Review Article

Barriers in adopting a healthy lifestyle: Insight from college youth

Anjali, Manisha Sabharwal

Department of Food and Nutrition, Lady Irwin College, Delhi University, New Delhi, India

Correspondence to: Anjali, E-mail: anjali.07.aj@gmail.com

Received: October 01, 2016; **Accepted:** October 15, 2016

ABSTRACT

Obesity, a preventable chronic disease, is becoming a serious health problem in all age groups due to the indulgence in a sedentary lifestyle. As a result, the population is at a risk of developing several obesity-related disorders, which in turn is likely to create a huge public health burden for developing nations shortly. With the rise in obesity trends across the population, it is necessary to target the different phases of life to tackle obesity problem. After schoolchildren, college students are the appropriate targets for interventions as their lives are in a transitional phase. Even if individual behavior changes are made, this alone is not likely to result in improved health and quality of life without an environment that enables sustenance of those changes. Therefore, all the interventions must take one's socio-ecological system that shapes behavior into consideration in creating health-promoting programs.

KEY WORDS: Obesity; College Students; Interventions; Quality of Life; Lifestyle

INTRODUCTION

Non-communicable diseases (NCDs) are becoming a major public health concern due to its rising epidemic. The factors that drive this are urbanization, economic growth, and changes in dietary and lifestyle habits. Most of these NCDs are preventable as most of its risk factors such as raised blood pressure, raised blood glucose, tobacco use, physical inactivity, and overweight and obesity can be avoided by adopting a healthy lifestyle.[1-4] However, a healthy lifestyle being a multifaceted process is influenced by various factors which can influence one's behavior and his/her compliance in following a healthy lifestyle.

With the rise in obesity trends across the population, it is necessary to target the different stages of life cycle to tackle obesity problem. After school adolescents, college students are the appropriate targets for interventions as their lives are in a transitional phase. There is a potential for positive changes as college settings offer opportunities to reach large numbers of young adults with health promotion services.[5,6] These services may be effective to improve nutrition and physical activity behaviors among large college students.[7] As a result, identification of barriers to a healthy lifestyle among young college adults is needed to accomplish optimal preventive lifestyle campaigns or interventions.

In general, reviews focusing on young college adults' lifestyle practices are scarce. Therefore, we aimed to review the literature focusing on the barriers faced by young adults in following a healthy lifestyle.

Access this article online	
Website: http://www.ijmsph.com	Quick Response code
DOI: 10.5455/ijmsph.2017.1059014102016	

STIGMA OF OBESITY

Obesity is not a recent stigma of public health, but it has never reached such endemic proportions like today. It is defined as an "abnormal or excessive fat accumulation that presents a risk to health."[8] Overweight and obesity are a key etiological factor of a defined cluster of NCDs which is causing enormous health hazards.[9] It is strongly associated

with reduced life expectancy and chronic diseases such as diabetes, hypertension (HTN), cardiovascular disease (CVD), and metabolic syndrome.[10] For adults, overweight and obesity ranges are determined by using weight and height to calculate the "body mass index" (BMI; weight in kilograms divided by the square of the height in meters (kg/m^2). The World Health Organization (WHO) defines a BMI ≥25 as overweight category and a BMI ≥30 as obesity category.[8] The International Obesity Task Force has also given the classification of obesity in Asia (Table 1) which is different from that of the WHO, due to increased fat percentage in Asians as compared to Caucasians for the same weight. It has also been found that there is an increased risk of comorbidities with obesity occurring at lower BMIs in Asians.[11]

To date, there has been an abundance of research on obesity and overweight in children and adults, but unfortunately, the transitional age of young adulthood has not received much attention. The scarcity of focus on overweight and obesity within this group may be attributed to the fact that it is usually considered as a healthy and vivacious period of life.[13]

OBESITY TRENDS IN YOUNG ADULTS

Global

Obesity is the fifth leading cause of mortality at the global level and is escalating worldwide at an alarming rate in both developing and developed countries.[14,15] According to the WHO,[16] there were 1.5 billion overweight adults, of these over 200 million men and nearly 300 million women were obese in 2008. It is a foresight that by 2015 the figures will reach up to 2-3 billion.[17] Obesity is rising with this alarming trend across the globe, especially in younger adults.[18-20] Gopalakrishnan et al.,[21] in their study done in Malaysia on 420 study participants (19-25 years) revealed that 14.8% of the participants were overweight (BMI 23-24.9 kg/m^2), i.e., 13.7% in males and 15.7% in females. Obesity was reported among 5.2% (BMI >30 kg/m^2), i.e., 9.2% in males and 1.9% in females. The study group consisted of 63.8% Indian, 32.4% Chinese, and 3.8% Malay students. Several studies were carried out on university students in Western countries. A cross-sectional study performed by Soriano et al.[22] on 917 university students in Spain showed a relatively low prevalence of overweight and obesity among males (10%) and females (3%).

Table 1: Classification of weight status according to BMI

Classification	BMI (kg/m^2)*	BMI (kg/m^2)#
Underweight	<18.5	<18.5
Normal range	18.50-24.99	18.5-22.9
Overweight at risk	25.00-29.99	23-24.9
Obese I	30.00-34.99	25-29.9
Obese II	35.00-39.99	>30
Obese III	≥40.00	-

*[12]; #[11]. BMI: Body mass index

India

According to the National Family Health Survey-3, the prevalence of obesity among adults aged 15-49 years was 12.1% and 16% in males and females, respectively. Among the females aged 20-29 years, the prevalence of overweight and obesity was 15.7% and 3.1%, whereas in males, it was 13% and 1.7%, respectively. Other studies done in India have also shown a tremendous prevalence of overweight/obesity in young adults as shown in Table 2.

