hydrogen urate salts and free base at pH values around neutral. It is aromatic because of the purine functional group

As a bicyclic, heterocyclic purine derivative, uric acid does not protonate at an oxygen [-OH] like carboxylic acids do. X-Ray diffraction studies on the hydrogen urate ion in crystals of ammonium hydrogen urate, formed in vivo as gouty deposits, reveal the keto-oxygen in the 2 position of a tautomer of the purine structure exists as a hydroxyl group and the two flanking nitrogen atoms at the 1 and 3 positions share the ionic charge in the six-membered pi-resonance-stabilized ring.

Thus, while most organic acids are deprotonated by the ionization of a polar hydrogen-to-oxygen bond, usually accompanied by some form of resonance stabilization (resulting in a carboxylate ion), uric acid is deprotonated at a nitrogen atom and uses atautomeric keto/hydroxy group as an electron-withdrawing group to increase the pK1 value. The five-membered ring also possesses a keto group (in the 8 position), flanked by two secondary amino groups (in the 7 and 9 positions), and deprotonation of one of these at high pH could explain the pK2 and behavior as a diprotic acid. Similar tautomeric rearrangement and pi-resonance stabilization would then give the ion some degree of stability. (On the structure shown at the upper-right, the NH at the upper-right on the six-membered ring is "1", counting clockwise around the six-membered ring to "6" for the keto carbon at the top of the six-membered ring. The uppermost NH on the five-membered ring is "7", counting counter-clockwise around this ring to the lower NH, which is "9".)

Uric acid was first isolated from kidney stones in 1776 by Scheele.(Scheele, V. Q. (1776) As far as laboratory synthesis is concerned, in 1882, Ivan Horbaczewski claimed to have prepared uric acid by melting urea hydrogen peroxide with glycine, trichlorolactic acid, and its amide. Soon after, repetition by Eduard Hoffmann shows that this preparation with glycine gives no trace of uric acid, but trichlorolacetamide produces some uric acid. Thus, Hoffmann was the first to synthesize uric acid. (Behrend, Robert (1925)

In human blood plasma, the reference range of uric acid is typically 3.4- 7.2 mg/dL (200-430 µmol/L) for men (1 mg/dL=59.48 µmol/L), and 2.4-6.1 mg/dL for women (140-360 µmol/L). However, blood test results should always be interpreted using the range provided by the laboratory that performed the test. Uric acid concentrations in blood plasma above and below the normal range are known, respectively, as hyperuricemia and hypouricemia. Likewise, uric acid concentrations in urine above and below normal are known as hyperuricosuria and hypouricosuria. Such abnormal concentrations of uric acid are not medical conditions, but are associated with a variety of medical conditions. High levels of uric acid is called hyperuricemia and can lead to gout.

Causes of high uric acid

- In many instances, people have elevated uric acid levels for hereditary reasons.
- Diet may be a factor. High intake of dietary purine, high-fructose corn syrup, and table sugar can cause increased levels of uric acid.(Cirillo P, Sato W, Reungjui S, et al. (December 2006)
- Serum uric acid can be elevated due to reduced excretion by the kidneys. (Mayo Clinic staff. (September 11, 2010)
- Fasting or rapid weight loss can temporarily elevate uric acid levels.
- Certain drugs, such as thiazide diuretics, can increase uric acid levels in the blood by interfering with renal clearance.

Although uric acid can act as an antioxidant, excess serum accumulation is often associated with cardiovascular disease. It is not known whether this is causative (e.g., by acting as a prooxidant) or a protective reaction taking advantage of urate's antioxidant properties. The same may account for the putative role of uric acid in the etiology of stroke.

Association with Type 2 diabetes

The association of high serum uric acid with insulin resistance has been known since the early part of the 20th century, nevertheless, recognition of high serum uric acid as a risk factor for diabetes has been a matter of debate. In fact, hyperuricemia has always been presumed to be a consequence of insulin resistance rather than its precursor. However, a prospective follow-up study showed high serum uric acid is associated with higher risk of type 2 diabetes, independent of obesity, dyslipidemia, and hypertension.(Dehghan A, van Hoek M, Sijbrands EJ, Hofman A, Witteman JC (February 2008)

14. TOTAL CHOLESTEROL

Cholesterol is carried in the blood stream in lipoproteins, 200 mg/dl is said to be the desirable total cholesterol and 240 mg / dl as high risk.

