



Original Research Article

Physical, Dietary and Personal Factors Associated with Overweight and Obesity among Higher Secondary School Level Adolescents in Kaski District, Nepal

Bishwas Acharya¹, Hoshiar Singh Chauhan², Dipendra Malla¹

¹MPH Scholar, ²Professor and Dean,
Akal School of Public Health and Hospital Administration, Eternal University, Baru Sahib, Sirmour-173101,
Himachal Pradesh, India

Corresponding Author: Bishwas Acharya

Received: 12/02/2015

Revised: 10/03/2015

Accepted: 12/03/2015

ABSTRACT

Introduction: Overweight and obesity is a global public health problem with adolescents as a vulnerable group for its development. Poor physical activities and increased intake of fatty foods are in rising level.

Objectives: To find out the associated physical, dietary and personal factors of higher secondary school level adolescents in Kaski district, Nepal.

Methods: A cross sectional study was conducted in Kaski district among 838 adolescents randomly selected from 12 schools using multistage cluster sampling from October to December, 2013 using self-administered questionnaire and anthropometric assessment. BMI for age was calculated using WHO AnthroPlus software version.1.0.4 using cut off value of 85th percentile and 95th percentile for overweight and obesity respectively. Statistical analysis was done using Statistical Software for Social Sciences Version 16.

Results: Significantly overweight and obesity was found high in adolescents who go school by bus/car ($p < 0.001$, OR=3.06), perform vigorous activities < 3 days per week ($p < 0.001$, OR=3.22), engage in passive activities ≥ 3 days per week ($p = 0.01$, OR=2.6) and passive activity at leisure time ($p < 0.001$, OR=16.73). Food habit such as number of meals > 3 times per day ($p < 0.001$, OR=7.34), fat intake > 3 times per week ($p < 0.001$, OR=14.06), vegetable intake ≤ 3 times per week ($p < 0.001$, OR=2.74), fast food intake frequency > 3 times per week ($p = 0.002$, OR=2.19) and average daily allowance \geq Rs.50 ($p < 0.01$) were found to be significantly associated with overweight and obesity.

Conclusion: Sedentary lifestyle was found to be a significant contributing factor for overweight and obesity.

Key words: Overweight; Obesity; Physical activity; Food habit; Personal factor

INTRODUCTION

Overweight and obesity undermine the health of adolescents in both industrialized and developing countries. [1] Overweight and obesity are epidemic and a

public health crisis among adolescents worldwide. [2] There is a rapid emergence of overweight and obesity in developing countries and has been recognized as a major public health problem

in most regions of the world. [3] Underweight, overweight and obesity are common for both male and female in developing countries but now overweight exceeds underweight among women of reproductive age. [4]

Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer and are the fifth leading risk factors for global deaths. Overweight and obesity are linked to more deaths worldwide than underweight. At least 2.8 million adults die each year as a result of being overweight or obese and about 44% of the diabetes burden, 23% of the ischemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity. [5] The global age-standardized prevalence of obesity nearly doubled from 6.4% (95% uncertainty interval 5.7-7.2%) in 1980 to 12.0% (11.5-12.5%) in 2008. [6] Prevalence of childhood obesity increased from 4% to 6% in 2010 which is expected to reach 9% or approximately 60 million in 2020. [7] Approximately 21-24% and 16-18% of children and adolescents were estimated to be overweight and obese in 2004. [8] At least 35 million overweight children were estimated to be living in developing countries and 8 million in developed countries of which obesity is increasingly prevalent among adolescent girls and women particularly in low-income and rapidly evolving economies such as Brazil, China and Egypt. [9,10] Although, the prevalence was comparatively lower in Asia (4.9% in 2010), the number of afflicted children were greater. [7] About 21 million children were overweight or obese in China by 2005 which consisted of 14% of boys and 9% of girls. [11] There is an epidemic of obesity and overweight in South Asian countries. [12] In India, 14 percent of children of ages 8-18 were overweight or obese. [13]

The overall prevalence of overweight or obesity in women in Nepal in 2006 was 10.1% with 25.5% in urban area and 7.4% in rural area which was 6.4% in 2000 and 1.6% in 1996. In age group 15-19 it was 2.5 in 2006. [14] Prevalence of overweight and obesity was 2.9 percent among adolescent girls of 15-19 years in 2011 in Nepal of which 2.6 percent were overweight and 0.3 percent girls were obese. [15]

The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. Increased intake of energy-dense foods that are high in fat and an increase in physical inactivity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization is increasing globally which are the contributing factors for overweight and obesity. Changes in dietary and physical activity patterns are often the result of environmental and societal changes. [5] Evidence indicates that conditions being underweight and overweight can exist in close proximity, such as in the same community and same household which could be linked to different environmental, behavioral and individual risk factors. [16,17]

The objective of this study is to find out the associated physical, dietary and personal factors of obesity and obesity among higher secondary school level adolescents in Kaski district, Nepal.