A study was undertaken to assess the prevalence of obesity, weight perception, and dietary behavior of urban college-going girls in Udaipur (Rajasthan). In the first stage of the study, 1000 samples, i.e., unmarried girls in the age group of 18-24 years were selected to estimate the prevalence of obesity. Height and weight of the participants were measured using the standard procedures for calculating BMI. In the second stage, 30 girls were selected from each of the weight status categories, i.e., normal, overweight, and obese, to study the dietary behavior and weight perception of the participants. The findings revealed that the prevalence of overweight and obesity was 5.6% and 4.4% in urban college-going girls in Udaipur, respectively. The study also revealed that 10% of the urban college-going girls were found to be overweight/obese and they had misconceptions about their body weight. Frequent inclusion of high-fat and energy-dense foods as observed might be the factors contributing toward their overweight.[23] This alarming trend is problematic because the studies have also shown that obesity in young adulthood promotes an increased risk of remaining obese in later adulthood.[24]

However, the sample of the mentioned studies was urban which ranged from middle- to high-income group as higher education and college facilities are only restricted to the big town and cities. Only a small segment of student population has access to higher education and may be at a risk of becoming overweight as they have the accessibility to calorie-dense food or are physically inactive. According to the 2011 Indian census data, more than 70% of Indian population lives in rural areas and more than 50% are engaged in agrarian activity which shows that only a small proportion of population lives in urban areas.[36] Data from the Ministry of Human Resource Development (2009-2010) stated that gross combined enrollment ratio (IX-XII) was 49.3% which is much skewed among different states of the country. The reasons for such low rates are lack of accessibility to school and poor quality of education. Despite considerable economic progress, <1/5th of the estimated 120 million are enrolled in India and wide disparities exist in enrollment percentages among states as well as urban and rural areas and disadvantaged section of the society and women. According to the 11th 5-year plan,

Table 2: Prevalence of overweight/obesity in India

Author	Country/state	*n*	Age group	Criteria used	Prevalence (%)	
					Overweight	Obesity
Flower and Poojara[25]	Ernakulum	200 college girls	17-19 years	BMI and WHR	24	10.5
Sidhu[26]	Amritsar	500 college girls	>18	NA	28.20	15.00
Kaur et al.[27]	Amritsar	1000 males	20-50 years	BMI	46.1	NA
Tiwari and Sankhala[23]	Rajasthan	1000 college girls	18-24 years	BMI	5.6	4.4
Gupta et al.[28]	Kolkata	114 students	NA	BMI	17.5	3.4
Thakkar et al.[29]	Agra	400 college girls	18-24 years	BMI	18.5	4.5
Lohitashwa and Patil[30]	Belgaum	427 adults	17-20 years	BMI	12.2 (M) 21.5 (F)	6.9 (M) 6.6 (F)
Kumar et al.[31]	Hyderabad	613 students	17-28 years	BMI	8	1.5
Vasudevan et al.[32]	Puducherry	471 adults	18-31 years	BMI	26.70 (M) 18.40 (F)	35.20(M) 29.50 (F)
Sudhera and Sidhu[33]	Amritsar	150 females	18-25 years	BMI	20	10.7
				WC		34
				WHR		57
				WSR		37
Deshpande et al.[34]	Ujjain	138 students	18-25 years	BMI	15.9	29
Kamath and Souza[35]	Manipal	506 students	18-24 years	BMI		65

BMI: Body mass index, WC: Waist circumference, WHR: Waist-hip ratio, WSR: Waist-stature ratio, NA: Not available, M: Male, F: Female

there were only 46,430 higher education institutions in the year 2011-2012 which cater only a small percentages of students.[37]

In developing countries such as India, the problem of both undernutrition and overnutrition coexists due to wide socioeconomic disparities. On one hand, there is undernutrition which exists in rural areas whereas the problem of overnutrition is seen more among urban population (12.8%), but due to improvement in socioeconomic status (SES) of rural areas (4%), the changes can be seen among urbanizing rural population as well.[38] Among urban population, the problem of overnutrition is more prevalent among middle SES (65%) followed by high SES (33.2%) and low SES (1.8%).[39]

COLLEGE YEARS: A TRANSITION PHASE

College years, also known as "emerging adulthood," are a unique developmental stage. This formative period of life can be typically defined as 18-25 years of age. It is a time for exploration of new ideologies and behaviors which can allow them to express their individuality. This period is marked by important transitions such as increasing autonomy in decision-making. This shifting from high school to college often results in drastic changes and the years following can give extremely stressful time for the young adults. For many, this is the first time they have held certain responsibilities. They may also have to take up challenging courses that demand a greater amount of dedication and time management skills, sometimes which leads to stressful situations.[40] This stress has both acute and chronic effects on the body and it is managed by college students in many ways that can directly affect their lifestyles and health. Binge eating and drinking, smoking, and other substance abuse are just a few of the unhealthy behaviors many take to deal with stress[41,42] which can further contribute to the weight gain.[43] Binge eating is a psychological condition[44] defined as uncontrolled eating episodes. Binge drinking is also known as heavy drinking, which is defined as the consumption of at least 5 consecutive standard drinks in one sitting for men and 4 consecutive standard drinks in one sitting for women.[45] A standard drink is usually defined as a 12-oz beer, a 4-oz glass of wine, a 12-oz wine cooler, or a 1.25-oz shot of liquor, either straight or in a mixed drink.[46]

Many college students engage in behaviors that decrease the likelihood of optimal health and increase the possibility of overweight and obesity occurrence.[47-49] Diet and exercise habits are most influenced by these behaviors. These unhealthy habits can eventually increase the risk of developing NCDs in the future. Thus, assessment of nutritional status is the cornerstone of efforts to improve the health of individuals and population throughout the world.

