



HFSS (HIGH-FAT, SALT, AND SUGAR) INTAKE THROUGH MEALS, SNACKS, AND BEVERAGES AMONG ADOLESCENT

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Abstract: This India has undergone lifestyle changes that have resulted in unhealthy eating habits, such as a high intake of HFSS (High-Fat, salt, sugar) food. Adolescents and young adults are the main groups affected and exposed to the adverse eating habits.

Overweight and obesity have been significant public health issues in both developing and developed nations. India is a developing nation that is transitioning from under nutrition to obesity as a result of rapid industrialization and urbanisation. Obesity and its negative effects are a high concern in developing countries due to high fat, salt, and sugar food consumption (HFSS), unhealthy food patterns, sedentary lifestyle, lack of healthcare facilities, and financial support (i.e. diabetes, ischemic heart disease, hypertension, abdominal obesity and dyslipidaemia, etc.)

Index Terms – HFSS (High-Fat, salt, sugar) Food Consumption, Dietary pattern, Adolescents.

I. INTRODUCTION

India is currently dealing with a triple burden of malnutrition, with under nutrition, micronutrient shortages (hidden hunger), and excessive calorie intake leading to overweight and obesity coexisting. The World Health Organization (WHO) reports that two-thirds of adolescents aged 11 to 17 are physically inactive. One out of every four Indians is at risk of dying from a non-communicable disease (NCDs). The Indian government has launched a number of initiatives to tackle child malnutrition, though obesity is also becoming one of the country's major health concerns. Children that are overweight or obese are more likely to develop non-communicable diseases (NCDs) in their early adult years, including diabetes, cardiovascular disease, hypertension, and dyslipidemia. To address the growing epidemic of childhood and adult obesity, immediate action is needed. Obesity and the prevalence of non-communicable diseases are strongly linked to eating habits. various factors have been related to under nutrition and obesity. For example, a new generation may be at risk for hypertension, type 2 diabetes, dyslipidemia, and non-alcoholic fatty liver disease due to nutritional, genetic, familial, psychosocial, socioeconomic status, marketing, peer pressure, and other factors. As a result, in order to address issues of malnutrition and secret hunger among teenagers, we must address the role of junk foods in adulthood obesity. Non-communicable diseases can be avoided by making simple lifestyle changes and eating a nutritionally healthy diet.

HFSS Foods consumption at Global and Indian level

E. Carbonneau studied on Liking for foods high in salt and fat is associated with lower diet quality. A cross-sectional study was aimed at examining how liking for foods high in salt and fat. for foods high in sugar are associated with overall diet quality and how these associations differ according to individual characteristics (i.e., sex, age, education, income, nutrition knowledge, and energy reporting status) In a total of 1096 men and women completed online questionnaires. The Canadian Healthy Eating Index (C-HEI) was computed based on data collected using 24-hour food recalls. The study concluded that liking for foods high in salt

and fat is a significant correlate of lower diet quality whereas liking for foods high in sugar is not. to reduce the liking of foods high in salt and fat, or to improve the healthiness of food habits among individuals with a strong liking for these foods, perhaps by emphasizing the importance of home-cooked meals made with healthy and nutritious ingredients. (Carbonneau et al., 2021)

T Meier studied “Healthcare Costs Associated with an Adequate Intake of Sugars, Salt and Saturated Fat in Germany.” Objective of this study was therefore to quantify the economic burden of unbalanced nutrition in Germany-in particular the effects of excessive consumption of fat, salt, and sugar-and to examine different reductions scenarios on this basis. In this study, the avoidable direct cost savings in the German healthcare system attributable to an adequate intake of saturated fatty acids (SFA), salt, and sugar (mono- & disaccharides, MDS) were calculated. Predicted direct healthcare cost savings through a balanced intake of sugars, salt, and saturated fat are substantial. However, as this study solely considered direct medical treatment costs regarding an adequate consumption of fat, salt, and sugars, the actual societal and economic gains, resulting both from direct and indirect cost savings, may easily exceed 16.8 billion EUR. (Meier et al., 2015)

