ORIGINAL ARTICLE

Influence of food habit on Body Mass Index of Indian and Nepalese male adolescents: a comparative study

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Abstract	Introduction	Methodology	Results	Conclusion	References	Citation	Tables / Figures

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Citation

Abstract

Background: Obesity has become an epidemic across the globe and it is a multifaceted disease which requires multi-pronged combat strategy to control it. The new generations are at high risk of obesity in both developing and developed countries. Body mass index (BMI), is one of the important parameters, used to assess over weight of an individual. **Aim of study**: To find out the influence of food intake in the overweight of the male adolescents. **Materials and Methods:** A total of 1950 male adolescents (750 Indians and 1200 Nepalese; ratio = 5:8) participated in the study from India and Nepal during the period of 1st January to 31st July, 2014. The BMI was calculated using the height and weight of the subjects. Microsoft Excel and SPSS-v16 were used for the data analysis. **Results**: Out of 1950 male adolescents 660 [33.84%] were overweight. Among the overweight individuals, 540 (81.82%) were non-vegetarians and 120 (18.18%) were vegetarians. **Conclusion:** The increased prevalence of overweight among male adolescents is an indicative for developing and implementing effective dietary strategies for weight management. It is reported that intake of a low-fat, low-energy diet, over the course of one week in a stress-free environment, had positive impact on the risk factors of obesity related diseases. Promoting increased awareness of better physical culture and dietary habits are necessary to prevent obesity.

Key Words

Overweight; BMI; male adolescents; India; Nepal

Introduction

Obesity is rapidly spreading epidemic across the globe and it is a multifaceted disease which requires multi-pronged combat strategy to control it. Overweight and obesity have become a major public health problem in both developing and developed countries as they are closely related to a wide spectrum of chronic diseases including type-II diabetes, cardiovascular diseases (CVD) and cancer. New generations are at higher risk (1). It has been recognized as one of the major challenges for cardiovascular disease control. Developing countries like Nepal and India have both the cardiovascular disease and obesity as major public health problem. National Health and Nutrition Examination Survey in US indicates that adherence to a healthy lifestyle pattern has decreased during the last 18 years, which have broad implications for the future risk of cardiovascular disease in adults. Nutritional factors play a key role along with modification of energy intake and expenditure. Emerging scientific evidence over the past decade suggests that dairy foods may be beneficial when included in a moderate energy restricted diet and possibly for weight maintenance

as well (2). Diet with fruit and vegetable plays an important part in the maintenance of optimal cardiovascular health. Reports from several studies indicate that consumption of fruit and vegetable is associated with a decrease in blood pressure, reduced risk of cancer and coronary heart disease (CHD) (3, 4). Low fruit and vegetable intake is associated with overweight (5). Body mass index (BMI) is one of the important parameters which is more frequently used to assess obesity and nutritional status of an individual. Even a simple cross-sectional measure of BMI has a good predictive value for subsequent development of clinical disease (6). The greater BMI in adolescence or early adulthood may be an important risk factor for ischemic heart disease (IHD) (7). Generally decrease in the healthy lifestyle patterns have broad implications for the future risk of cardiovascular disease in adults (8).

Aims & Objectives

The objective of the present study is to find out the influence of type of food habit in the overweight of the male adolescents.

Material and Methods

This is a cross sectional study carried out at Kottayam District of Kerala, India and Pokhara, Nepal during January to July, 2014 with ethical committee permission. A total number of 1950 college students were participated in this study. All of them were male adolescents selected randomly from colleges. The details of the study were explained and informed consent was taken from each student. Assessment was made using self-structured questionnaire which contains the details of anthropometry parameters, food habits, and socio demographic data. Commonly used cutoff for BMI, which is recommended by World Health Organization (WHO), were used in this study as an indicators of overweight and obesity (9). The BMI was calculated using the height and weight measurements (kg/m^2). All the subjects were categorized as normal (18.50-24.99), and overweight (≥25) according to their BMI cutoff values. Further all overweight subjects were categorized in to vegetarian and non-vegetarians. **Sample size calculation:** The sample size calculation suggested that for a 95% confidence interval and significance level α = 5%, P = 0.29, Q = 0.71, allowable error = 7%, whereby P = Proportion of overweight among the 100 respondents of the pilot study sample from Nepal and India, the required sample size was 1919.

Statistical methods: Z- Test was used to compare the proportions or percentages. t- Test was used to compare the BMI in different groups to identify for any significant difference between them. SPSS v-16 and Microsoft Excel for Windows 2003 software platforms were used for data analyses in the present study.

Results

Among 1950 male adolescents, who were participated in this study, 750 (38.46%) were Indians and 1200 were (61.54%) Nepalese. The comparisons of age, weight, height and BMI between Indian and Nepalese are shown in table-1. Average BMI of Nepalese were more compared to Indians.

The result was further analysed and it is found that out of 1950 male adolescents 660 were come under over weight category according to the WHO recommended cut-off for BMI which is shown in table-2.

Further the overweight male adolescents were divided into vegetarians and non-vegetarians, which are shown in table-3. Out of 660 overweight male adolescents 540 (81.82%) were non vegetarians and 120 (18.18%) were vegetarians.

It shows that Nepalese male adolescents are significantly more in number in overweight category (p<0.05) than Indians. But average BMI of Indian students were more than Nepalese in overweight category which is shown in table-4.