DIETARY INTAKE AND PATTERN

Adequate nutrition is one of the most important and modifiable lifestyle determinants of an individual's health. With recent evidences of overnutrition, importance of the healthy diet and good eating habits is being emphasized. Hence, it is important to have appropriate nutrition to remain healthy and physically active. Westernization of food in terms of both quantity and quality has driven the obesity rates. Several studies have reported the engagement

of college students in unhealthy eating habits, i.e., increased consumption of animal products and refined foods in the diet at the expense of vegetables and fruits, which is a leading cause of obesity in this age group.

The college students' diet has a low intake of fruit,[28,50-52] vegetables,[52] dietary fiber,[15,28,47,49,53-57] and an increased consumption of fast and fried food[15,50,51,54,58-61] and alcohol.[60,62] Non-compliance to food groups and nutrient recommendations has also been seen among this age group.[22,28,63-65]

Therefore, colleges are practical locale and settings to influence and improve the eating habits of young adults, otherwise poor dietary patterns in emerging adulthood phase may set the foundation for the beginning of many diseases not manifested yet but can occur much later in life.[66]

PHYSICAL ACTIVITY

Physical activity is an essential component for the management of many health conditions. It also has a major impact on the health of an individual.[67] It is defined as "any bodily movement produced by skeletal muscles that require energy expenditure." It includes exercise as well as other activities which involves bodily movement through part of playing, working, active transportation, household chores, and recreational activities.

Physical inactivity is one of the behavioral risk factors for NCDs. It is becoming a major public health concern regarding overnutrition and is causing an estimated 3.2 million deaths globally. It has also been associated with the risk of several chronic diseases and health conditions such as CVDs, diabetes, HTN, colon and breast cancer, depression, and also obesity. Therefore, it is necessary to take steps toward improving general population's physical activity levels.

Physical inactivity increases with age and the most rapid increase occurs in late adolescence and early adulthood.[68-71] Young adults on college campuses are also not meeting the physical activity recommendations,[47,67,72-74] and a substantial population in this group is physically inactive,[49,70,75-80] leading a sedentary lifestyle.[80,81] This in turn can put them at significant risks for numerous lifestyle-related chronic diseases. Increasing physical activity is not just an individual approach. It demands a population-based, multisectoral, multidisciplinary, and culturally relevant approach. Changing the general population's lifestyle behavior seems to be a battle that cannot be easily won as there are substantial factors or barriers that makes it challenging to establish the healthy lifestyle.[77] Hence, interventions at this crucial developmental period may be the last opportunity for cost-effective health education and prevention interventions.[47]

What Makes it So Hard to Follow? Barriers to Healthy Lifestyle

Eating and physical activity are the individual characteristics, but the amount of food, type of food a person eats, and physical activity a person does are also determined by the factors outside.

According to the ecological approach, health is not solely determined by one's individual features, but also from the factors outside the individual and interaction between the two.

The ecological model of health promotion presents health "as the product of interdependence between the individual and subsystems of ecosystems."

There are multiple levels of influence on one's health behavior, including intrapersonal, interpersonal, community/institution, and macro/public policy.[82]

Intrapersonal Barriers

An individual's food choices and lifestyle practices are influenced by a variety of personal factors such as beliefs, thoughts, feelings,[83] and these are the reasons that make it difficult to change the individual's behavior. In the process of choosing healthy lifestyle stimuli such as perceptions, values, expectations, or emotions; health considerations, taste preferences; knowledge and skills; and experiences play an important role[84] which are mostly within the control of an individual. At this level, taste preferences (e.g., for fast foods) and lack of nutrition knowledge and skills, laziness, tiredness, and irritability can be barriers to choosing a healthy lifestyle. When people acquire knowledge and develop perceptions, expectations, and feelings about foods and healthy lifestyle, they all become powerful determinants of food choices and dietary and physical activity behavior.

Among the several levels of influence, the intrapersonal barriers have been well documented and have been associated with the poorer lifestyle practices. Several studies have mentioned lack of time.[3,85-88] lack of motivation, stress,[3,89,90] lack of knowledge.[91,92] as a some of the intrapersonal barriers. Hence, these beliefs, thoughts, feelings, and other intrapersonal factors must be carefully understood so that sensitive nutrition programs can be designed and implemented.

Interpersonal Barriers

Human beings are social creatures and they all participate in the network of social relationships. These networks include friends, peers, family, and coworkers/colleagues. The structures of social networks and the support one receives from others have an impact on one's lifestyle. Healthy lifestyle patterns are also influenced by the need to negotiate with others in the family about what they buy/eat or what lifestyle they opt. Peers and colleagues also impact our

day-to-day lifestyle patterns. In several studies, participants have reported a lack of parental support as a barrier as they give academic success more priority over others.[87] Some of the barriers perceived at this stage are lack of social support and culture. Socioeconomic factors also influence lifestyle behaviors. Lower SES individuals may have poorer access to parks, walking or jogging trails, and gym equipment than those of higher SES. Access to good quality, inexpensive, healthy foods has also been reported to be more limited among persons of low SES.[93,94]

Television viewing or computer use (screen time) can be intra- or inter-personal-level barriers as they can apply to an individual or to the entire family, but they are also influenced by the public policy-level factors such as food advertisements and media regulations. Thus, strategies which include creating support groups, peer educators, and worksite-based program can promise to combat barriers at this level.

Community/Institution Barriers

The community/institution-level barriers include the characteristics of physical infrastructure/environment that help in determining what lifestyle we live.

