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## A cross-sectional study on prevalence of obesity in adults of rural area (hajin block) of Kashmir valley with reference to their demographic profile

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### Abstract

**Background:** Obesity results when the size or number of fat cells in a person's body increases. When a person gains weight, these fat cells first increase in size and later in number. When a person starts losing weight, the cells decrease in size, but the number of fat cells generally stays the same. This is part of the reason that once you gain a significant amount of weight, it is more difficult to lose it. The global epidemic of overweight and obesity - "globesity" - is rapidly becoming a major public health problem in many parts of the world. The obesity epidemic moves through a population in a reasonably consistent pattern over time and this is reflected in the different patterns in low- and high income countries. In more affluent countries, it is associated with lower socioeconomic status, especially in women, and rural communities.

**Material and Methods:** The study was a population based cross sectional survey conducted among residents of rural area of Kashmir Valley in the age group of 25-64yrs. WHO STEP wise approach was utilized for conducting the study. A multistage cluster sampling design was used. People having secondary obesity, drug induced obesity and pregnant ladies were excluded from this study. The data was collected and analyzed using statistical software and chi square statistical test were applied.

**Results:** Out of total 960 participants 12.29% were obese. Prevalence of overweight/obesity was higher in females with 48.11%. Highest prevalence for overweight/obesity was in age group of 45-54 years (55.55%). The percentage of Overweight/obese was highest in post graduates (65.78%). The prevalence of Overweight/Obese increases with higher socio-economic classes. Overweight/obese was highest in married (46.31%) followed by ever married (44.18%) and then by unmarried (28.52%). This association was statistically highly significant (p value<0.001).

**Conclusion:** This study found a high burden of major risk factor of non-communicable diseases with 40.62% overweight or obese. Since risk factors for major NCDs tend to appear in early life and track down into adulthood, it is thus, needed to identify those adults or groups with unfavorable risk profiles.

**Keywords:** Obesity, non-communicable disease and risk factors.

### Introduction

Obesity is a nutritional disorder that spans all ages, ethnicities and affects both sexes. World health organization (WHO) in 2000 called an international consultation on obesity to review epidemiological data worldwide, which concluded that obesity is a rapidly growing epidemic and at the same time acknowledged its status as disease [1]. Due to obesity, many complications arises like Diabetes Mellitus type 2, Hypertension, Stroke, Hyperlipidemia, Osteoarthritis, Coronary heart diseases, Cancer (Post-menopausal breast carcinoma, endometrial, Ovarian, Gall-bladder and colon), Gall stones, sleep apnoea [2, 3]. Obesity results when the size or number of fat cells in a person's body increases. When a person gains weight, these fat cells first increase in size and later in number. When a person starts losing weight, the cells decrease in size, but the number of fat cells generally stays the same. This is part of the reason that once you gain a significant amount of weight, it is more difficult to lose it [4]. The global epidemic of overweight and obesity - "globesity" - is rapidly becoming a major public health problem in many parts of the world [5].

The obesity epidemic moves through a population in a reasonably consistent pattern over time and this is reflected in the different patterns in low- and high income countries. In more affluent countries, it is associated with lower socioeconomic status, especially in women, and rural communities [6, 7]. The sex differences are less marked in affluent countries and obesity is often common amongst adolescents and younger children.

Women in all regions are generally more obese than men and the prevalence for those on low income is still increasing. However, the rate of obesity among women with high income is becoming stable or even declining [8]. As populations become more urban and incomes rise, diets high in sugar, fat and animal products replace more traditional diets that were high in complex carbohydrates and fibre [9, 10]. A high BMI is associated with higher blood pressure and risk of hypertension, higher total cholesterol, LDL-cholesterol and triglyceride levels and lower HDL-cholesterol levels. The overall risk of coronary heart disease and stroke, therefore, increases substantially with weight gain and obesity [11]. There is evidence to suggest increased cancer risk as BMI increases, such as colorectal cancer in men, cancer of the endometrium and biliary passage in women, and breast cancer in post-menopausal women [11, 12]. The direct costs of obesity are predominantly from diabetes, cardiovascular disease and hypertension. Indirect costs, which are far greater than direct costs, include workdays lost, physician visits, disability pensions and premature mortality which all increases as BMI increases [13].

