Factors Associated with Overweight and Obesity among Reproductive Age Women of Kaski District, Nepal

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ABSTRACT

Introduction: Overweight and obesity are associated with numerous comorbidities so they are of great public health concern. In Nepal, the proportion of overweight and obese women of reproductive age has been gradually increasing which marks obesity as a serious public health challenge. The study aimed to assess the factors associated with overweight and obesity among reproductive aged women residing in Pokhara metropolitan.

Methods: A cross-sectional study was conducted among 278 married women of reproductive age at Pokhara metropolitan, Kaski district, Nepal using probability proportional to size sampling method. Face to face interview was conducted among respondents through pretested questionnaire. Similarly, height and weight were also measured. Based on anthropometric measurements, Body Mass Index was computed and defined according to the World Health Organization criteria. The association between overweight /obesity and the explanatory variables were assessed in bivariate analysis using the Chi-square test and the association was further explored by using multivariate logistic regression.

Results: The prevalence of overweight and obesity was 49.6%; with 33.7% of overweight and 15.9 % of obesity. Factors associated with overweight/obesity were age (AOR= 13.85, 95% CI: 5.77-40.80), business as occupation (AOR=7.39, 95%CI: 2.25-14.17), fast food consumption of three or more times a week (AOR=3.42, 95%CI: 1.01-11.63), energy intake above the RDA (AOR=5.45; 95%CI: 2.19-13.55), low or moderate physical activity level (AOR=2.84; 95%CI: 1.18-6.83) and multiparity (AOR=17.80; 95%CI: 4.04-89.06).

Conclusion: The study provides evidence that the prevalence of overweight, obesity is remarkably high in married women of reproductive age in Pokhara metropolitan. The study concluded older age, business as occupation, consumption of fast foods for three or more times per week, low or moderate physical activity level, energy intake above the RDA and multiparty had higher odds of being overweight/obesity. On the other hand fruits and vegetables consumption were found to be protective against overweight/obesity.

Keywords: *Overweight, Obesity, Reproductive age, Women, Prevalence*

INTRODUCTION

Obesity is increasing at an alarming rate throughout the world and has now become a global epidemic.[1] The World Health Organization (WHO) has declared overweight as one of the top 10 health risks in the world and one of the top five in developed nations.[2] Once associated with high-income countries; obesity is now also prevalent in low and middle-income countries. Most of the developing countries at present experience a dual burden of disease with over nutrition and under nutrition occurring simultaneously[3, 4] including Nepal.[5,6]

Overweight and obesity are associated with numerous co-morbidities. It is of great public health concern, particularly cardiovascular diseases, type 2 diabetes, high blood pressure, high blood cholesterol, high triglycerides, certain types of cancer, and sleep apnea.[7,8] There are many obesity-related conditions, which uniquely or mostly affect women. These include: osteoarthritis, birth defects, breast and endometrial cancers, cardiovascular and gall bladder diseases, infertility and gynecological complications and stigma/discrimination.[9] In addition, the compromised quality of life resulting from overweight and obesity is related to higher medical, psychological, and social burden to the society.[7]

Globally, each year at least 2.8 million people die as a result of being overweight or obese. Obesity has nearly tripled since 1975. In 2016, more than 1.9 billion adults, 18 years and older, were overweight; of these, over 650 million were obese. 39% of adults aged 18 years and over were of overweight in 2016, and 13% were obese.[1]

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According to Nepal National Micro-nutrient Status Survey Report -2016, among women of 15-49 year the prevalence of overweight is 18.5% and obesity is 4.6%.[10] Overweight and obesity among adults is increasing[11-13]and according to Nepal Demographic Health Survey 2016, the prevalence of overweight is higher in females (22%) when it is compared with men (17%).[13] Between 2006 to 2016, the proportion of women who were overweight or obese increased from 9% to 22%.[13] Different studies show that the prevalence is much higher in urban areas compared to the national level and rural areas.[13-16] Similarly, among non-pregnant women of 15-49 years the prevalence of overweight is 18.5% and obesity is 4.6%.[10] Prevalence of overweight and obesity is high in the age group of 30-44 years (24.6 % overweight and 4.6% of obesity) with overall overweight and obesity being 18% and 3.1% among women of 15-69 years.[12] So this study aimed to assess the factors associated with overweight and obesity among reproductive aged women residing in Pokhara metropolitan.