This level includes institutions or organizations; work sites, schools and colleges, parks, industrial areas, and highways. There is evidence showing that the physical environment has an impact on large population dietary and physical activity behavior.[95,96] Limited availability of healthful foods is also a barrier to healthful eating in schools, colleges, and workplaces. Furthermore, frequent eating at restaurants is related to suboptimal dietary patterns characterized by larger portions and foods high in calories, fat, and sodium.[97] Physical environment like built environment such as street lighting, neighborhood safety, green open areas, parks and playgrounds, and sidewalk facilities can facilitate or hinder physical inactivity.[98-100]

Macro/Public Policy Barriers

The macro/public policy-level factors involve local, state, and federal policies, especially the policies that influence food pricing. The food pricing is found to affect individuals' food intake patterns because healthful foods are reported to cost more than less nutrient-dense foods.[101]

Thus, price can be a strong determinant in adopting healthy lifestyle practices.[102] Differences in the price can explain the differences among individuals in terms of their food choices and lifestyle practices. It has also been documented that low-income individuals eat fewer fruits and vegetables, which can contribute to the unhealthier dietary practices in them.[103]

Information environment which includes media and advertising is also a major contributing factor influencing lifestyle. Media have evolved drastically in the past two decades, which has resulted in easier accessibility to television channels, websites, radio, etc. Due to this revolution, the screen time has been increased among individuals, which has made their lifestyle sedentary.[104] The screen time can be defined as time spent using computers, watching television or DVDs, and/or playing video games.[105] The media have also evolved as information media by providing information about the importance of healthy lifestyle to the population. It has also a powerful capacity to persuade people through advertisement. Availability and accessibility of the opportunities for healthy eating and active living is also influenced by social structure and public policies. These barriers can be addressed both at individual and policy levels.

Therefore, all the interventions must recognize that people live in social, political, ecological system that shape behavior and access to the resources that they need to maintain good health. Even if individual behavioral changes are made, this alone is not likely to result in improved health and quality of life without an environment that enables sustenance of those changes. Thus, understanding the effect of personal, social, and environmental determinants of lifestyle is essential in creating health-promoting programs.

STRATEGIES ADOPTED SO FAR

Nutrition education through various techniques is widely used for a range of population groups as a medium to deliver healthy diet and nutrition information. Several studies have also used this as a method of intervention and have revealed encouraging and positive changes in college students such as increased vegetable and fruits,[106-108] increased whole grain intake,[109] improved dairy intake,[108,110-112] decreased soft drink consumption,[110] and decreased fat intake.[113]

Prevention of obesity is most effective when implemented in childhood itself. Therefore, in India, initiatives such as weekly periods for exercise and outdoor activities have been started by the schools. Nutrition education is also being imparted to the children by teachers. Schools have also restricted the sale of aerated drinks and chips. They are also providing them better food choices and have introduced substitutes such as milk products and different varieties of Indian food items that have good nutritive value. A recent suggestion has been made by the Ministry of Women and Child Development, India, to withdraw junk food and aerated drinks across the country from school and college canteens.[114] The appropriate direction to the schools and colleges has been issued to promote awareness about healthy habits among students such as benefits of consumption of fruits, vegetables, and whole grains.[115,116] Nutrition education is a well-suited technique to both improve students' dietary habits as well as to increase their awareness toward overall health across the countries. Ethnicity and cultural practices also have an

important impact on lifestyle practices. Different regions have different practices. Asian population is more likely to be less physically active. It has been reported that among Asians only household and occupational activity contributed to the physical activity.[76] In countries such as India, there are cultural and religious barriers and gender differences. Females, especially in Asian ethnicity, are generally restricted in doing physical sports and outdoor activities by their parents at the time of transition to secondary school/puberty as compared to Caucasian population where much freedom is given. Thus, intervention effectiveness can be enhanced if physical activity promotion efforts are made keeping characteristics of the student population such as health determinants, students' ethnicity, and their lifestyle patterns in mind. Primary prevention strategies to educate community regardless of their economic status through mass media or through counseling can tackle the global problem of obesity. However, population-based strategies such as formulating policies using the WHO guidelines to improve social and physical environment can also improve the situation and can meet the challenges.

SUCCESS STORIES

Nutrition education is widely used for a range of population groups as a medium to deliver healthy diet and nutrition information; however, this type of intervention is still rarely implemented for college students. Several studies have shown significant and beneficial changes in dietary habits of college students after the implementation of nutritional interventions through various techniques.[107,109-112,117] In a peer-led nutrition education intervention where cooking demonstrations along with skills regarding planning and preparing meals were given to college students; was found to be more effective as compared to basic nutrition session.[118]

In India also, it has been found that urban schoolchildren are learning to fight back obesity with awareness, self-control, and a zeal for fitness. Now, they are more aware and ready to change their unhealthy lifestyle. Apart from children's initiatives, stricter monitoring of schools and parents has also led this change. The schoolchildren are now cutting their intake of fast foods and are adopting a more healthy and active lifestyle. In particular, it is evident that nutrition education and its combination with supplement provision appeared to be the best methods for enhancing college students' eating habits and promoting healthier diets and lifestyles.[119]

RECOMMENDATIONS

The role of societal adults should be identified in the prevention of obesity and promoting opportunities for easier access to healthy food choices for children and young adults. Government initiatives are also needed to encourage laws necessitating calorie information easily accessible at outlets so that individuals can be more informed and can make better nutrient selections. Promotion of healthy eating through inclusion of nutrition workshop/classes in the curriculum, or government-sponsored advertisements, or public service campaign could be an important strategy. Thus, the government needs to undertake initiatives such as advertisement on television, radio about better food choices, and the importance of physical activity.

Many nations have already issued bans on junk foods and have promoted proper labeling of packaged food items. Such stringent action is also required in a country like India, where NCDs are growing with alarming rates. Healthier and nutritious food options in the canteen can also help in making healthy choices. Nutrition education of both students and people working at the grass-roots level such as college and school canteen should be promoted. Regular and stringent inspection by authorities on the foodstuffs being sold in canteens can also help.

