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THE STUDY OF ASSOCIATION OF DIET AND LIFE STYLE IN ETIOPATHOGENESIS OF DIABETES MELLITUS (TYPE2)

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ABSTRACT

Type 2 diabetes is a global public health crisis that threatens the economies of all nations, particularly developing countries. Fuel by rapid urbanization, nutrition transition, and increasingly sedentary lifestyles, the epidemic has grown in parallel with the worldwide rise in obesity. Asia's large population and rapid economic development have made it an epicenter of the epidemic. Several factors contribute to accelerated diabetes epidemic in Asians, including high prevalence of smoking and heavy alcohol use; high intake of refined carbohydrates (e.g., white rice); and dramatically decreased physical activity levels. Recent advanced studies have contributed substantially to our understanding of diabetes pathophysiology, Also, interactions between Westernized diet and lifestyle may accelerate the growth of diabetes in the context of rapid nutrition transition. Epidemiologic studies show that type 2 diabetes is largely preventable through diet and lifestyle modifications. Translating these findings into practice, however, requires fundamental changes in public policies, the food and built environments, and health systems. To control the escalating diabetes epidemic, primary prevention through promotion of a healthy diet and lifestyle should be a global public policy priority.

INTRODUCTION

The dynamics of the diabetes epidemic are changing rapidly. Once a disease of the West, type 2 diabetes has now spread to every country in the world. Once "a disease of rich," it is now increasingly common among the poor. Once an adult-onset disease almost unheard of in children, rising rates of childhood obesity have rendered it more common in the pediatric population, especially in certain ethnic groups. According to the International Diabetes Federation[1], diabetes affects at least 285 million people worldwide, and that number is expected to reach 438 million by the year 2030, with two-thirds of all diabetes cases occurring in low- to middle-income countries. The number of adults with impaired glucose tolerance will rise from 344 million in 2010 to an estimated 472 million by 2030. Globally, it was estimated that diabetes accounted for 12% of health expenditures in 2010, or at least $376 billion—a figure expected to hit $490 billion in 2030.[2] Its increasing prevalence and associated health complications threaten to reverse economic gains in developing countries. With limited infrastructures for diabetes care, many countries are ill-equipped to manage this epidemic.

AIMS AND OBJECTIVES
AIM
To study the role of Diet and Lifestyle in etiopathogenesis of type 2 Diabetes Mellitus.

OBJECTIVES
1. To study Diet and Lifestyle.
2. To study the role of Diet and Lifestyle in etiopathogenesis of type 2 Diabetes Mellitus.

MATERIALS AND METHODS
All references regarding Diet, Lifestyle and Diabetes Mellitus were compiled and studied from Samhita, textbook of pathology, Research article and websites.

REVIEW OF LITERATURE
AYURVEDIC REVIEW
- **ASHTVIDH AHAR VIDHI VISHESHAYATAN**
Health is that the state of physical, mental, social, and spiritual well-being. It's dependent upon food and their proper food preparation method. The Prayojana of Ayurveda is to guard the health of the healthy and to cure disorders within the diseased condition. As Acharyas had described that Ahara, Nidra and Brahmacarya are Triupstambha, which support the body itself.[3] Here Ahara has been placed first, which shows that it's most vital to take care of and sustain life. Ayurveda places a special predominance on Ahara and the right way of eating food. For the technique of taking food, Acharya Charak has defined Ashta Ahara Vidhi Visheshayatana in a very systematic and scientific manner. It gives basic dietary guidelines for choosing appropriate food, quality and quantity of food, a combination of food and cooking

method etc. Proper knowledge of this Ahar Vidhi Visheshayatana will help in reducing diseases and help for a proper healthy diet.

Acharya Charak has described 8 specific factors of the method of dieting in a very systematic and scientific manner which is known as Ashta Ahara Vidhi Visheshayatana.[4]
1. Prakriti/Swabhava- Nature of food/ Quality of food.
2. Karan – Processing of food.
3. Samyoga – Combination of food.
4. Rashi – Quantity of food
5. Desha – Habitat of food.
6. Kala – Time and seasonal variation.
7. Upayoga Samstha – Rules for dieting.
8. Upayokta – The person who consumes the food.

1. Prakriti[5]
It is Swabhava (nature) which is the natural existence of properties like Laghu, Guru etc. in the substance used as food and drug. As we know that everyone has got specific Sharirika and Manasika Prakriti (temperament), in the same way, according to heaviness, hotness etc each food and drug substance has also got its Prakriti. For example, Masha is Guru (heavy) and Mudga is Laghu (light).

2. Karana
It is also known as Samskara. It means the processing of substances which leads to alteration in the inherent properties of substances. Eg.application of heat.

3. Samyoga
It is an aggregation of two or more substances. This exhibits peculiarities that are not seen in the case of individual substances. Sometimes it is seen that the combination of diet shows the different effect from the individual effect. ingredient must be compatible with each other and should be properly mixed.

4. Rasi
It is the measure of the total mass and each constituent to determine the effects of the right and wrong doses. Person should have his diet in proper amount, it means that a person should have diet according to his digestive power (Agni).