Rosemary Green studied “Dietary patterns in India: a systematic review” and the aim of the study was to analyze relationships between non-communicable diseases (NCD) and complete diets rather than individual food items or nutrients. This review has shown that dietary patterns in India are highly diverse, including traditional vegetarian patterns, those that incorporate high-fat, high-sugar foods, and also meat. Also found large regional variations and some evidence of changes in patterns over time. Consumers of high-fat dietary patterns were more likely to have greater BMI, and a dietary pattern high in sweets and snacks was associated with a greater risk of diabetes compared with a traditional diet high in rice and pulses, but other relationships with NCD risk factors were less clear. The evidence of an association between dietary patterns and nutrition or health impacts was sparse, but it did appear to indicate a relationship between patterns characterized by sweets, savory snacks, and meat and obesity, as well as potentially other CVD risk factors. It has been shown that dietary pattern analyses can be highly valuable in assessing variability in national diets and diet-disease relationships. (Green et al., 2016)

R. Dasgupta studied “Whole-of-society monitoring framework for sugar, salt, and fat consumption and non-communicable disease in India.” a study reported that India has experienced a rising prevalence of cardio metabolic risk factors in the past 15 years. The prevalence of diabetes has increased from 5.9% to 9.1%, hypertension from 17.2% to 29.2%, and obesity from 4% to 15%. The increase is among all socioeconomic groups and in urban and rural populations, though the quantum of change varies. A concomitant increase in per capita consumption of sugar from 22 to 55.3 g/day and total fat from 21.2 to 54 g/day was observed (figure 2.2), with significant differences between states of high and low human development index (HDI). Per capita consumption of sugar, salt, and fat is consistently and significantly associated with overweight and obesity but variably associated with the occurrence of hypertension and diabetes. (Dasgupta et al., 2014)

S. Gulati studied “dietary fats and oils in India.” India has undergone a rapid nutrition transition concurrent with an increase in obesity, metabolic syndrome, and type-2 diabetes (T2DM) towards increasing consumption of packaged, ready-to-eat foods which are calorie-dense and contain refined carbohydrates, high fat, salt, and sugar; and less fiber. Although fats and oils have been an integral part of our diets, there is a change in the pattern of consumption, in terms of both quality and quantity. Data have also been taken from nutritional surveys in India and worldwide, websites and published documents of the World Health Organization, the Food and Agricultural Organization, National Sample Survey Organization, and websites of industries related to oil production. They found that Increasing use of saturated fat, low intake of n-3 polyunsaturated fatty acids, and increase in trans-fatty acids, along with increasing intake of dietary sugars has been noted in India. Most importantly, traditional false beliefs and unawareness about the health effects of oils continue to be prevalent. Aggressive public health awareness programs coupled with governmental action and guidelines tailored for the Indian population are required, to promote less consumption of fats and oils, use of healthy oils and fats decreased intake of saturated fats and trans-fatty acids, and increase intake of n-3 Polyunsaturated fatty acids and mono-unsaturated fatty acids. (Gulati et al., 2017)

Consequences of HFSS food consumption

India is the world's highest consumer of sugar with one of the highest salt consumption per day. Increased salt intake is associated with increased risk of hypertension, left ventricular hypertrophy and fibrosis, cardiovascular events, renal stones, proteinuria, and renal failure. Increased sugar intake is directly linked to an increased risk of obesity, fatty liver disease, and metabolic syndrome. Also, increased sugar intake may be indirectly related to the increased risk of type 2 diabetes. Both salt and sugar intake is directly linked to increased systemic and hypothalamic inflammation, endothelial dysfunction, microangiopathy, cardiovascular remodeling, cancers, and death. So this review was an in-depth analysis of medical literature on salt and sugar being the two white troublemakers of modern society. This study found that Salt and sugars, though an integral part of daily diets, strong association with the risk of various NCDs. (Gupta et al., 2018)

Adolescence is the transitional phase of physical and mental development between childhood and adulthood and is characterized by immense hormonal changes. 75% of girls experience some problems associated with menstruation. (Rupa Vani et al., 2013) studied adolescent girls of secondary schools of Pondicherry, India. A cross-sectional study aim was to find out the prevalence of menstrual abnormalities in school-going girls in Pondicherry and their association with dietary and exercise habits. A total of 853 students participated in the study. They found that dysmenorrhea and premenstrual symptoms were the most frequent problems encountered. Premenstrual symptoms were significantly more common among girls who were overweight, in girls who were eating junk food regularly, in girls who were eating less food to lose weight, and in those who were not doing regular physical activity. Dysmenorrhea was significantly more common in the girls who were dieting to lose weight. Passage of clots was also significantly high in the girls who were dieting. They concluded that Lifestyle modifications like regular physical activity, decreasing the intake of High fat, salt, sugar food, and promoting healthy eating habits should be emphasized in school health education programs to improve their menstrual health.