Thus, new researches focusing on the development of effective and interesting nutrition education tools that are relevant to the current generation of students are also required. Merely personal actions are not enough to tackle the obesity problem; efforts from the government policies are also required. Only imparting knowledge and skills for new health behavior is not enough; targeting and intercepting workplace norms and eating environment is necessary to support change. In addition, having understanding of an individual receptivity of health innovation is important to create effective behavioral change intervention.

CONCLUSION

Both developed and developing countries have experienced a major transformation over the past few decades, and a sedentary lifestyle and an unhealthy diet have contributed to this change. This change has led to the high rates of obesity among young people which have created the urgency for multifactorial approaches to promote healthy lifestyle behaviors focusing on barriers at various levels. This will tackle the problem of obesity, and most of the NCDs can be avoided.

Hence, ecological models can prove to be useful tools in developing such health promoting interventions as it identifies both individual and environmental factors.

Thus, to develop an effective and appropriate educational intervention, it is necessary to understand the barriers that young adults perceive in following a healthy lifestyle. There is also an urgent need to develop human resources and infrastructure to tackle this problem rather than just assessing it.

REFERENCES

1. Eyre H, Kahn R, Robertson RM; American Cancer Society, the American Diabetes Association, and the American Heart Association. Collaborative Writing Committee. Preventing cancer, cardiovascular disease, and diabetes: A common agenda for the American Cancer Society, the American Diabetes Association, and the American Heart Association. Diabetes Care. 2004;27(7):1812-24.
2. Ignarro LJ, Balestrieri ML, Napoli C. Nutrition, physical activity, and cardiovascular disease: An update. Cardiovasc Res. 2007;73:326-40.
3. Sajwani RA, Shoukat S, Raza R, Shiekh MM, Rashid Q, Siddique MS, et al. Knowledge and practice of healthy lifestyle and dietary habits in medical and non-medical students of Karachi, Pakistan. J Pak Med Assoc. 2009;59:650-5.
4. WHO. Global Status Report on Noncommunicable Diseases. Geneva: World Health Organization; 2010.
5. Wengreen HJ, Moncur C. Change in diet, physical activity, and body weight among young-adults during the transition from high school to college. Nutr J. 20098;8:32.
6. Quintiliani LM, Bishop HL, Greaney ML, Whiteley JA. Factors across home, work, and school domains influence nutrition and physical activity behaviors of nontraditional college students. Nutr Res. 2012;32(10):757-63.
7. Wong Y, Huang YC, Chen SL, Yamamoto S. Is the college environment adequate for accessing to nutrition education: A study in Taiwan. Nutr Res. 1999;19:1327-37.
8. World Health Organization. Noncommunicable Diseases in the South-East Asia Region: Situation and Response. Genava: WHO; 2011.
9. Kalra S, Unnikrishnan A. Obesity in India: The weight of the nation. J Med Nutr Nutraceuticals. 2012;1:37.
10. Ramachandran A, Chamukuttan S, Shetty SA, Arun N, Susairaj P. Obesity in Asia--Is it different from rest of the world. Diabetes Metab Res Rev. 2012;28 Suppl 2:47-51.
11. World Health Organisation, (WHO). The Asia-Pacific Perspective: Redefining Obesity and Its Treatment. Geneva, Switzerland: World Health Organization; 2000. p. 56.
12. WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004;363(9403):157-63.
13. Nelson MC, Story M, Larson NI, Neumark-Sztainer D, Lytle LA. Emerging adulthood and college-aged youth: An overlooked age for weight-related behavior change. Obesity (Silver Spring, Md). 2008;16:2205-11.
14. Ezzati M, Lopez AD, Rodgers A, Murray CJ. Comparative Quantification of Health Risks: Global and Regional Burden of Diseases Attributable to Selected Major Risks. Vol. 1. Geneva: World Health Organisation; 2004.
15. Al-Rethaiaa AS, Fahmy AE, Al-Shwaiyat NM. Obesity and eating habits among college students in Saudi Arabia: A cross sectional study. Nutr J. 2010;9:39.
16. Alwan A, Armstrong T, Cowan M, Riley L. WHO: Noncommunicable Diseases Country Profiles 2011. Geneva: World Health Organisation; 2011.
17. World Health Organisation. Obesity and Overweight: Fact Sheet No. 311. 2013. p. 311. Available from: http://www.who.int/mediacentre/factsheets/fs311. [Last accessed on 2015 March 12].
18. Hensrud DD, Klein S. Extreme obesity: A new medical crisis in the United States. Mayo Clin Proc Mayo Clin. 2006;81:S5-10.
19. Eiben G, Lissner L. Health hunters--An intervention to prevent overweight and obesity in young high-risk women. Int J Obes. 2006;30(4):691-6.
20. Wane S, van Uffelen JG, Brown W. Determinants of weight gain in young women: A review of the literature. J Women's Health (Larchmt). 2010;19(7):1327-40.
21. Gopalakrishnan S, Ganeshkumar P, Prakash MV, Christopher, Amalraj V. Prevalence of overweight/obesity among the medical students, Malaysia. Med J Malaysia. 2012;67(4):442-4.
22. Soriano JM, Moltó JC, Maes J, Mañes, J. Dietary intake and food pattern among university. Nutr Res. 2000;20(9):1249-58.
23. Tiwari P, Sankhala A. Prevalence of obesity, weight perception and dietary behaviour of urban college going girls. J Hum Ecol. 2007;21:181-3.
24. Desai MN, Miller WC, Staples B, Bravender T. Risk factors associated with overweight and obesity in college students. J Am Coll Health. 2008;57:109-14.
25. Flower AL, Poojara H. Prevalence of obesity, weight perceptions and weight control practices among urban college going girls. Indian J Community Med. 2003;28:187-90.
26. Sidhu S. Prevalence of overweight and obesity among the college-going girls of Punjab. Anthropologist. 2004;6:295-7.
27. Kaur N, Sidhu SS, Sidhu SS. Prevalence of overweight and obesity in preschool children of Amritsar, Punjab. Anthropologist. 2010;12:221-4.
28. Gupta S, Ray TG, Saha I. Overweight, obesity and influence of stress on body weight among undergraduate medical students. Indian J Community Med. 2009;34:255-7.
29. Thakkar HK, Misra SK, Gupta SC. A study on prevalence of obesity among college going girls in agra district of U.P. Indian J Community Health. 2009;21:61-4.
30. Lohitashwa R, Patil P. A cross sectional study of relationship of obesity indices with blood pressure and blood glucose level in young. Int J Basic Med Sci. 2012;3:102-7.
31. Kumar CA, Revannasiddaiah N, Gopi A, Halevoor V. A cross-sectional study on the dietary factors and their association with body mass index among undergraduate medical students in a medical college. Int J Health Sci. 2014;2:591-8.
32. Vasudevan PK, Umamaheshwari K, Vedapriya D, Chinnakali P. Overweight and obesity in young adults: Food for thought. Int J Curr Res Rev. 2012;4:38-42.
33. Sudhera N, Sidhu S. Assessment of obesity using various anthropometric variables among young adult females of amritsar (Punjab). Hum Biol Rev. 2012;1:365-75.
34. Deshpande K, Patel S, Bhujade R, Deepak P. Lifestyle and obesity among college students. Nat J Community Med. 2013;4(2):291-3.
35. Kamath S, Souza JD. Prevalence of obesity among the medical students: A cross sectional study in a south Indian medical college. Al Ameen J Med Sci. 2013;6:93-5.
36. Available from: http://www.data.gov.in. [Last accessed on 2015 Dec 08].
37. Available from: http://www.mhrd.gov.in. [Last accessed on 2015 Dec 08].
38. Sidhu S, Kumari K. Incidence of overweight and obesity among urban and rural males of amritsar. J Exer Sci Physiother. 2006;2:79-83.
39. Goyal RK, Shah VN, Saboo BD, Phatak SR, Shah NN, Gohel MC, et al. Prevalence of overweight and obesity in

