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ASSOCIATION OF DISEASES WITH FOOD HABITS IN DIFFERENT STATES OF SOUTH INDIA: A SYSTEMATIC REVIEW

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Abstract

India is the second most populous country in the world with diverse caste, religion, habitat, socioeconomic status, and lifestyle and food habits. The South India is facing various epidemic of diet related non-communicable diseases such as Diabetes, Cardiovascular diseases, Obesity etc. This study will help to understand food habits of different states of South India as well asthe prevalence of diseases in those states. The methodology used here is secondary data collection of the dietary pattern and associated diseases of South India as it is a review study. It was found that, in Kerala, the most prevalent diseases are type II diabetes and cardiovascular diseases which are caused mainly by excess intake of tapioca, coconut oil, rice and rice-based products. In Tamil Nadu, it was found that the people are suffering from obesity or overweight in huge numbers. The main causes behind these diseases are consumption of polished rice and fast foods. There is a need for all the people of South India to adopt a healthy lifestyle and a good dietary habit so that they understand the choice of food and its relation with certain diseases.

Keywords: Food habits, non-communicable diseases, south India, tapioca, diabetes, cardiovascular diseases, and obesity

INTRODUCTION

India is the second most populous country in the world with diversity. India is facing an epidemic of diet related non- communicable diseases (DR-NCDs), along with widely prevalent under nutrition resulting in substantial socio- economic burden. Unhealthy diet is one of the major risk factors for NCDs, which include Cardio-vascular diseases (CVDs), respiratory diseases, mental disorders, diabetes and cancer. India is becoming a major part in the global burden of CVDs with a 34% rise in prevalence in recent years (Annamalai Manickavasagan et al., 2013) [15]. One of the main factors behind this is that India is progressing towards US in terms of lifestyle and foods habits. Nutrition transition over the past 30 years (1973-2004), has resulted in a 7% decrease in energy derived from carbohydrates and a 6% increase in energy derived from fats. The South India is facing various epidemics of diet related non-communicable diseases (Santosh R Patil et al., 2018). Studies have shown a rapid conversion of impaired glucose intolerance to diabetes in the southern states of India, where the prevalence of diabetes among adults has reached approximately 20% in urban populations and around 10% in rural population. The most disturbing trend is the shift in age group of onset of diabetes to a younger age group in the recent years. The prevalence of Celiac disease (CD) is also found which varies greatly, but it was found that its frequency is increasing in different geographic areas. In India CD is "Submerged in an ocean of malnutrition". Overweight or obesity among children was found to be associated with increased frequency of fast food consumption in a week. The state of Kerala, South India, has particularly higher prevalence rates for cardiovascular diseases and Type II Diabetes (Caroline Wilson et al., 2016). The burden of CVD has been contributed by reduced physical activities, social stress, and increased food consumption and consumer lifestyle. Smoking, unhealthy diets, stress, consumption of alcohol, sedentary lifestyle are

some of the other risk factors contributing for many such diseases. There is a documented increase all over Kerala in consumption of animal source foods and dairy products, and very low per capita consumption of fruits and vegetables, excluding roots and tubers (Meena Daiviadanam et al., 2015). A high dietary salt intake is significantly associated with high Blood Pressure (BP) and high risk of CVD (daily intake of salt was 5-6 g). Obesity can be called as a cluster of non-communicable diseases called "New World Syndrome" and is one of the most neglected public health problems (Dr. Ramya et al., 2017). The prevalence of obesity among urban area (29.53%) was significantly higher than the rural area (11.39%) (Dr. Ramya et al., 2017). A study conducted in 2019 states that more than 135 million individuals were affected by obesity in India (Rajeev Ahirwar et al., 2019). Frequent consumption of tea / coffee or other carbonated beverages was found to be associated with risk for Gastrointestinal Esophageal Reflux Disease (GERD). Andhra Pradesh was found to be the most affected state with GERD (Vindhya Vasini Lella et al). There are studies about the diseases of different states of South India but there are no studies about the association of food habits with diseases in those states. So, this review article aims to understand the importance of food in causing various diseases & to understand how the geographical areas are responsible for certain diseases in relation to the food.

METHODOLOGY

Methodology is a way of doing research based on the particular principles.

Study design

This systematic review is conducted between the month of January to March, 2023.