**Methods**

This population based cross sectional study was conducted over a period of six months from August 2018 to January 2019 among permanent residents, aged 25-64 years in rural area of Kashmir Valley. The Sample size was calculated by using following formula

$$n = Z^2 p(1-p) / e^2$$

where  
 n=Sample size,  
 Z<sup>2</sup>=Confidence interval,  
 P = prevalence,  
 e<sup>2</sup> = margin of error

A response rate of 80% was taken. Design factor of 1 was used. Age-sex estimate correction of 2 was done. Thus by the above formulae sample size came out to be 960 individuals. Multistage and multiphasic sampling technique was utilized in this study to screen the obese subjects, in which first of all people in the selected sample had been assessed for obesity, based on WHO classification of obesity according to BMI. WHO STEP wise approach was utilized for conducting the study. All the villages along with their population were enlisted. Then the cumulative population of each village was calculated and was divided by 30 to get cluster interval. First cluster was chosen randomly and subsequent clusters based on cluster interval. In each cluster 32 individuals were selected by Kish method. In this method each household in the cluster received a number. The *Kish Household List* determined Kish table which was used for each household based on the number of the households. The household information was filled on the coversheet and a participant was selected based on the Kish table. All participants were studied in a face-to-face interview for obtaining demographic particulars on a pre-structured questionnaire. Physiological measures of height, weight were taken and BMI was calculated.

- a) **Weight:** It was measured on a pre-calibrated weighing scale (bathroom scale). The scales were calibrated daily using a standard weight. Measurements were taken to the nearest 0.1 kg. Participants were weighed in light clothing and bare feet.
- b) **Height:** Height was measured in the Frankfort plane with a portable stadiometer. The measurements were taken to the nearest 0.1 cm.

**Statistical Analysis:** The standard statistical test like chi square (x<sup>2</sup>) was applied where ever required. All the results obtained have been discussed on 5% level of significance i.e. a p value of < 0.05 has been considered significant. The analysis of the data was done using SPSS version 20.00, Chicago, USA for windows.

**Results**

Table 1 shows Body Mass Index in study participants. Out of total 960 participants 50.74% were normal, 28.33% participants were overweight, 12.29% were obese and only 8.66% were underweight. Table 2 shows Gender wise distribution of Overweight and Obese in the study population. Prevalence of overweight/obese in the study population was 40.62% with females leading with 48.11% and males 25.92%. Table 3 shows distribution of Overweight / Obese in the study population with respect to their age groups. Highest prevalence for overweight/obesity was in age group of 45-54 years (55.55%) followed by 46.40% in 55-64 years and 39.93% in 35-44 years of age. The lowest prevalence (25.77%) of overweight/obesity was in 25-34 year old individuals. Thus with the increasing age prevalence of overweight/obesity also increased and the difference was found to be statistically highly significant (p value<0.001). Table 4 shows distribution of Overweight / Obese in the study population with respect to level of education. The percentage of Overweight/obese was highest in post graduates (65.78%) followed by illiterates (45.65%), secondary pass individuals (40.16%), and lowest in higher secondary educated (18.36%). Thus it was seen that the BMI was more in participants with lower levels of education and the difference was found to be statistically highly significant(p value<0.001). Table 5 shows distribution of Overweight / Obese in the study population with respect to their Socio Economic Status. The prevalence of Overweight/Obese increases with higher socio-economic classes. It is highest in Class I participants (56.86%) and lowest in Class V (30.00%). The association was significant statistically. Table 6 shows distribution of Overweight / Obese in the study population with respect to marital status. Overweight/obese was highest in married (46.31%) followed by ever married (44.18%) and then by unmarried (28.52%). The association was statistically highly significant (p value<0.001).

**Table 1:** BMI \*(Body Mass Index) in the study population

BMI	Frequency (n)	%
< 18.5(underweight)	83	8.66
18.5-24.99(Normal)	487	50.74
25 - 29.99(Overweight)	272	28.33
> 30(Obese)	118	12.29
Total	960	100

**Table 2:** Gender wise distribution of Overweight / Obese in the study population

Sex	*Overweight and Obese		Overweight and Obese		Total	
	present	(%)	absent	(%)	n	(%)
Male	84	25.92	240	74.07	324	100
Female	306	48.11	330	51.88	636	100
Total	390	40.62	570	59.37	960	100

\*overweight=28.33% and obese=12.29%

**Table 3:** Overweight / Obese across different age groups

Age in years	Overweight / Obese		Overweight / Obese		Total	
	Present	(%)	Absent	(%)	n	(%)
25-34	75	25.77	216	74.22	291	100
35-44	117	39.93	176	60.06	293	100
45-54	140	55.55	112	44.44	252	100
55-64	58	46.40	67	53.60	125	100
Total	390	40.62	570	59.37	960	100