Indian adolescent school going children: Its relationship with socioeconomic status and associated lifestyle factors. J Assoc Physicians India. 2010;58:151-8.
40. Webb E, Ashton CH, Kelly P, Kamah F. An update on British medical students' lifestyles. Med Educ. 1998;32(3):325-31.
41. Kidorf M, King VL, Peirce J, Kolodner K, Brooner RK. A treatment reengagement intervention for syringe exchangers. J Subst Abuse Treat. 2011;41:415-21.
42. Ham LS, Casner HG, Bacon AK, Shaver JA. Speeches, strangers, and alcohol use: The role of context in social stress response dampening. J Behav Ther Exp Psychiatry. 2011;42(4):462-72.
43. Serlachius A, Hamer M, Wardle J. Stress and weight change in university students in the United Kingdom. Physiol Behav. 2007;92(4):548-53.
44. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed., Vol. 4. American Psychiatric Association; 1994.
45. Wechsler H, Dowdall GW, Davenport A, Castillo S. Correlates of college student binge drinking. Am J Public Health. 1995;85(7):921-6.
46. Wechsler H, Lee JE, Kuo M, Lee H. College binge drinking in the 1990s: A continuing problem. Results of the harvard school of public health 1999 college alcohol study. J Am Coll Health. 2000;48(5):199-210.
47. Huang TT, Harris KJ, Lee RE, Nazir N, Born W, Kaur H. Assessing overweight, obesity, diet, and physical activity in college students. J Am Coll Health. 2003;52(2):83-6.
48. Levitsky D, Halbmaier C, Mrdjenovic G. The freshman weight gain: A model for the study of the epidemic of obesity. Int J Obes Related Metab Disord. 2004;28:1435-42.
49. Racette SB, Deusinger SS, Strube MJ, Highstein GR, Deusinger RH. Changes in weight and health behaviors from freshman through senior year of college. J Nutr Educ Behav. 2008;40:39-42.
50. Dinger MK, Waigandt A. Dietary intake and physical activity behaviors of male and female college students. Am J Health Promot. 1997;11:360-2.
51. Sharma SK, Kaur J, Kaur J, Kaur K. A descriptive study on dietary pattern and biophysical profile among nursing students. Nurs Midwifery Res J. 2009;5(2):80-8.
52. Kaur I, Kaur S. A comparison of nutritional profile and prevalence of anemia among rural girls and boys. J Exer Sci Physiother. 2011;7:11-8.
53. Georgiou CC, Betts NM, Hoerr SL, Keim K, Peters PK, Stewart B, et al. Among young adults, college students and graduates practiced more healthful habits and made more healthful food choices than did nonstudents. J Am Diet Assoc. 1997;97(7):754-9.
54. Chourdakis M, Tzellos T, Papazisis G, Toulis K, Kouvelas D. Eating habits, health attitudes and obesity indices among medical students in northern Greece. Appetite. 2010;55(3):722-5.
55. Greene GW, Schembre SM, White AA, Hoerr SL, Lohse B, Shoff S, et al. Identifying clusters of college students at elevated health risk based on eating and exercise behaviors and psychosocial determinants of body weight. J Am Diet Assoc. 2011;111(3):394-400.
56. Small M, Bailey-Davis L, Morgan N, Maggs J. Changes in eating and physical activity behaviors across seven semesters of college: Living on or off campus matters. Health Educ Behav. 2013;20:435-41.
57. Vigasini N. Adequacy of fiber intake of students of nutrition aged between 18 to 23 years. Int J Sci Res. 2014;3:189-90.
58. Harnack L, Story M, Rock BH. Diet and physical activity patterns of Lakota Indian adults. J Am Diet Assoc. 1999;99:829-35.
59. Nisar N, Qadri MH, Fatima K, Perveen S. Dietary habits and life style among the students of a private medical university Karachi. J Pak Med Assoc. 2009;59:98-101.
60. Nelson MC, Lust K, Story M, Ehlinger E. Alcohol use, eating patterns, and weight behaviors in a university population. Am J Health Behav. 2009;33:227-37.
61. Chhaya S, Jadav P. Dietary and lifestyle pattern in relation to overweight and obesity among the medical and nursing students. Indian J Res Rep Med Sci. 2012;2:9-12.
62. Vella-Zarb RA, Elgar FJ. Gain in the freshman year of college. J Am Coll Health. 2009;58:161-6.
63. Hendricks KM, Herbold N, Fung T. Diet and other lifestyle behaviors in young college women. Nutr Res. 2004;24:981-91.
64. McArthur LH, Pawlak R. An exploratory study of compliance with dietary recommendations among college students majoring in health-related disciplines: Application of the transtheoretical model. Nutr Res Pract. 2011;5:578-84.
65. Hahn D, Yoon A, Kim K, Kim K, Lee S. Where college students live can impact their eating and exercise habits category: Masters. Int J Exer Sci. 2013;2:52.
66. Berg CJ, An LC, Ahluwalia JS. Dietary fat intake and exercise among two- and four-year college students: Differences in behavior and psychosocial factors. Community Coll J Res Pract. 2013;37:388-96.
67. Al-Eisa ES, Al-Sobayel HI. Physical activity and health beliefs among Saudi women. J Nutr Metab. 2012;2012:1-6.
68. Stephens T, Jacobs DR Jr., White CC. A descriptive epidemiology of leisure-time physical activity. Public Health Rep. 1985;100:147-58.
69. Sallis JF. Age-related decline in physical activity: A synthesis of human and animal studies. Med Sci Sports Exerc. 2000;32:1598-600.
70. Behrens TK, Dinger MK. A preliminary investigation of college students' physical activity patterns. Am J Health Stud. 2003;18:169-72.
71. Han JL, Dinger MK, Hull HR, Randall NB, Heesch KC, and Fields DA. During the transition to college. Am J Health Educ. 2008;39:194-9.
72. Atlantis E, Barnes EH, Ball K. Weight status and perception barriers to healthy physical activity and diet behavior. Int J Obes. 2008;32:343-52.
73. Williams ED, Stamatakis E, Chandola T, Hamer M. Assessment of physical activity levels in South Asians in the UK: Findings from the Health Survey for England. J Epidemiol Community Health. 2011;65:517-21.
74. Poobalan AS, Aucott LS, Clarke A, Smith WC. Physical activity attitudes, intentions and behaviour among 18-25?year olds: A mixed method study. BMC Public Health. 2012 10;12:640.
75. Al-Refaee SA, Al-Hazzaa HM. Physical activity profile of adult males in Riyadh City. Saudi Med J. 2001;22:784-9.
76. Suminski RR, Petosa R, Utter AC, Zhang JJ. Physical activity among ethnically diverse college students. J Am Coll Health 2002;51(2):75-80.
77. Keating XD, Guan J, Piñero JC, Bridges DM. A meta-analysis of college students' physical activity behaviors. J Am Coll Health. 2005;54(2):116-25.