METHODS

A cross-sectional analytical study was conducted among 278 married women of reproductive age (15-49 years) at Pokhara metropolitan, Kaski district, Nepal. Probability proportional to size sampling was used as the sampling strategy for the study. For the sample size calculation, Nepal Demographic and Health Survey 2016 prevalence of overweight and obesity among women was taken as reference which is 22%. Permitted error of 5% was taken (CI= 95%), q= 1-p (1-0.22 =0.78). Therefore, $n = Z^2 pq/d^2 = 1.96 * 1.96 * 0.22 * 0.78 / 0.05^2 = 264$. The non response rate of 5% was kept thus the sample size was 278. The data was collected after obtaining informed consent from respondents. Face to face interview was conducted among respondents through pretested questionnaire. Similarly, height and weight were also measured. Based on anthropometric measurements, Body Mass Index was computed and it was defined according to the WHO criteria.

Validity of the instruments was maintained by incorporating expert's opinion and through extensive literature review. Content validity of the tool was established using a panel of three judges, competent in the field of nutrition, who were requested to assess the relevance of the content used in the questionnaire. Tool to determine physical activity level (IPAQ-L) was adopted which have international acceptability and validity. The anthropometric measurement tools were validated from Nepal Bureau of Standards & Metrology (NBSM), (Pokhara branch) which is the National Standards Body of Nepal. A standard weight of 1 kg validated from NBSM was taken and it was used to calibrate the digital weighing scale at interval of five participant's weight measurement.

Data were entered in Epi data software except for dietary intake and analyzed by using SPSS 20 version software. The association between overweight /obesity and the explanatory variables were assessed in bivariate analysis using the Chi-square test and the association was further explored by using multivariate logistic regression. Ethical approval was taken from Institutional Review Committee of Pokhara University Research Centre. Similarly, administrative approval was also taken from Pokhara metropolitan Health Division.

RESULTS

Table 1:Socio-demographic characteristics of the respondents

Variable	Frequency (n=276)	Percentage
Age category		
<30 years	90	32.6
30-39 years	124	44.9
40-49 years	62	22.5
Mean ±SD : 33.1± 8.14 , Min:18 , Max: 49		
Family type		
Nuclear	190	68.8
Joint/Extended	86	31.2
Family size		
≤4 members	154	55.8
>4 members	122	44.2
Mean ±SD: 4.8 Min:2, Max: 12		
Ethnicity		
Upper Caste	159	57.6
Advantages Janajatii	62	22.5
Disadvantages Janajati	39	14.1
Dalit	13	4.7
Others	3	1.1
Level of Education		
Illiterate	8	2.9
Literate with no formal school	15	5.4
Primary	70	25.4
Secondary Level	114	41.3
Bachelors and above	69	25.0
Occupation		
House maker	135	48.9
Students	35	12.7
Business	62	22.5
Service Sector	24	8.7
Agriculture	12	4.3
Daily wages	8	2.9

Table 1 shows that the mean age of the respondents was 33.1±8.1years, ranging from 18 to 49 years and almost half (44.9%) of the respondents were between the age of 30 to 39 years. More than two third (68.7%) of the respondents were from

nuclear family and more than half (55.8%) of the respondents had four or less members in their family. More than half (57.6%) of the respondents were from the upper caste ethnic group. Similarly, more than two fifth (41.3%) of women had educational attainment of secondary level (SLC or +2 level). About two fifth (38.0%) of women had business as the major source of income in the family and about half of the women (48.9%) were house makers by occupation.

Table 2: Prevalence of overweight and obesity according to BMI classification

BMI Classification	Frequency	Percentage
Normal/underweight (BMI <25)	139	50.4
Overweight/Obese (BMI ≥25)	137	49.6
Mean ±SD: 25.67 ± 4.51 Min : 16.94, Max: 42.86		

Table 2 shows that about half (49.6%) of the respondents were overweight/obese. The mean BMI was 25.67 ± 4.51 ranging from 16.92 to 42.86.