MATERIALS AND METHODS

A cross sectional study was conducted in Kaski district to find out the associated physical, dietary and personal factors of obesity and obesity among 838 adolescents randomly selected from 12 schools using multistage cluster sampling. Data collection was done in between 24th of October to 4th of December, 2013 using self-administered questionnaire and

anthropometric assessment. Height and weight were entered in WHO AnthroPlus software v.1.0.4 for calculating BMI for age. Cut off value of 85th percentile was used for classification of overweight and 95th percentile for obesity. Collected data from questionnaire and nutritional status were entered in SPSS v. 16 and statistical analysis was done using SPSS. Frequency tabulation, chi square test and odds ratio were done. Pre-testing was done among the 10% students of total sample size in Bal Mandir Higher Secondary School, Pokhara. Pre-tested samples were excluded from study.

Approval was taken from Department of Public Health, Pokhara University along with Higher Secondary Education Board (HSEB), Pokhara Branch and District Education Office (DEO), Kaski

for the conduction of research. Written informed consent was taken from school administration as well as from students and their participation in the study was voluntary. Clarity of the purpose of study was done among the school administration and students in every school prior to data collection. Confidentiality of each respondent has been maintained strictly.

RESULTS

General Information

Out of 838 adolescents, 444 (53%) were from village followed by 394 (47%) from municipality. More than half, 439 (52.4%) were female and 399 (47.6%) were male. The prevalence of overweight and obesity was 8.1%.

Table 1: Association between physical activity and overweight and obesity

Physical activity	Overweight and obesity		χ^2	P value	OR	95% CI
	Yes	No				
Means of going school (n=838)						
Bus/Car	36(14.8)	207(85.2)	20.607	<0.001**	3.06	1.85-5.06
By foot/bicycle	32(5.4)	563(94.6)				
Vigorous physical activities (n=838)						
< 3 times per week/Never	57(10.7)	475(89.3)	13.206	<0.001**	3.22	1.66-6.34
≥ 3 times per week	11(3.6)	295(96.4)				
Duration of vigorous physical activities (n=734)						
< 20 minutes	16(4.6)	331(95.4)	0.001	0.979	-	-
≥ 20 minutes	18(4.7)	369(95.3)				
Moderate physical activities (n=838)						
< 5 times per week	49(8.9)	504(91.1)	1.214	0.270	-	-
≥ 5 times per week	19(6.7)	266(93.3)				
Duration of moderate physical activities (n=814)						
< 30 minutes	33(8.5)	355(91.5)	0.903	0.692	-	-
≥ 30 minutes	33(7.7)	393(92.3)				
Passive entertainment activities (n=838)						
≥ 3 days per week	60(9.5)	572(90.5)	6.558	0.01*	2.6	1.22-5.53
< 3 days per week	8(3.9)	198(96.1)				
Duration of passive entertainment activities (n=838)						
≥ 30 minutes	62(8.8)	639(91.2)	3.064	0.08	-	-
< 30 minutes	6(4.4)	131(95.6)				
Leisure activity (n=838)						
Passive	66(11.4)	511(88.6)	27.452	<0.001***	16.73	4.07-68.83
Vigorous/Moderate	2(0.8)	259(99.2)				

#Figures in parenthesis indicate percent

*Statistically significant at p<0.05

**Statistically highly significant at p<0.01

***Fisher exact test

Association between physical activity and overweight and obesity

A significant association was found between means of going school by bus/car (p<0.001, OR=3.06), vigorous physical

activities less than 3 times per week ($p < 0.001$, $OR = 3.22$), passive entertainment activities more than or equal to 3 days per week ($p = 0.01$, $OR = 2.6$), leisure activity ($p < 0.001$, $OR = 16.73$) and overweight and obesity. However, no significant association was found between duration of vigorous physical activity ($p = 0.979$), moderate physical activity ($p = 0.27$), duration of moderate physical activity ($p = 0.692$), duration of passive entertainment activity ($p = 0.08$) and overweight and obesity. (Table 1)