Study Tool

The literature study was conducted on electronic databases (Google scholar, PubMed, Research Gate) and was limited to the articles in English. The search words included: Food Habits, dietary pattern, diseases, risk factors, South India, geographical areas etc. This process yielded 34 references, including reports from national and international organizations, government reports, review articles and research studies. These 34 references include all the states of South India that have already been mentioned. The reviewed data were used to understand the relationship between the food habits and the diseases.

Duration of the study

Duration of this study was for 3 months. For 3 months the secondary data has been collected and the information was gathered.

Area of Study

The study was conducted for a specific geographical area, South India. The states included were Kerala, Tamil Nadu, Karnataka, Andhra Pradesh and Telangana.

RESULTS AND DISCUSSION

Food Habits & Diseases of Kerala

Kerala, South India, with the population of over 33 million, is the most advanced state in epidemiological transition. Certain food items consumed by the people of the state showed association with several diseases. Kerala has particularly higher prevalence rates for cardiovascular diseases (CVD) and type II diabetes.

Cardiovascular Disease

The major social dynamics contributing to the burden of cardiovascular diseases were consumer's lifestyle, reduced physical activity, increased food consumption and social stress. (Wilson et al., 2010) [32]. Cardiovascular diseases were found to be the highest leading cause of death in the South India, according to Million Death study (Registrar General of India. 2009). Kerala showed nutrition transition (Popkin, 2009) [21]. The staple foods of the state are rice or rice based foods, pulses or legumes, fish, particularly along the coastal area where fishing is the major occupation. They have a high consumption of animal source foods and dairy products, and very low per capita consumption of fruits and vegetables, excluding roots and tubers (National Sample Survey Organization, 2006). The fruits which were available throughout the year were bananas, guavas, gooseberries and the seasonal fruits were jackfruit and mango. The WHO guidelines recommend at least 400 g of fruits and vegetables intake/day (World Health Organization). Instead of fruits, they preferred Payar kanji (rice porridge with green gram and shallots) which was ideal for both cleaning the body and providing enough nourishment. Most commonly consumed vegetable curry was Sambar. To cook every meal, they use coconut oil predominantly. The fat profile of Kerala diet was highly loaded with saturated fats, by the regular use of fresh, grated coconut and to a lesser extent, coconut oil (which contributed to 70% of derived energy) (Soman CR; 2006) [29]. When saturated fatty acids (SFA) were replaced by poly unsaturated fatty acids (PUFA), particularly linoleic acid, a significant reduction in coronary risk was evidenced (World Health Organization). The role of SFA, myristic acid and palmitic acid (meat products) in raising the total cholesterol and low density lipoprotein, and the double atherogenic effect of trans fatty acids (processed foods) at the same time has also been consistently established (Daiviadanam et al., 2015).

Anemia

There is a significant association between moderate under nutrition and anemia. The percentage of anemic among the moderate undernourished children was 16.37% whereas 11.78 % of the mild undernourished children were anemic. It was revealed by the dietary survey that the consumption of iron sources, whether hem or non-hem, was below the recommended level. The statistical analysis showed that female children or adolescent girls were more susceptible to anemia than male children (George et al., 2000). It is also found that anemia is prevalent in the individuals at 26.3% among 194 adolescent girls of Tholur panchayath in Thrissur district, Kerala. The majority of the anemic girls (94%; Hb between 10 and 11.9 g/dl) were mildly anemic, and the remaining 26% were moderately anemic (Hb between 7-9.9 g/dl). The age group between 10–14 years (39.5%) had significantly greater levels of anemia than 15–
19 years (15.6%), Wholegrain cereal consumption and consumption of green leafy vegetables were found to be significantly correlated with anemia (N., D., & V., S. M. (2022).

Dental Caries

Early childhood caries lesions were found on pre-school children in Kerala. About 83 % of the denate children consumed snacks. They were getting sweets as rewards. Statistically significant positive correlations were found between caries lesions and consumption of snacks (Jose, 2003).

Type II Diabetes

In comparison to other states, Kerala has very much elevated frequency for type 2 diabetes. Among patients with type 2 diabetes, the prevalence of good dietary practice was 20.4%. In a study conducted in rural Kerala, it was found that 79% of the subjects did not take medicines regularly; only 49% people were regularly monitoring their blood glucose levels. Only 20.4% people were following the good dietary practice. Their main staple food is rice. Most of the

diabetic patients have the believe that they are taking sugar in the form of fruits. This information misleads them and also the costs of fruits were the barriers for the required servings of fruits and vegetable servings (Mannethodi et al., 2023).