$\chi^2=51.7, df=3, p<0.001$

**Table 4:** Overweight / Obese with Education

Education Status	Overweight / Obese		Overweight / Obese		Total	
	present	(%)	absent	(%)	n	(%)
Illiterate	226	45.65	269	54.34	495	100
Primary	35	37.63	58	62.36	93	100
Middle	24	35.29	44	64.70	68	100
Secondary	49	40.16	73	59.83	122	100
Higher secondary	18	18.36	80	81.63	98	100
Graduate	13	28.26	33	71.73	46	100
Post-Graduate & above	25	65.78	13	34.21	38	100
Total	390	40.62	570	59.37	960	100

$\chi^2=39.39, df=6, p<0.001$

**Table 5:** Overweight / Obesity with Socio Economic Status

Socio Economic Class	Overweight / Obesity		Overweight / Obesity		Total	
	Present	(%)	Absent	(%)	N	(%)
Class I	87	56.86	66	43.13	153	100
Class II	99	39.91	149	60.08	248	100
Class III	109	37.84	179	62.15	288	100
Class IV	92	35.24	169	64.75	261	100
Class V	3	30.00	7	70.00	10	100
Total	390	40.62	570	59.37	960	100

$\chi^2=21.29, df=4, p=0.0027$

**Table 6:** Overweight/Obese with Marital Status

Marital Status	Overweight/Obese		Overweight/Obese		Total	
	present	(%)	absent	(%)	n	(%)
Un-married	85	28.52	213	71.47	298	100
Married	280	46.31	325	53.71	605	100
Ever married	25	44.18	32	56.14	57	100
Total	390	40.62	570	59.37	960	100

$\chi^2=26.36, df=2, p<0.001$

**Discussion**

Obesity is associated with numerous co morbidities, including hypertension (HTN), type II diabetes mellitus, dyslipidemia, certain cancers, and major cardiovascular diseases <sup>[14]</sup>. WHO has recommended classifications of body weight which include gradations of excess weight or over weight that are associated with increased risk of non-communicable diseases <sup>[15, 16]</sup>. These classifications are based on BMI. Current study found the prevalence of overweight or obese as 40.62%. This was contrary to the studies of Okpechi *et al* found overall overweight/obese to be 33.7% and in a national study conducted by Vartika *et al*, reported prevalence of overweight and obesity as 14.8% in Dehradun <sup>[17, 18]</sup>. In this study the prevalence for overweight/obesity was highest in age group of 45-54 years (55.55%). Similar trends were found by Lekhray Rampal *et al*. <sup>[19]</sup>, Habibullah *et al*. <sup>[20]</sup> and Decanoy *et al*. <sup>[21]</sup>. The association between obesity and age can be explained due to a decrease in the physical activity with the increasing age.

Our study reveals Overweight/Obese increases with higher socio-economic classes. It is highest in Class I participants (56.86%) and lowest in Class V (30.00%). This was in contradiction with the study results of Ibrar Bashir Sherazi, *et al* were prevalence of obesity was highest among illiterate group (10.67%) as compared to people with higher education (7.04%) <sup>[22]</sup>. Sobal J *et al*, in their review of the related literature found that socio-economic status in terms of income is the main indicator associated with obesity in developing countries <sup>[23]</sup>. We being a developing nation also have similar trends as observed in our study. We observed that the prevalence of obesity increases with higher socio-economic classes. It is highest in Class I participants (56.86%) and lowest in Class-V (30.00%).The association was significant statistically. Our study revealed Overweight/obese was highest in married (46.31%) followed by ever married (44.18%) and then by unmarried (28.52%). The association was statistically highly significant (p value<0.001). This was in accordance with several other cross sectional studies of marital status and obesity reported that currently and formerly married individuals were more obese than those never married. The positive relationship between marital status and obesity can be explained by the fact that people after marriage have less physical activity, change their dietary pattern, have more social support and may be exposed to other environmental factors <sup>[24, 25]</sup>.

**Conclusion and Recommendation**

This study found a high burden of major risk factor of non-communicable diseases with 40.62% overweight or obese. Since risk factors for major NCDs tend to appear in early life and track down into adulthood, it is thus, needed to identify those adults or groups with unfavourable risk profiles. To lower the burden of risk factors of this global pandemic the need of the hour is that all the stakeholders, be it the public, health care service providers, government, food industry, agriculture, media have to join hands to create sustainable actions in the form of health education programs, health policies, early diagnosis and prompt treatment, laws and regulations and their implementation.

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