Association between food habit and overweight and obesity

A highly significant association was found between number of meals > 3 times per day ($p < 0.001$, $OR = 7.34$), fat intake per > 3 times week ($p < 0.001$, $OR = 14.06$), vegetable intake ≤ 3 times per week ($p < 0.001$, $OR = 2.74$) fast food intake frequency > 3 times per week ($p = 0.002$, $OR = 2.19$) and overweight and obesity. But fruit intake ($p = 0.528$) and fast food intake ($p = 0.444$) weren't significantly associated with overweight/obesity. (Table 2)

Table 2: Association between food habit and overweight and obesity

Dietary Habit	Overweight and obesity		χ^2	P value	OR	95% CI
	Yes	No				
Number of meals per day (n=838)						
>3 times	41(23.7)	132(76.3)	71.34	<0.001**	7.34	4.36-12.35
≤ 3 times	27(4.1)	638(95.9)				
Fat intake per week (n=838)						
>3 times	37(17.5)	175(82.5)	33.192	<0.001**	4.06	2.45-6.73
≤ 3 times	31(5.0)	595(95)				
Fruit intake per week (n=838)						
>3 times	39(8.7)	411(91.3)	0.397	0.528	-	-
≤ 3 times	24(8.8)	249(91.2)				
Vegetable intake per week (n=838)						
≤ 3 times	35(14.0)	215(86.0)	16.552	<0.001**	2.74	1.66-4.52
>3 times	33(5.6)	555(94.4)				
Intake of fast foods (n=838)						
Yes	67(8.2)	746(91.8)	0.585	0.444	-	-
No	1(4)	24(96.0)				
Frequency of fast food intake (n=813)						
>3 times	42(11.5)	324(88.5)	9.209	0.002**	2.19	1.31-3.66
≤ 3 times	25(5.6)	422(94.4)				

#Figures in parenthesis indicate percent

**statistically highly significant at $p < 0.01$

Association between personal factors and overweight and obesity

A highly significant association was found between average daily allowance \geq Rs.50 per day and overweight and obesity

($p < 0.001$, $OR = 55.71$). But no significant association was found between average sleep per day ($p = 0.969$) and overweight and obesity. (Table 3)

Table 3: Association between personal factors and overweight and obesity

Personal factors	Overweight and obesity		χ^2	P value	OR	95% CI
	Yes	No				
Average daily allowance (n=838)						
\geq Rs.50	23(76.7)	7(23.3)	196.1	<0.001**	55.71	22.7-136.74
< Rs.50	45(5.6)	763(94.4)				
Average sleep per day (n=838)						
≥ 8 hours	14(8.2)	157(91.8)	0.002	0.969	-	-
<8 hours	54(8.1)	613(91.9)				

Figures in parenthesis indicate percent

**Statistically highly significant at $p < 0.01$

DISCUSSION

Kaski district which consists of Pokhara Sub Metropolitan Municipality, Lekhnath Municipality and 43 VDCs is quite developed and rich in comparison with other districts in western region of Nepal. With the pace of increasing urbanization and adoption of sedentary behavior, overweight and obesity is in increasing trend among the adolescents.

A significant association was found between means of going school ($p < 0.001$), vigorous physical activities ($p < 0.001$), passive entertainment activities ($p = 0.01$), leisure activity ($p < 0.001$) and overweight or obesity. Majority of the adolescents (68.9%) were found to do passive physical activities in their leisure time. It shouldn't be forgotten that vigorous activities like exercises and sports helps in energy consumption, thereby reducing body fat and ultimately prevents from overweight or obesity. As 12.4% adolescents never do any vigorous activities and 51.1% do less than 3 times a week, they are at the risk of developing body fat and ultimately obesity. Similarly 42.8% of the adolescents were found to be involved in passive activities like watching television, chatting, playing video games, reading books daily and 32.6% of the adolescents were found to be involved in such activities often. This can be easily said that sedentary behavior is increasing among adolescents and most of the adolescents are at risk of developing body fat. A study conducted in Kuwait in 2012 found among boys, moderate and vigorous activities were found to be significantly negatively associated with overweight and obesity ($p < 0.05$), whereas in girls, only those with not less than moderate activities were negatively associated with overweight and obesity ($p < 0.05$).^[18] Similarly, studies conducted in Pakistan in 2012, Saudi Arabia in 2010, Chennai, India in 2009 also found significant association between passive

physical activity and overweight/obesity ($p < 0.5$).^[19-21]