Discussion *(Quote only relevant study)*

There are more than 1 billion overweight people worldwide and at least 350 million who are estimated to be obese. According to the Nepal Demographic and Health Survey-2006, the prevalence of overweight in urban population is about 20.7 %(10). A follow-up study in Australia has reported that children who were overweight or obese at the age of 8 year were continued to be overweight and obese even at the age of 15 year and further it has reported that there were stronger association between BMI in mid childhood and later adverse CVD risk clustering in adolescence (11). Many research has been carried out in Asian population which proves that Asian population have a higher percentage of body fat than do Western populations for a given BMI or waist circumference (12-14) and greater prevalence of cardiovascular disease risk factors at low BMI and waist circumference values (15). A population based study in Nepal reported that prevalence of overweight and

obesity were higher in the males and 89.4% were non-vegetarian among them (16).

In a comparative study between Western vegetarian and non-vegetarians, vegetarians had a lower mean BMI, a lower mean plasma total cholesterol concentration, and a lower mortality from ischemic heart disease (17). Skipping food or reducing quantity of food may not help to reduce body weight. Instead an inadequate food habit may lead to development of overweight and obesity (18). In order to reduce the body weight and maintain good health condition consumption of adequate amount of fruits, dark green vegetables, whole grains cereal fibers and recommended level of fat are essential (19, 20). In a cross-sectional descriptive study on school employees in America reports that the employees who were obese did not consume fruits, dark-green vegetables, whole grains and consumed more fat than the recommended level (19). Therefore effective dietary strategies for weight management are essential to prevent overweight and obesity (21). Intake of a low-fat, low-energy diet, over the course of one week in a stress-free environment, had positive impact on the risk factors of cardiovascular diseases (22, 23). Physical activity level would have a stronger impact on obesity during childhood than at adolescence. A study in school children in America was observed that children, who were provided with a daily snack which included fruit, fruit juice, or vegetables, were significantly spent more time in moderate and vigorous physical activity during free play sessions compared to organized adult-led sessions (24). To avoid the risks to develop degenerative diseases during their adulthood, attention should be brought early to the nutritional status, food and physical activity habits of young children (25, 26).

Conclusion

In the present study it is observed that the occurrence of overweight is more in non vegetarian. To prevent obesity all must be encouraged and motivated to follow healthy eating behaviours so as to maintain ideal body weight by including more fruit, vegetables, nuts, whole grains, recommended level of fat in their diet and reduce intake of sugary food. Effective weight management for individuals and groups at risk of developing obesity involves a range of long-term strategies. These include physical activity, weight maintenance, management of co-morbidities and weight reduction in overweight individuals. Creating supportive environments through policies that promote the availability and accessibility of a variety of low-fat, high-fibre foods, and provide opportunities for physical activity are essential.

Recommendation

Promotion of increased awareness of better physical culture and dietary habits is the need of the hour to curb the spread of this preveilable malady.

Limitation of the study

A bigger study with multi stage random sampling technique is required to find out more accurate estimates.

Relevance of the study

This study shows that overweight rate is increasing among Indian and Nepalese youth. In future, it can be a reason for increase in blood pleasure, cholesterol and glycaemia of this productive group. Which will develop the diseases like Cancer, Stroke and Ischaemic heart disease among them.

Authors Contribution

BS and RE collected and collated the data. All authors designed the study. BS, RMG and JS analysed the data. All authors interpreted the findings. RMG, BS and PA prepared the manuscript. SBD and JS reviewed the draft and final manuscript versions. All authors read and approved the final manuscript.

Acknowledgement

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Tables

TABLE 1 COMPARISON BETWEEN INDIANS (N=750) AND NEPALESE (N=1200)

Variables	Nationality	Mean	Confidence Interval
Age	Indians	20.61	(20.53- 20.69)
	Nepalese	20.70	(20.62- 20.77)
	Total	20.66	(20.61- 20.72)
Weight	Indians	69.83	(69.23-70.43)
	Nepalese	65.20	(64.74-65.66)
	Total	67.03	(66.65-67.41)
Height	Indians	174.925	(173.593-176.257)
	Nepalese	165. 730	(164.681-166.779)
	Total	169.372	(168.524-170.221)
BMI	Indians	23.087	(22.881-23.293)
	Nepalese	24.003	(23.842-24.164)
	Total	23.364	(23.512-23.768)

TABLE 2 COMPARISON BETWEEN NORMAL (N=1290) AND OVERWEIGHT (N=660) STUDENTS

Variables	Male adolescents #	Mean	P value	Confidence Interval
BMI	Normal	21.974	0.001*	(21.884-22.064)
	Over weight	26.690		(26.777-27.024)
Weight	Normal	70.64	0.001*	(70.30-70.98)
	Over weight	59.97		(59.37-60.57)
Height	Normal	179.611	0.001*	(178.926-180.295)
	Over weight	149.335		(148.437-150.233)

Total number of male adolescents participated (n=1950); * statistically significant

TABLE 3 COMPARISON BETWEEN VEGETARIANS (N=120) AND NON VEGETARIANS (N=540)

Variables	Food Habit	Mean	P value	Confidence Interval
BMI	Vegetarian	27.101	0.032*	(26.929-27.274)
	Non Vegetarian	26.855		(26.855-27.001)
Weight	Vegetarian	58.15	0.001*	(57.35-58.96)
	Non Vegetarian	60.39		(59.67-61.10)
Height	Vegetarian	149.528	0.001*	(145.133-147.922)
	Non Vegetarian	149.975		(148.925-151.025)

TABLE 4 COMPARISON BETWEEN NON VEGETARIAN NEPALESE (N=450) AND INDIAN (N=90) OVERWEIGHT STUDENTS

Variables	Nationality	Mean	P value	Confidence Interval
BMI	Indians	28.624	0.001*	(28.323-28.924)
	Nepalese	26.479		(26.337-26.621)
Weight	Indians	64.50	0.003*	(61.29-67.71)
	Nepalese	59.51		(59.01-60.01)
Height	Indians	149.560	0.819	(145.304-153.816)
	Nepalese	150.063		(149.154-150.973)

*Statistically significant