5. Desha
Desha denotes place relating to growth as well as distribution of the substances and the suitability in respect of place. Food substances differ in quality due to differences in soil and climate.

6. Kala
Here time is about disease (Avastha Kala) and in the general sense is used about seasonal wholesomeness in form of day and night. Ahara should be taken according to Dincharya and Ritucharya, which help the body function to acclimatize with the external environment.

7. Upayogasamstha
These are the Classical Ayurveda rules of dieting. Ahara should be Ushna (warm), tasty, qualitative, easily digestible.

8. Upyokta
The user is he who makes use of food, habituation depends on him. Creating wholesomeness by habitual intake of things comes under Upyokta and known as Satmya which differs from person to person.

MODERN VIEW ABOUT DIET
Excessive caloric intake is a major driving force behind type 2 diabetes epidemics worldwide, but diet quality also has independent effects. We already know that the quality of fats and carbohydrates play an important role in the development of diabetes, other risk factors.[6] In particular, higher dietary glycemic load and trans-fat are associated with increased diabetes risk, whereas greater consumption of cereal fiber and polyunsaturated fat is associated with decreased risk. In a meta-analysis, we found that a 2 serving/day increment in whole-grain intake was associated with a 21% lower risk of diabetes.[7] In addition to weight gain, several other mechanisms such as increased insulin demand, dyslipidemia, and chronic inflammation may explain the adverse effects of (Sugar soluble Beverages) SSBs on cardiometabolic risk. Large quantities of rapidly absorbable carbohydrates (e.g., sucrose) in SSBs result in a high dietary GL that leads to quick increases in blood glucose and insulin levels. A high GL diet, which increases insulin demand and may lead to pancreatic b-cell exhaustion in the long run, has been implicated in increased risk of type 2 diabetes and cardiovascular disease.[8] Fructose from high fructose corn syrup or any sugar may also play a role. It is preferentially metabolized to lipid in the liver, leading to increased hepatic lipogenesis, dyslipidemia, and insulin resistance.[9] The recent study that compared the effects of consuming 25% of energy from glucose- or fructose sweetened beverages showed similar weight gain, but only the fructose group had a significant increase in visceral adiposity.[10] Many developing nations experience rapid economic and social development with shifting in lifestyle habits and dietary structure. These changes promote overnutrition and positive energy balance. In Asia, traditional dietary patterns are being lost as the population adapts to more industrialized and urban food environments. At the same time, built living environments have become increasingly sedentary. These changes have a significant impact on type 2 diabetes risk by increasing body weight and central adiposity, and decreasing physical activity. With the rapid pace of nutrition transition, many countries are facing problems of over- and undernutrition, which lead to the double burden of infectious and chronic diseases.[11]

In India, the percentage of energy from animal products increased substantially between 1975 and 1995, mostly

among urban residents who consumed 32% of energy from fat compared with 17% of those in rural areas.[12] Both vegetable and animal ghee, which are used for cooking in India. Dalda, which is a type of vegetable ghee and major source of edible oil in India, has a trans-fat level of about 50%.[13] Trans-fat intake may also play a role in the development of insulin resistance. Global trade liberalization has made food products, such as edible oil and sugar, more accessible and relatively cheaper than in the past. Major changes that have occurred in Asia in the last several decades include 1) a large shift from consumption of coarse grains to polished rice and refined wheat, especially in India and China; 2) reduced intake of cereals particularly among urban populations and higher-income groups; 3) higher energy intake among the poor, lower energy intake among the rich, and greater consumption of fat in all income groups; and 4) increased intake of meat, edible oil, and fruits and vegetables, increased consumption of dairy products, especially highly saturated ghee (clarified butter), and added sugar in India (5). Globalization and economic development have spurred nutrition transitions in many developing nations. This nutritional shift typically involves increased consumption of animal fat and energy dense foods, decreased fiber, and more frequent intake of fast foods. At the same time, the traditional diets of many Asian countries, which are largely based on polished white rice and refined wheat, have high glycemic index (GI) and GL values.

The adverse effects of high dietary GI and GL are more evident in overweight or obese individuals who are prone to insulin resistance. Prior to rapid urbanization throughout Asia, the metabolic effects of high GI/GL diets were offset by high levels of physical activity. As lower income Asian countries shift away from agricultural labor toward employment in manufacturing services, energy expenditure has declined dramatically. The combination of excessive energy intake and reduced energy output leads to increased obesity and insulin resistance. Underlying insulin resistance can exacerbate adverse metabolic effects of high carbohydrate diets.