Overweight and obesity among adolescents in this study was found significantly associated with number of meals per day ($p < 0.001$), fat intake per week ($p < 0.001$), vegetable intake per week ($p < 0.001$) and frequency of fast foods per week ($p = 0.002$). A study in Kuwait in 2012 found the consumption of breakfast, vegetables, and fast foods (boys and girls) and potatoes, cakes and doughnuts, and sweets (girls only) was significantly associated with overweight and obesity ($p < .05$).^[18] Similarly, a study in California, USA in 2011 found children who consumed fewer servings of fruits and vegetables, consumed more servings of soda, and were more likely to be overweight (OR = 1.06; 95% CI = 1.02, 1.10) or obese (OR = 1.07; 95% CI = 1.02, 1.12).^[22] Studies in Ghana in 2011, Chennai, India in 2009 and Balearic Island, Spain in 2007 also reported significant role of frequency of food intake, fatty foods in developing overweight/obesity and vegetable intake in preventing overweight.^[23,21,24] This clearly shows that frequent intake of meals, intake of fatty foods, less intake of vegetables and frequent intake of fast foods are the risk factors for developing overweight/obesity among the adolescents.

Adolescents having average daily allowance Rs. 50 or more were significantly 55.71 times more overweight and obese (76.7%) than having less than Rs. 50 daily allowance (5.6%, $p < 0.001$). But no significant association was found between average sleep per day. This may be explained knowledge and sleep duration have no role on developing body fat and average daily allowance have highly significant relation in developing overweight and obesity.

CONCLUSION AND RECOMMENDATIONS

Sedentary activities were revealed as significant factors associated with overweight and obesity. Food habit such as number of meals per day, fat intake, vegetable intake and frequency of fast food were significantly associated with overweight and obesity. Average daily allowance was found significantly associated with overweight and obesity but average sleep duration wasn't significantly associated with overweight and obesity.

As overweight and obesity are preventable, it is recommended that health programs should be organized by the government, health professionals, civil society and concerned agencies, NGOs, INGOs promoting low intake of fatty foods, regular intake fruits and vegetables and regular physical activities resulting in behavioral implications. School and college based programs on nutrition and physical activities should be promoted. Media like radio, television, newspaper and online media can also be used for health promotion. Besides these further research studies should be done on overweight and obesity to determine and prevent overweight and obesity at regional and national level.

REFERENCES

1. World Health Organization. Young people: Health risks and solutions [Internet]. 2011 Aug [cited 2014 Sep 20]. Available from: <http://www.who.int/mediacentre/factsheets/fs345/en/>.
2. Maiti S, De D, Ali KM, Bera TK, Ghosh D, Paul S. Overweight and obesity among early adolescent school girls in urban area of West Bengal, India: prevalence assessment using different reference standards. *Int J Prev Med*. 2013 Sep;4(9):1070-4.
3. Prentice AM. The emerging epidemic of obesity in developing countries. *Int J Epidemiol*. 2006;35:93-99.
4. Mendez MA, Monteiro CA, Popkin BM. Overweight exceeds underweight among women in most developing countries. *Am J Clin Nutr*. 2005;81:714-21.
5. World Health Organization. Fact sheet: Obesity and overweight [Internet]. 2013 Mar [cited 2014 Sep 23]. Available from: <http://www.who.int/mediacentre/factsheets/fs311/en/>.
6. Stevens GA, Singh GM, Lu Y, Danaei G, Lin JK, Finucane MM, et al. National, regional, and global trends in adult overweight and obesity prevalences. *Population Health Metrics*. 2012 Nov 20; 10:22. doi:10.1186/1478-7954-10-22.
7. de Onis M, Blossner M, Borghi E. Global prevalence and trends of overweight and obesity among preschool children. *Am J Clin Nutr*. 2010; 92:1257-64.
8. Gagagan S. Child and adolescent obesity. *Curr Probl Pediatr Adolesc Health Care*. 2004; 34:1-48.
9. World Health Organization. PMNCH Knowledge Summary #18 Nutrition [Internet]: The partnerships for maternal newborn and child health. 2012[cited 2014 Sep 25]. Available from: http://www.who.int/pmnch/knowledge/publications/summaries/knowledge_summaries_18_nutrition/en/.
10. World Health Organization. Childhood overweight and obesity [Internet]. 2014[cited 2014 Sep 25]. Available from: <http://www.who.int/dietphysicalactivity/childhood/en/>.
11. Ji CY, Cheng TO. Epidemic increase in overweight and obesity in Chinese children from 1985 to 2005. *Int J Cardiol*. 2009; 132:1-10.
12. Jayawardena R, Byreane NM, Soares MJ, Katulanda P, Hills AP. Prevalence, trends and associated socio-economic factors of obesity in