Table 3: Physical activity, dietary practices and reproductive factors of reproductive age women

Variables	Frequency	Percentage
Physical activity		
Low	9	3.3
Moderate	119	43.1
High	150	53.6
Median MET, (Q_1~Q_3) : 3213, (2319.63~ 3213)		
Dietary practice		
Main diet		
Rice/dal/vegetable	273	98.9
Wheat Roti	3	1.1
Vegetables or fruits servings consumption / week		
≤21 servings	166	60.1
>21 servings	110	39.9
Eating away from home		
Occasional	76	27.5
Once or twice a week	98	35.5
Three or more times a week	102	37.0

Frequency of consumption of fast food/processed food		
Occasional	85	30.8
Once or twice a week	132	47.8
Three or more times a week	59	21.4
Energy intake/day(RDA=2230 kcal/day)		
≤RDA	171	62.0
>RDA	105	38.0
Mean ±SD: 2236.8±281.4 ,Min: 1325 Max: 2961		
Reproductive factors		
Age at menarche		
<14 years	165	59.8
≥14 years	111	40.2
Mean ±SD: 13.58±1.4 ; Min: 11, Max:19		
Parity		
Nulliparity	46	16.7
1 parity	71	25.7
≥ 2 parity	159	57.6
Ever used any contraceptive devices		
Yes	131	47.5
No	145	52.5
Using contraceptive device currently(n=131)		
Yes	56	42.7
No	75	57.3

Table 3 shows that more than half (53.6%) of the respondents were highly physically active (MET ≥3000) with median MET of 3212 per week. Under the dietary practices adopted by the respondents, rice was the main diet of the majority (98.9%) respondents. Similarly, three fifth of the respondent (60.1%) consumed less than 21 servings of fruits or vegetables per week. About two fifth of respondent (37.0%) eat three or more time away from home per week. About half of the respondents (47.8%) consumed fast or processed food once or twice a week. The mean age at menarche was 13.58 years, ranging from 11 to 19 years, and about three fifth (59.8%) of respondents menarche age was below 14 years. Of the respondents 16.7%, were nulliparous. More than half (52.5%) of the respondents had ever used contraceptive devices and of them, more than two fifth (42.7%) were currently using contraceptive devices.

Table 4: Association of socio-demographic and socio economic factors with overweight including obesity

Variables	Overweight/ Obesity (BMI ≥25)		χ^2statistics	p value	UOR (At 95% CI)	AOR (At 95% CI)
	Yes	No				
Age group						
<30 years	18 (13.1)	72 (51.8)	57.259	<0.001*	Ref	Ref
30-39 years	69 (50.4)	55 (39.6)			3.151 (4.098-5.992)	13.855 (5.779-50.801)**
40-49 years	50 (36.5)	12 (8.6)			4.098 (1.741-9.647)	18.794 (4.015-82.969)**
Educational level						
Primary or below	60 (43.8)	33 (23.7)	20.014	<0.001**	Ref	Ref
Secondary level	57 (41.6)	57 (41.0)			0.550 (0.314-0.964)	1.504 (0.560-4.036)
Bachelors and above	20 (14.6)	49 (35.3)			0.224 (0.115-0.439)	0.922 (0.247-3.446)

Occupation						
Notemployed outside home	72 (52.6)	98 (70.5)	14.720	0.002*	Ref	Ref
Business	43 (31.4)	19 (13.7)			3.080 (1.658-5.725)	7.390 (2.259-14.174)**
Public/private job	10 (7.3)	14 (10.1)			0.972 (0.409-2.313)	4.510 (0.954-12.432)
Others	12 (8.8)	8 (5.8)			2.042 (0.794-5.252)	1.297 (0.255-6.586)

Table 4 shows that variables with p<0.05 i.e. age and occupation were significantly associated with overweight including obesity. With reference to women age less than 30 years (18-30 years), the odds were 13.85 times raised among the women of age 30-39 years (AOR= 13.855, 95% CI: 5.779-40.801) and 18.79 times raised among women of age 40-49 years. (AOR=18.794, 95%CI: 4.015-72.969). Similarly, compared to women who do not work outside the home (House maker and students), women having business as an occupation were 7.39 times more likely to be overweight including obesity (AOR=7.390, 95%CI: 2.259-14.174).