78. El-Gilany AH, Badawi K, El-Khawaga G, Awadalla N. Physical activity profile of students in Mansoura University, Egypt. East Mediterr Health J. 2011;17:694-702.
79. Ferreira de Silva GDS, Bergamaschine R, Rosa M, Melo C, Miranda R, Filh MB. Evaluation of the physical activity level of undergraduation students of health/biology fields. Rev Bras Med Esport. 2007;13:32e-5.
80. Buckworth J, Nigg C. Physical activity, exercise, and sedentary behavior in college students. J Am Coll Health. 2004;53(1):28-34.
81. Budakov N, Bokan DD, Rakić D, Bokan D. Body mass index and physical activity of students of university of Novi Sad. South East Eur Health Sci J. 2012;2:8-14.
82. Fitzgerald N, Spaccarotella K. Barriers to a healthy lifestyle: From individuals to public policy - An ecological perspective. J Ext. 2009;47:1-8.
83. Timmerman GM. Addressing barriers to health promotion in underserved women. Fam Community Health. 2007;30 1 Suppl:S34-42.
84. Contento IR. Nutrition education: Linking research, theory, and practice. Asia Pac J Clin Nutr. 2008;17 Suppl 1:176-9.
85. Biloukha O, Utermohlen V. Healthy eating in Ukraine: Attitudes, barriers and information sources. Public Health Nutr. 2001;4:207-15.
86. Gyurcsik NC, Spink KS, Bray SR, Chad K, Kwan M. An ecologically based examination of barriers to physical activity in students from grade seven through first-year university. J Adolesc Health. 2006;38:704-11.
87. Daskapan A, Tuzun EH, Eker L. Perceived barriers to physical activity in university students. J Sports Sci Med. 2006;5:615-20.
88. Al-Otaibi HH. Measuring stages of change, perceived barriers and self efficacy for physical activity in Saudi Arabia. Asian Pac J Cancer Prev. 2013;14(2):1009-16.
89. Nguyen-Michel ST, Unger JB, Hamilton J, Spruijt-Metz D. Associations between physical activity and perceived stress/ hassles in college students. Stress Health. 2006;22:179-88.
90. Wainer JS. Perceived stress, perceived social support, depression and food consumption frequency in college students. 1-34: Carnegie Mellon University; 2010.
91. Lappalainen R, Saba A, Holm L, Mykkanen H, Gibney MJ, Moles A. Difficulties in trying to eat healthier: Descriptive analysis of perceived barriers for healthy eating. Eur J Clin Nutr. 1997;51 Suppl 2:S36-40.
92. López-Azpiazu I, Martínez-González MA, Kearney J, Gibney M, Martínez JA. Perceived barriers of, and benefits to, healthy eating reported by a Spanish national sample. Public Health Nutr. 1999;2(2):209-15.
93. Chinn DJ, White M, Harland J, Drinkwater C, Raybould S. Barriers to physical activity and socioeconomic position: Implications for health promotion. J Epidemiol Community Health. 1999;53(3):191-2.
94. Wilson DK, Kirtland KA, Ainsworth BE, Addy CL. Socioeconomic status and perceptions of access and safety for physical activity. Ann Behav Med. 2004;28(1):20-8.
95. Davison KK, Lawson CT. Do attributes in the physical environment influence children's physical activity? A review of the literature. Int J Behav Nutr Phys Act. 2006;3:19.
96. Sallis JF, Glanz K. Physical activity and food environments: Solutions to the obesity epidemic. Milbank Q. 2009;87:123-54.
97. Popkin BM, Duffey K, Gordon-Larsen P. Environmental influences on food choice, physical activity and energy balance. Physiol Behav. 2005;86:603-13.
98. Sallis JF, Johnson MF, Calfas KJ, Caparosa S, Nichols JF. Assessing perceived physical environmental variables that may influence physical activity. Res Q Exerc Sport. 1997;68(4):345-51.
99. Addy CL, Wilson DK, Kirtland KA, Ainsworth BE, Sharpe P, Kimsey D. Associations of percieved social and physical environmental supports with physical activity and walking behavior. Am J Public Health. 2004;94(3):440-3.
100. Bolívar J, Daponte A, Rodríguez M, Sánchez JJ. The influence of individual, social and physical environment factors on physical activity in the adult population in Andalusia, Spain. Int J Environ Res Public Health. 2010;7:60-77.
101. Monsivais P, Drewnowski A. The rising cost of low-energy-density foods. J Am Diet Assoc. 2007;107(12):2071-6.
102. Cody MM, Gravani R, Edge MS, Doohar C, White C. International food information council foundation food and health survey, 2006-2010, food safety: A web-enabled survey. Food Prot Trends. 2012;32:309-26.
103. Wardle J, Steptoe A. Socioeconomic differences in attitudes and beliefs about healthy lifestyles. J Epidemiol Community Health. 2003;57:440-3.
104. Fountaine CJ, Liguori GA, Mozumdar A, Schuna J. Physical activity and screen time sedentary behaviors in college students. Int J Exer Sci. 2011;4:102-12.
105. Marshall S, Gorely T, Biddle S. A descriptive epidemiology of screen-based media use in youth: A review and critique. J Adolesc. 2006;29:333-49.
106. Richards A, Kattelmann KK, Ren C. Motivating 18- to 24-year-olds to increase their fruit and vegetable consumption. J Am Diet Assoc. 2006;106:1405-11.
107. Ha EJ, Caine-Bish N. Effect of nutrition intervention using a general nutrition course for promoting fruit and vegetable consumption among college students. J Nutr Educ Behav. 2009;41:103-9.
108. Hekler EB, Gardner CD, Robinson TN. Effects of a college course about food and society on students' eating behaviors. Am J Prev Med. 2010;38:543-7.
109. Ha EJ, Caine-Bish N. Interactive introductory nutrition course focusing on disease prevention increased whole-grain consumption by college students. J Nutr Educ Behav. 2011;43:263-7.
110. Ha EJ, Caine-Bish N, Holloman C, Lowry-Gordon K. Evaluation of effectiveness of class-based nutrition intervention on changes in soft drink and milk consumption among young adults. Nutr J. 2009;8:50.
111. Poddar KH, Hosig KW, Anderson ES, Nickols-Richardson SM, Duncan SE. Web-based nutrition education intervention improves self-efficacy and self-regulation related to increased dairy intake in college students. J Am Diet Assoc. 2010;110(11):1723-7.
112. Poddar KH, Hosig KW, Anderson-Bill ES, Nickols-Richardson SM, Duncan SE. Dairy intake and related self-regulation improved in college students using online nutrition education. J Acad Nutr Diet. 2012;112:1976-86.
113. Finckenor M, Byrd-Bredbenner C. Nutrition intervention group program based on preaction-stage-oriented change processes of the transtheoretical model promotes long-term reduction in dietary fat intake. J Am Diet Assoc. 2000;100(3):335-42.
114. Sharma N. Centre wants to ban sale of junk food in and around