- South Asia. *Obes Facts*. 2013 Oct 8; 6(5):405-414. doi:10.1159/000355598.
13. Gupta N, Goel K, Shah P, Misra A. Childhood obesity in developing countries: Epidemiology, determinants, and prevention. *Endocr Rev*. 2012. Feb;33(1):48-70. doi: 10.1210/er.2010-0028.
 14. Balarajan Y, Villamor E. Nationally representative surveys show recent increases in the prevalence of overweight and obesity among women of reproductive age in Bangladesh, Nepal, and India. *J Nutr*. 2009 Sep; 139:2139-44. doi:10.3945/jn.109.112029.
 15. Ministry of Health and Population (MOHP) [Nepal], New ERA, and Macro International Inc. *Nepal Demographic and Health Survey 2011*. Kathmandu, Nepal: Ministry of Health and Population, New ERA, and Macro International Inc., 2012.
 16. Doak CM, Adair LS, Bentley M, Monteiro C, Popkin BM. The dual burden household and the nutrition transition paradox. *Int J Obes*. 2005;29:129-36.
 17. Doak CM, Adair LS, Monteiro C, Popkin BM. Overweight and underweight coexist within households in Brazil, China and Russia. *J Nutr*. 2000; 130:2965-71.
 18. Al-Haifi AR, Al-Fayez MA, Al-Athari BI, Al-Ajmi FA, Allafi AR, Al-Hazzaa HM, Musaiger AO. Relative contribution of physical activity, sedentary behaviors, and dietary habits to the prevalence of obesity among Kuwaiti adolescents. *Food Nutr Bull*. 2013 Mar; 34(1):6-13.
 19. Ahmed J, Laghari A, Naseer M, Mehrai V. Prevalence of and factors associated with obesity among Pakistani schoolchildren: a school-based, cross-sectional study. *East Mediterr Health J*. 2013 Mar; 19(3):242-7.
 20. Al-Hazzaa HM, Abahussain NA, Al-Sobavel HI, Qahawaii DM, Musaiger AO. Physical activity, sedentary behaviors and dietary habits among Saudi adolescents relative to age, gender and region. *Int J Behav Nutr Phys Act*. 2011 Dec;8:140. doi: 10.1186/1479-5868-8-140.
 21. Rani MA, Sathivasekaran BW. Behavioural determinants for obesity: a cross-sectional study among urban adolescents in India. *J Prev Med Public Health*. 2013 Jul;46(4):192-200. doi: 10.3961/jpmph.2013.46.4.192.
 22. Davis B, Carpenter C. Proximity of fast-food restaurants to schools and adolescent obesity. *Am J Public Health*. 2009 Mar; 99(3):505-10. doi:10.2105/AJPH.2008.137638.
 23. Abiba A, Grace AK, Kubreziga KC. Effects of dietary patterns on nutritional status of upper primary school children in Tamale Metropolis. *Pak J Nutr*. 2012;11(7):591-609.
 24. Bibloni MM, Pich J, Cordova A, Pons A, Tur JA. Association between sedentary behavior and socio economic factors, diet and lifestyle among the Balearic Islands adolescents. *BMC Public Health* 2012, 12:718. doi:10.1186/1471-2458-12-718.

How to cite this article: Acharya B, Chauhan HS, Malla D. Physical, dietary and personal factors associated with overweight and obesity among higher secondary school level adolescents in Kaski district, Nepal. *Int J Health Sci Res*. 2015; 5(4):241-247.