Table 5: Association of behavioral factors with overweight including obesity

Variables	Overweight/ Obesity (BMI ≥25)		χ^2 statistics	p value	UOR (At 95% CI)	AOR (At 95% CI)
	Yes	No				
Vegetables or fruits consumption per week						
≤21 servings	113 (82.5)	53 (38.1)	56.621	<0.001*	Ref	Ref
≥22 servings	24 (17.5)	86 (61.9)			0.131 (0.075-0.229)	0.141 (0.056-0.354)**
Frequency of fast food of consumption						
Occasional	36 (26.3)	49 (35.3)	10.206	0.006*	Ref	Ref
Once or twice a week	61 (44.5)	71 (51.1)			1.169 (0.675-2.026)	1.563 (0.595-4.108)
Three or more times a week	40 (29.2)	19 (13.7)			2.865 (1.430-5.743)	3.427 (1.009-11.632)**
Energy intake/day(RDA=2230 kcal/day)						
≤RDA	67 (48.9)	104(74.8)	19.659	<0.001*	Ref	Ref
>RDA	70 (51.1)	35(25.2)			3.104 (1.866-5.164)	5.452 (2.194-13.550)**
Level of Physical activity						
Low and Moderate	76 (55.5)	52 (37.4)	9.054	0.003*	2.085 (1.288-3.373)	2.844 (1.183-6.837) **
High	61 (44.5)	87 (62.6)			Ref	Ref

Table 5 shows that as compared to women consuming 21 servings or less fruits or vegetables per week ,those consuming more than 21 servings were less likely to be overweight/obese with 85.9% lower odds of being overweight/obesity (AOR=0.141; 95%CI: 0.056-0.354). Meanwhile, women consuming fast food for three or more times a week were 3.4 times more likely (AOR=3.427, 95%CI: 1.009-11.632) to be overweight/obese than those consuming fast occasionally (less than one time a week). Likewise, women who had more energy intake than RDA were 5.45 times (AOR=5.452; 95%CI: 2.194-13.550) more likely to be overweight, including obesity compared to women who had intake energy less than or equal to RDA.

Regarding physical activity level of women this study revealed, those women who had low or moderate level of physical were 2.84 times (AOR=2.844; 95%CI: 1.183-6.837) more likely to be overweight including obesity as compared to women who were highly physically active.

Table 6: Association of reproductive factors with overweight including obesity

Variables	Overweight/ Obesity (BMI ≥25)		χ^2 statistics	p value	UOR (At 95% CI)	AOR (At 95%CI)
	Yes	No				
Parity						
Nulliparity	7 (5.1)	39 (28.1)	40.212	<0.001*	Ref	Ref
1 parity	27 (19.7)	44 (31.7)			3.419 (1.340-8.721)	4.646 (1.279-45.304)
≥ 2 Parity	103 (75.2)	56 (40.3)			10.247 (4.302-24.407)	17.803 (4.046-89.067)**
Ever used any contraceptive devices						
Yes	87 (63.5)	44 (31.7)	28.067	<0.001*	3.757 (2.282-6.186)	1.959 (0.732-5.244)
No	50 (36.5)	95 (68.5)			Ref	Ref
Using any device contraceptive currently						
Using	35 (25.5)	21 (15.1)	4.649	0.031*	1.928 (1.056-3.522)	2.509 (0.732-8.599)
Not Using	102 (47.5)	118 (84.9)			Ref	Ref

Of the three reproductive variable which were significant in the chi-square, only parity remained statistically significant (p<0.05) whereas, variables ever use of contraceptive devices and using any contraceptive devices currently do not remained statistically significant in multivariate analysis.

DISCUSSION

The present study was undertaken to assess the prevalence of overweight and obesity and their determinants among married women of reproductive age at Pokhara metropolitan, where socio-demographic, behavioral and reproductive factors were assessed.