Cholesterol, a sterol, is the most familiar of all the derived lipids. Cholesterol synthesized from acetate in all animal tissues, is a precursor of cholic acid, vitamin D and the steroid hormones, including estradiol, progesterone, testosterone, and adrenal steroids. A high level of serum cholesterol and the cholesterol rich low density lipoprotein molecule are associated with an increased risk of coronary artery disease. Cholesterol deposits on the inner lining of the medium and larger arteries results in authroselerosis (McArdle et al. 1991).

Mobilisation of free fatty acids is important during aerobic exercise. As a consequence of aerobic exercise, considerable mobilization of free fatty acids occurs resulting in body fat loss. The exercise can beneficially alter blood lipid values and this is related to volume and intensity of training (Pollock and Wilmore, 1990). The exercises reduce blood cholesterol and low density lipoprotein along with increased high density lipoprotein. These changes work together to reduce the risk of heart attacks and brain strokes (Grana and Kalenak, 1991).

15. CONCLUSION

The purpose of the Random Group Experimental study was to find out the effects of Traditional Yoga (Group I) and Tibetian Yoga (Group-II) on selected Physiological, Bio Chemical and Psychological variables among Type II Diabetic women. To facilitate the study, 45 Type II Diabetic women were selected at random from Chennai as subjects aged between 35 to 45 years. In this study yogic practices were given to experimental group for the period of twelve weeks. The pretest was taken from the subjects before administering the training. The subjects were involved with their respective training for a period of twelve weeks. At the end of the twelfth week training post test were taken. After the experimental period of twelve weeks post test scores were obtained from all the three groups. The scores on Physiological, Bio Chemical and Psychological variables were considered as the effect of Traditional Yoga (Group I) and Tibetian Yoga (Group-II) practices on Type II Diabetic women. The mean differences were tested for significance at 0.05 level of confidence using Analysis of Covariance (ANCOVA) among the three groups on selected Physiological, Bio Chemical and Psychological variables were considered as the effect of Traditional Yoga (Group I) and Tibetian Yoga (Group-II) practices on Type II Diabetic women patients.

16. REFERENCES

- Dwivedi, Girish & Dwivedi, Shridhar (2007). History of Medicine: Sushruta – the Clinician – Teacher par Excellence, National Informatics Centre (Government of India)
- Edwards NL (2011). Crystal deposition diseases. in: Goldman L, Schafer AI, eds. Cecil Medicine. 24th ed. Philadelphia, Pa: Saunders Elsevier.
- McCrudden, Francis H. (2008). Uric Acid. BiblioBazaar.
- Nelson, D. L.; Cox, M. M. Lehninger, (2000) Principles of Biochemistry 3rd Ed. Worth Publishing: New York,
- William McArdle, Frank I. Katch & Victor L. Katch, (1991) Exercise Physiology Energy, Nutrition and Human Performance (Lee & Febiger, USA.) p.705.
- Ahmadizad S et al. (2013), "Effects of short-term nonperiodized, linear periodized and daily undulating periodized resistance training on plasma adiponectin, leptin and insulin resistance.", Clin Biochem. Dec 28
- Alexander G, et al. (2012), "Patterns of yoga practice and physical activity following a yoga intervention for adults with or at risk for type 2diabetes.", J Phys Act Health. Jan;9(1):53-61.
- Allen JD et al. (2013), "Diabetes status differentiates endothelial function and plasma nitrite response to exercise stress in peripheral arterial disease following supervised training." J Diabetes Complications. Dec 16. pii: S1056- 8727(13)00172-4.
- Aswathy S, et al. (2013), "Effective management of type 2 DM in India: Looking at low-cost adjunctive therapy.", Indian J Endocrinol Metab. Jan;17(1):149-52.
- Balaji PA, Varne SR, and Ali SS. (2012), "Physiological effects of yogic practices and transcendental meditation in health and disease.", N Am J Med Sci. Oct;4(10):442-8