Colorectal Carcinoma

In the world, the third most common malignancy was found to be Colorectal Carcinoma (CRC). It has strong association with tapioca, beef and pungent spices, while fruits and vegetables showed inverse association. Unprocessed boiled tapioca is regularly consumed in Kerala. Tapioca, also known as cassava is a cheap source of carbohydrates. Linamarin and Cyanide derivates are the toxins contained in it that needs to be processed in order to make tapioca consumable. These toxins could be directly acting on the bowel mucosa to cause CRC. Cooked red meat is another major factor contributing to cause CRC due to N-nitroso compounds, polycyclic aromatic hydrocarbons and heterocyclic amines (HCA) content. To increase the HCA content of the red meat, it was dry heated or barbequed. It is also known to increase bile acid release into the gut which is known to promote mitosis. Compared to other states of India, Kerala has significantly higher beef consuming population. They usually do not barbeque the beef, instead consume as curry. Study showed that even a small consumption of beef can promote CRC. The local consumes fish as curry with rice as a part of their staple diet. Fish meat also forms HCA on cooking in dry heat and thus can be carcinogenic. Though it is considered safe, it does not appear to significantly reduce the risk of CRC. Tea consumption did not show an increase in risk when consumed up to two cups/day. Among men, very frequent tea consumption (>12 cups/day) showed a significantly higher risk (Nayak et al., 2009).

Thyroid

Among the most common endocrine disorders, the most common is the thyroid disorders. It is highly dependent on iodine intake whose deficiency can lead to mental retardation, congenital births, still births and psychomotor defects. The prevalence was higher in females (25%) which may be associated with estrogen and progesterone. 11.5% people were estimated to have hypothyroidism whereas only 1.8% had hyperthyroidism. Low consumption of sea food could be the reason for hypothyroidism. Thyroid hormones could be fluctuated due to non-vegetarian and vegetarian foods like cabbage, cauliflower, soya which are goitrogens. High fiber diet also plays a major role in the hormone imbalance (Nimmy et al., 2012).

Food Habits & diseases of Tamil Nadu Cardiovascular Disease

In general, South Indian population had higher prevalence of cardiovascular diseases compared to North Indian population. India has become a major part in the global burden of CVD with a 34% rise in prevalence in recent years. Between the ages of 20-70 years, the crude prevalence has increased from 5-13 % (Hegde,et. al. 2016) [9]. One of the reasons behind this is the progression of Indian population in westernization towards US in terms of lifestyle and food habits. Tamil Nadu stands the third highest state, second being Kerala, among other states with 36% deaths due to CVD, especially among the male population (Maanasa et al., 2019).

Obesity

Obesity was found to be another major problem among the rural population. In that population, the prevalence of general obesity was 27.4% and that of abdominal obesity was 14.0%. More than 3/4th (78.1%) of calories were provided by carbohydrates only (Ahirwar et al., 2019). The major contributor of total calories was refined cereals, mainly polished rice. Due to low intake of pulses, fresh foods and dairy products, about 45% of the population did not meet WHO recommendation for protein. About more than half (57.1%) of the population

exceeded the salt intake limit, 99% exceeded the limit for fruits and vegetables, and 100% did not meet the recommendation for n-3 polyunsaturated fatty acids (PUFA) (Sowmya et al., 2016) [30]. Obesity is one of the most neglected public health problems and is a cluster of non-communicable diseases called "New World Syndrome". The overall prevalence of obesity was found to be 20.46% according to a study conducted in 2017, of which among urban area it was 29.53%, which was significantly higher than rural area (11.39%). This population was also associated with other diseases such as diabetes (55.67%) and hypertension (11.39%) (Ramya et al., 2017).

Food Habits & Diseases of Andhra PradeshGastro-intestinal reflux disease

Due to various lifestyle changes, the overall prevalence of Gastro-intestinal reflux disease (GERD) has been increased all over the world (Vasini Lella et al., 2023). GERD is a condition that is characterized by the reflux of the stomach contents into back into the esophagus causing unpleasant consequences or symptoms such as heartburn and acid regurgitation (Sree et al., 2023). The major contributors of lifestyle factors can be obesity or overweight, chocolate, high fat meals, exposure to alcohol and tobacco, hot beverages such as coffee and tea, intense exercise or lack of physical activity, lack of sleep or irregular eating pattern such as late night snacking. It was observed that GERD has lower incidence in female individuals that may be due to the presence of estrogen that helps in inactivating the inflammatory cells. Among over weight population GERD could be explained by gastric over-filling. It may cause hiatal hernia by loosening lower esophageal sphincter (Arivan, R., & Deepanjali, S. (2018) [3]. Theophylline, amajor component of tea, eases the lower sphincter that couldlead to GERD (Vasini Lella et al., 2023). In a study conducted in a medical college, it was found that the prevalence of GERD in the rural population of the college was 24.2%. Among them the crucial factors found were the irregular meal timings, heavy consumption of soft drinksand coffee (Sree et al., 2023).