Shau J. studied "Fast foods - are they a risk factor for functional gastrointestinal disorders?" Taiwanese adolescents. The study aimed to describe fast food habit changes and to assess the relationship between fast food intake and the risk of functional gastrointestinal disorders (FGIDs) among Taiwanese adolescents. A total of 2,042 adolescents (12- 19 years) completed the questionnaire. 545 subjects (26.8%) had a history of at least one functional gastrointestinal disorder. 88.1% of the subjects reported fast-food consumption. A significantly higher prevalence of functional gastrointestinal disorders was noted in adolescents with a history of fast food consumption. Results revealed that functional gastrointestinal disorders were common among Taiwanese adolescents. Fast-food consumption may contribute to a positive association with the development of functional gastrointestinal disorders. Lower fiber intake and more frozen desserts in the diet may be complicit in functional gastrointestinal disorders. (Shau, James et al., 2016)

High salt intake is the major cause of raised blood pressure and accordingly leads to cardiovascular diseases. Recently, it has been shown that high salt intake is associated with an increased risk of obesity through sugar-sweetened beverage consumption. Increasing evidence also suggests a direct link. Our study aimed to determine whether there was a direct association between salt intake and obesity independent of energy intake. (Ma et al., 2015) studied on High salt food consumption by Youth in the UK. The cross-sectional study aimed to determine whether there was a direct association between salt intake and obesity independent of energy intake. They included 458 children (52% boys; age, 10±4 years) and 785 adults (47% men; age, 49±17 years) who had complete 24-hour urine collections. Energy intake was calculated from a 4-day diary and misreporting was assessed by the Goldberg method. The results showed that salt intake as measured by 24-hour urinary sodium was higher in overweight and obese individuals. A 1-g/d increase in salt intake was associated with an increase in the risk of obesity by 28% in children and 26% in adults. Higher salt intake was also significantly related to higher body fat mass in both children and adults after adjusting for age, sex, ethnic group, and energy intake. Results revealed that salt intake is a potential risk factor for obesity independent of energy intake.

Lifestyle-related behavioural risk factors are mainly implicated in the increased burden of cardiovascular diseases. (Rustagi et al., 2011) studied to evaluate the burden of cardiovascular risk behaviours among students. A cross-sectional study was carried out among undergraduate medical students of a medical college in Delhi. They found that consumption of carbonated soft drinks either once or more on daily basis was present in 23.7% of students and 32.0% reported frequent consumption of fast foods in the past week. Consumption of alcohol was present in 28.8% of students but only a small proportion of students (7%) were current tobacco users. Large proportions of students (42.6%) were either not carried out or were involved in only occasional physical activity. Results concluded that Unhealthy behavioural practices were present. Developing strategies targeting these risk behaviors and determining factors is necessary to promote a healthy lifestyle among medical students.

Factors responsible for adopting HFSS food among the adolescent

- Nuclear Family
- Skipping Breakfast
- Time, Taste and Attractiveness
- Emotional eating or Snacking throughout the day
- Lack of Nutritional Knowledge
- Television Watching and Advertising

According to (Kurian et al., 2017), When compared to older adults, adolescents are the primary buyers of fast food meals. They spend the majority of their time away from home, such as at school or in classes. They eat high-fat, salt, sugar foods and gain weight, which is unhealthy. It can cause harm to health. Taste, time considerations, convenience, and cost are major factors that contribute to an adolescent's food choices, fast food restaurants are a common place for them to eat outside the home. They eat high-fat, high-sugar foods and gain weight, which is unhealthy. These may be the root causes of obesity.

According to (Kaushik et al., 2011), Despite the fact that breakfast is considered the most important meal of the day, but many people still seem to make a habit out of skipping it. Skipping breakfast not only drains energy but also makes it more likely that we will snack throughout the day. Breakfast deprivation also affects metabolism, generally busy schedule, Adolescents skip their meals at home. When they do not eat breakfast at home, they eat fast food, cafeterias offer sodas, cold drinks, chips, and many other foods of low nutritional value. they are more likely to grab fast food from a restaurant. According to findings, there is a positive correlation of increased fast food consumption skipped breakfast and increased body mass index was found among adolescents.

According to (Taverns et al., 2005), Emotional eating, or stress eating, is another common unhealthy habit that should be avoided. This occurs when adolescents are driven by certain emotions though not hungry. Some teenagers have habituated eating continuously tasty or fatty throughout the day. It is another factor that causes more consumption of HFSS food; Unhealthy dietary habits such as large portion sizes and high energy density, which are known to contribute to body weight.