LIFE STYLE
PHYSICAL ACTIVITY
Numerous epidemiologic studies show that increased physical activity reduces risk of diabetes, whereas sedentary behaviors increase risk. In the NHS, each 2-h/day increment of time spent watching television (TV) was associated with a 14% increase in diabetes risk. Each 2-h/day increment of standing or walking around at home was associated with a 12% reduction in risk. Each 1-h/day increment of brisk walking was associated with a 34% reduction in risk. These results indicate a continuation in the relationship between physical activity levels and diabetes risk. Among sedentary behaviors (TV watching, sitting at work, and other sitting), prolonged TV watching was associated with the highest risk. At least two potential mechanisms account for the positive association between watching TV and obesity and diabetes risk.[14]

Smoking
Cigarette smoking is an independent risk factor for type 2 diabetes. A meta-analysis found that current smokers had a 45% increased risk of developing diabetes compared with non-smokers. Moreover, there was a dose-response relationship between the number of cigarettes smoked and diabetes risk. Several possible biological mechanisms may explain the association between cigarette smoking and diabetes. First, although smokers tend to be healthy than nonsmokers, smoking has been associated with increased risk of insulin resistance and diabetes. Second, smoking has anti-estrogenic effects in women and decreases plasma testosterone in men. These factors may promote abdominal fat accumulation and insulin resistance, especially in men.

An estimated 50–60% of adult males in developing countries are regular smokers. India is the second largest producer and consumer of tobacco products worldwide. In India, many use smokeless tobacco products, such as betel quid, and 40% smoke bidis, which are small, typically flavored cigarettes. These are non-taxable, and their production provides employment for large numbers of urban poor.[15] Reducing high smoking rates in most developing countries should be a key public health objective to prevent and control the global epidemic of diabetes and its complications.

ALCOHOL CONSUMPTION
Light-to-moderate alcohol consumption is associated with reduced risk of diabetes. Possible mediators of beneficial effects of moderate alcohol consumption include improved insulin sensitivity, increased HDL cholesterol. On the other hand, heavy alcohol intake has multiple deleterious metabolic effects, including excess caloric intake and obesity, increased triglyceride levels, pancreatitis, disturbance of carbohydrate and glucose metabolism, and impairment of liver function.[16]

In Asia, alcohol use is rising with rapid globalization and socioeconomic development. It is also worth noting that within-country consumption patterns are changing. Traditionally, heavy drinking was more prevalent in poor rural regions. However, high rates of heavy drinking are also starting to appear in the urban middle and upper classes as the alcohol industry increases social marketing to encourage more people to adopt Westernized lifestyles, which are symbolized by drinking and affluence. To date, many countries in Asia, including China and India, do not have public health policies regarding alcohol consumption. Concurrent alcohol and tobacco use, which could have a synergistic effect on diabetes risk, is highly common in Asian populations.

WESTERN DIETARY PATTERN AND TYPE 2 DIABETES

The dietary pattern, which is characterized by high intakes of SSBs, refined grains, and red and processed meat, but low consumption of wine, coffee, cruciferous vegetables, and yellow vegetables. This dietary pattern is strongly associated with an increased risk of diabetes'.

DISCUSSION

Dietary habits and sedentary lifestyle are the major factors for rapidly rising incidence of DM among developing countries. Asia accounts for 60% of the world's diabetic population. In recent decades, Asia has undergone rapid economic development, urbanization, and transitions in nutritional status. These have lead to an explosive increase in diabetes prevalence within a relatively short time. However, in urban areas of south India, the prevalence of diabetes has reached nearly 20%.

Compared with Western populations, Asians develop diabetes at younger ages, at lower degrees of obesity, and at much higher rates given the same amount of weight gain. Asian women are also at greater risk of gestational diabetes, thereby putting their children at risk for type 2 diabetes later in life. Many epidemiologic studies have implicated individual dietary and lifestyle factors in the development of type 2 diabetes in diverse populations, yet few studies have investigated multiple risk factors simultaneously. - diet high in cereal fiber and polyunsaturated fat and low in *trans*-fat and GL, moderate-to-vigorous physical activity for at least half an hour/day,no current smoking, and an average intake of least alcoholic beverage/day. The data provide strong epidemiologic evidence that the majority of cases of type 2 diabetes could be prevented by a healthier lifestyle.

Lifestyle intervention significantly reduces diabetes incidence. Diet and lifestyle modification is highly effective in preventing type 2 diabetes in different ethnic and racial groups. There is an urgent need to start the healthy diet and life style guidelines into clinical and public health practice.

CONCLUSIONS

Type 2 diabetes is a global crisis that threatens the health and economy of all nations, particularly developing countries. This epidemic is primarily driven by rapid urbanization, nutrition transition, and increasingly sedentary lifestyles. The diabetes epidemic in Asia is characterized by onset at lower BMI levels and younger ages compared with neighbouring populations. Poor nutrition plus overnutrition may also contribute to the current diabetes epidemic in Asian populations.

Recent advances have substantially improved our understanding of the pathophysiology of diabetes. Accumulating evidence strongly demonstrates that the majority of type 2 diabetes cases seen due to improper diet and lifestyle modification. However, the adoption of a healthy diet and lifestyle requires not only individual behavioral changes, but also changes in our food, built, and social environments. Public health strategies that target the environment are critical. Translating clinical and epidemiologic findings into practice requires fundamental shifts in public policies and health systems. To control the diabetes epidemic, primary prevention through the promotion of a healthy diet and lifestyle should be a global public policy priority.

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