Food Habits & Diseases of KarnatakaAnemia

In Karnataka, it has been found that a lot of people suffer from anemia and the major cause behind this suffering was found to be iron deficiency. It was seen majorly among female population, especially in adolescent girls as iron requirement increases due to rapid cell growth and onset of menstruation. In adolescents, iron deficiency anemia may lead to compromised growth, depressed immune function and decreased cognitive function (Norris SA et al. 2022) [19]. The prevalence of anemia in 2019 was 29.9% in women of reproductive age; equivalent to over half a billion women aged 15-49 years. Iron deficiency is the most common anemia and estimated to contribute to approximately 50% ofanemia cases globally (Chaparro CM et.al;2019) [4]. Commonly, people in the area consumed rice, roti and dahl (lentil stew). Due to cultural and religious preferences, they rarely consumed meat and fish. Several adolescents were cited opting for vegetarian food items, although their own families consumed meat. Some adolescents purchased snacks, such as cakes, noodles and other local items as supplementation for home or school foods. They were also provided with IFA (Iron-Folic Acid) tablets in their schools and communities, but only a few of them knew what it isfor. IFA tablets were given to prevent anemia (Gillespie et al., 2023) [7].

Food Habits & Diseases of TelanganaThyroid

In India, thyroid disorders have become increasingly common. Around 40 million people in India are affected by thyroid disorders. The production of thyroid hormones (Triiodothyronine and Thyroxine) is controlled by Thyroid Stimulating Hormone (TSH)

which is made by the pituitary gland in the brain. In hypothyroidism, the levels of thyroid hormones decrease and the levels of TSH increase above thereference range. In South India, particularly Telangana, the number of cases has been increased alarmingly. In a study it has been indicated that most common thyroid disorder prevailing in Telangana is hypothyroidism, particularly females are affected to an extent of 62.3%. But hypothyroidism was less prevalent (27.4%) in cases of pregnancy than non-pregnant females (72.6%). The inclusion of fruits and vegetables were very less in their daily diet (16.9%). Many of them (68.4%) were found not to be interested in doing exercises during hypothyroidism. The females were also suffering from irregular menstrual cycles. Thyroidism associated with goiter was found to be 33.8%. A large group of people (47.4%) were not avoiding goitrogenic food items such as cauliflower, soya, cabbage etc. (Kadiri. et al., 2023) [12].

In another study, it was found that people who consume caffeine daily, more than 200 mg; for more than 6 months, may lead to decrease in T3 and cortisol levels, which raises the TSH level and ACTH (Adrenocorticotrophic hormone). These fluctuations of the thyroid hormones lead to Thyroidism, majorly hypothyroidism (Upadrasta. et al., 2023).

CONCLUSION

There is an urgent need among population in general to adopt healthy lifestyle modifications. The factors associated with the prevalence of disorders are mainly food habits especially the intake of sea food, coconut, tapioca, goitrogenic foods (such as cabbage, cauliflower, soy), beverages (such as tea or coffee). Tea or coffee consumption was found to be a major risk factor for GERD. Due to unhealthy lifestyle people are getting more prone towards overweight and obesity. The increased frequency of fast food consumption in a week remains the leading cause for the disorders. Education is needed for each and every people so that they understand the choice of food and its relation with diseases. People should be trained on proper eating habits, maintaining an ideal body weight, good sleep hygiene and avoiding drinking alcohol and smoking to lessen the burden of several disorders such as GERD, overweight or obesity, CVD, Diabetes etc. Awareness should be created about menstrual hygiene to females, especially young adolescents so that they could take care of themselves and prevent the risk for anemia. It can be concluded that food and lifestyle go hand in hand. Oneshould keep in mind that we become what we eat. If we lead a healthy lifestyle, we can prevent various diseases to affect us and keep our immune system strong. It is good to include staple food in our daily diet, but everything should be consumed in a limit, else it may create complications.

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