Impact of advertisement regarding HFSS food

J Kearney studied "Television advertisements for high sugar foods and beverages: Effect on children's snack food intake" sample of the study was 101 UK children (40 male) aged 8-10 years. This study aimed to determine whether children would increase their intake of sugar, and total energy, following high sugar food advertising (relative to toy advertising) and whether dental health, weight status, and socioeconomic status would moderate any effect. Children consumed a significantly greater amount of energy and sugar following food advertisements compared with after toy advertisements. This was driven by increased intake of the items with the most sugar (chocolate, jelly sweets). Children of healthy weight and with dental caries had the greatest intake response to food advertising exposure. The result revealed that the marketing of HFSS foods could negatively impact sugar and energy intakes in children, and therefore supports action to reduce children's exposure to the advertising of HFSS foods across all broadcast and non-broadcast media. (Kearney et al., 2020)

Nathan Critchlow studied "Adolescents' Reactions to Adverts for Fast-Food and Confectionery Brands That are High in Fat, Salt, and/or Sugar (HFSS), and Possible Implications for Future Research and Regulation." a cross-sectional study was an effect of restrictions on television food advertising to children on exposure to advertisements for less healthy foods: a repeat cross-sectional study. half of the adolescents had positive reactions to an advertisement. Positive reactions had associations with age, gender, and, to a lesser extent, BMI. For example, 11-15-year-olds were more likely than 16-19-year-olds to report appeal to their age group for the fast-food and confectionery advert. They found that there were key associations with demography and, to a lesser extent, BMI category, which suggests that some adolescents are more susceptible to the influence of advertising for HFSS foods. They also stated that the impact of clearly displaying nutritional information and health messaging in adverts and testing alternative methods of regulating appeal to young people based on existing approaches for other fast-moving consumer goods. (Critchlow et al., 2020)

A study was conducted by (Kaushal N & Dudeja P, 2017) in India. The objective was to study the prevalence of misleading food advertisements in India. Advertisements influence the food consumption behaviour of children as they are the easiest target for food promotional activities. A cross-sectional study was conducted for 30 days to assess the food-related advertisements Standards Act (FSSA 2006).

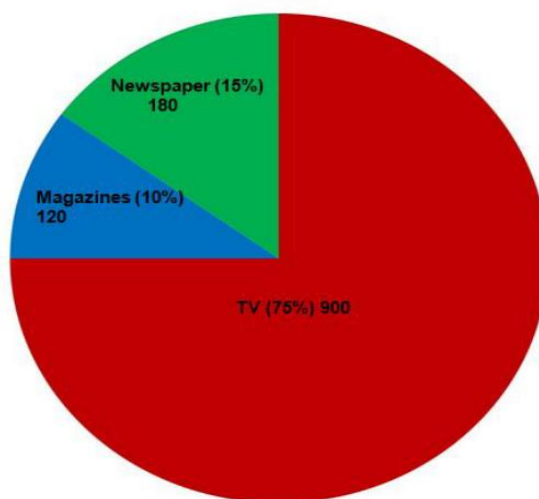


Figure: Distribution of advertisements in different forms of media.

Figure showing that a total of 1200 advertisements in different forms of media, Children often get attracted towards these items, and 900 (75%) on TV, 120 (10%) in magazines, and 180 (15%) in the newspaper were reviewed against guidelines for advertisement in FSSA 2006. They found that the prevalence of misleading food advertisements was high. The number of food-related advertisements was 15 ± 3.55 per hour on television. A majority (90%) of these were for food items that are linked to foods High in Fat, Sugar, and Salt (HFSS). Result concluded that this is a cause for concern as the same is an indirect contributory factor in the increase in the prevalence of obesity in children in our country.

According to (Adams et al., 2012), The prevalence of overweight and obesity has increased rapidly in recent years. Consumption of an unhealthy diet is a key contributor to the development of overweight and obesity. Several systematic reviews have concluded that food advertising affects children's food preferences, purchasing requests, and consumption. There is also growing evidence that food marketing affects adults' food consumption. Because most food advertising focuses on less healthy products, advertising is likely to play an important part in the development and maintenance of overweight and obesity.