This study reported the prevalence of overweight/obesity to be 49.6% (overweight 33.7% and obesity 15.9%) with the mean BMI of 25.67 ± 4.5. Studies from Nepal like step survey of 2003 conducted in Kathmandu reported 41.86% to be overweight/ obesity with mean BMI 24.56 (overweight 31.22, obesity 10%). Similarly, studies from Kathmandu and Dharan reported 47.4% and 48% of reproductive age women to be overweight/ obese respectively.[17,18] Likewise, study among adults from India uttarakhand[19] and another study of Delhi reported 55.5% and 50.1% to be overweight including obesity respectively.[20] In contrast, this study reported higher prevalence of overweight and obesity among 15-49 years than the prevalence from the national level surveys NDHS 2016 and NNMSS 2016, which reported 22% of overweight/obese respectively among 15-49 non pregnant women. While NCD Step Survey 2016 reported 22.1 % (overweight 17.3% and obesity 4.8%) of 15-69 years non pregnant women were overweight /obese. Similarly, this study also over reported the higher prevalence of overweight/obesity than the study conducted at Ramkot VDC of Kathmandu where the prevalence was 26.3% (overweight 24.5% and obesity 1.8%)[16] and a study among ever-married women in India where the prevalence was 34.6% in Delhi and 36.0% in Punjab.[21] This indicates that there is a difference in prevalence of overweight

and obesity in rural and urban region with urban region having a higher prevalence than in rural area.

Age was found significantly associated with overweight, including obesity from studies in Nepal[22,18] and other different parts of the world.[23] The results of this study were also consistent with studies in India and Ghana, where in India women age 40-49 years were 12.35 times and age 30-39 years were 8.48 times more likely to be obese[21] and in Ghana women within the age 35-44 years had the highest odds (3.55, p=0.000) of being overweight or obese.[24]

The findings of this study showed that occupation was significantly associated with overweight, including obesity, which is similar to the finding from Benin (p<0.05)[26] and from India.[25] The findings of this study showed women having self-run business as occupation (Odds: 7.39) exhibited significantly greater odds for being overweight, including obesity (p=0.001) in compared to housewife, this could be compared to the study findings of Bangladesh where women having job that required mostly sitting were more likely to be overweight/obesity in compare with jobs that required manual labor (AOR=2.33; 95%CI: 1.75-3.08).

Studies have documented that fast food consumption is an independent predictor of mean BMI.[27,28] This study uncovered women consuming fast food or processed food three or more times a week had odds(3.4 times) of being overweight/ obesity(AOR=3.427, 95%CI: 1.009-11.632) in compared to those consuming junk or fast food less than once /week (occasional). The finding was consistent with study in America[27].The findings of this study revealed that energy intake was significantly associative with overweight including obesity which was consistent with studies of Kenya(58) and Belgium[30] The mean energy intake was 2236.8±281.4 kcal/day, which is slightly lower than the national intake of 2,536 Kcal per capita per day and energyintake at Kathmandu valley 2480 Kcal per

capita per day.[31] These differences might be because the national average is for all type of adult population.

In this study overweight and obesity were significantly associated with physical activity and sedentary setting time (p<0.05). Similar results have been reported by different studies from India,[32] Bangladesh,[35] Ethiopia[33] and Australia.[34] Study exhibited that compared to highly physically active women, low or moderately physically active women were 2.84 times more likely (AOR=2.844; 95%CI: 1.183-6.837) to be overweight including obesity, this could be compared with study findings from Ethiopia where women having moderate and low physical activity level were 3.10 times and 4.8 times more likely to be obese and overweigh respectively.[33]

This study finding showed that higher parity was significantly associated with overweight and obesity (p<0.05), similar findings were reported by other studies.[29,32,36] In compared to nulliparous women, women who had given birth to two or more child (multiparious) were 17.8 times more likely (AOR=17.803; 95%CI:4.046-89.067) to be overweight including obesity.

CONCLUSION

The study provides evidence that the prevalence of overweight and obesity were remarkably high in married women of reproductive age in Pokhara metropolitan. The overall prevalence of overweight and obesity among reproductive age women in Pokhara was 49.6%; with 33.7% of overweight and 15.9% of obesity. The substantial proportion of women had moderate (43.1%) physical activity level.

The study concluded older age, business as occupation, consumption of fast foods for three or more times per week, low or moderate physical activity level, energy intake above the RDA and multiparty had higher odds of being overweight/obesity. On the other hand fruits and vegetables consumption were found to be protective against overweight/obesity. Considering the changing scenario from under nutrition to over nutrition the authorities at Pokhara metropolitan should focus on framing the policies and nutrition programs with special attention among reproductive age women.

CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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