schools. Mail Today. 2015. Available from: http://www.indiatoday.intoday.in/story/junk-food-ban-school-children-government-panel/1/460035.html. [Last accessed on 2015 Dec 22].
115. Dubudu R. FSSAI issues draft guidelines for restricting high fat foods in schools & nearby areas. News Laundry. 2015. Available from: http://www.newslaundry.com/2015/12/08/fssai-issues-draft-guidelines-for-restricting-high-fat-foods-in-schools-nearby-areas/#. [Last accessed on 2015 Dec 22].
116. Dhawan H. Maneka Gandhi seeks ban on junk food for students. New Delhi: The Times of India; 2015.
117. You JS, Sung MJ, Chang KJ. Evaluation of 8-week body weight control program including sea tangle (*Laminaria japonica*) supplementation in Korean female college students. Nutr Res Pract. 2009;3(4):307-14.
118. Bradley K, Silliman K, Morris MN. Evaluation of a peer-led nutrition education intervention among college students. FASEB. 2008;22(1):681-7.
119. Anjali, Sabharwal M. Effectiveness of lifestyle interventions among college students: An overview. J Nutr Food Sci. 2015;5:1-6.

How to cite this article: Anjali, Sabharwal M. Barriers in adopting a healthy lifestyle: Insight from college youth. Int J Med Sci Public Health 2017;6(3):439-448.

Source of Support: Nil, **Conflict of Interest:** None declared.