Awareness of Food labels

According to S. vermula a cross-sectional study was conducted in New Delhi and Hyderabad. The study aimed to study consumer knowledge and the use of food labels. The study sample included a total of 1832: Adolescent (10–19 years), adults (20–59 years), and elderly (60 years) consumers. About 99% of the study participants were educated. About 45% reported that they buy pre-packaged foods once weekly and about a fifth buy them every day. Taste, quality, convenience, and ease of use are the main reasons for buying pre-packaged foods. Although 90% of consumers across the age groups read food labels, the majority (81%) looked only for the manufacturing date or expiry/best before date. Of those who read labels, only a third checked nutrition information and ingredients. Nutrient information on labels was not often read because most consumers either lacked nutrition knowledge or found the information too technical to understand. Women and girls concerned about 'fat' and 'sugar' intake read the nutrition facts panel. They concluded that the intention of promoting healthy food choices through the use of food labels was not being completely met. Since a majority of people found it difficult to comprehend nutrition information, there is a need to take up educational activities and/or introduce new forms of labelling. (Vemula et al., 2014)

S. Saha studied "Knowledge and practices of using food label information among adolescents attending schools in Kolkata, India." A cross-sectional study was conducted to assess knowledge and use of label information among adolescents. Results showed that 88% of adolescents read food labels, many read-only dates of manufacture (79%), expiration (74%), or best used before dates (65%). Fewer adolescents read ingredients (50%) and nutrition information (20%). Their knowledge about quality symbols was low. Many of them (over 60%) recognized the symbols but did not know what they indicated. About 66% believed that nutrition information on labels was too complex to understand. Results concluded and implicated that there is a need to

provide education on different aspects of label information to promote label use. The effectiveness of alternative methods of nutrition information display should also be investigated. (Saha et al., 2013)

Contribution of processed and package foods on consuming HFSS food.

According to (WHO2015), Ultra-processed foods (UPFs) high in fats, sugar, and salt (HFSS) are industrially formulated food products manufactured largely by Big Food companies. Their contribution to non-communicable diseases (NCDs) like obesity, insulin resistance and type-2 diabetes, coronary heart disease, high blood pressure, and stroke is well documented.

A Jain Studied “Intake of Ultra-processed Foods among Adolescents from Low- and Middle-Income Families in Delhi.” The study aimed to assess the contribution of ultra-processed foods to the macronutrient intake of adolescents. Adolescents (n=1030) aged 12-16 years from four private and four government schools of Delhi were interviewed using 24-hour recall (repeated on three days), and a food frequency questionnaire. They found that the mean energy intake from ultra-processed foods was 371 kcal (16.2%) of the total energy intake. The mean intake of macronutrients from ultra-processed foods was 7.1 g (16.3%) fat, 78.9 g (18.6%) carbohydrate, and 4.8 g (10.9%) protein. Children from middle-income families consumed significantly higher (P<0.05) amounts of macronutrients coming from ultra-processed foods, as compared to those from low-income families. They concluded that adolescents reported regular consumption of a variety of ultra-processed foods, and measures to reduce this consumption and encouraging healthy food choices are urgently needed. (A. Jain & Mathur et al., 2020)

L. Hamilton studied “Patterns of sugar-sweetened beverage consumption amongst young people aged 13–15 years during the school day in Scotland” The study aimed to explore the patterns of sugar-sweetened beverage purchase and consumption amongst young people. They found that consumers were significantly more likely to consume a drink at mid-morning break. Fewer consumed food at the mid-morning break ate food before school or ate food at lunchtime. A higher percentage of sugar-sweetened beverage consumers consumed ‘unhealthy’ food and drinks in comparison to young people who did not consume a sugar-sweetened beverage. Results revealed that sugar-sweetened beverage purchasers consume significantly more sugar at lunchtime than non-purchasers. However, both purchasers and non-purchasers exceeded WHO's (2015) recommendations that sugar consumption is halved to form no more than 5% of daily energy intake. (Hamilton & Wills et al., 2017)

Conclusion

HFSS food contributes to the major risk of obesity in adolescents. There is a direct connection between consumption of HFSS foods and increased risk of non-communicable diseases (NCDs). To reduce the liking of foods high in salt and fat, or to improve the healthiness of food habits among individuals with a strong liking for these foods, perhaps by emphasizing the importance of home-cooked healthy and balanced diet. Lifestyle modifications like regular physical activity, decreasing the intake of High fat, salt, sugar food, and promoting healthy eating habits, need to take up educational activities for food label reading, should be emphasized in school health education programs. Advertisement regarding processed and package foods which play significant role among adolescents. The marketing of HFSS foods could negatively impact sugar and energy intakes in children and therefore supports action to reduce children's exposure to the advertising of HFSS foods across all broadcast and non-broadcast media.

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