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Association between Sociodemographic Profile and Body Mass Index (BMI) in Rural Population of North India

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ABSTRACT:

A healthy society is one of the requirements for sustainable human development in every country. The socio-demographic transition has brought major changes in the health behaviours and health profile of developing countries. Global burden of disease has continued to shift from communicable to noncommunicable diseases (NCD) and from premature deaths to years lived with disability.

In most middle- and high-income countries, NCDs are responsible for more deaths than all other causes of death combined, with almost all high-income countries, reporting the proportion of NCD deaths to total deaths to be more than 70% (WHO, 2010).[1] India is currently facing a double burden of malnutrition with obesity emerging as an epidemic among the affluent. A significant value of the population has been found to be under-nutrition, which has been prevalent in different sections of the society. This epidemic has affected all socioeconomic groups irrespective of age, gender, and ethnicity. [2] There is an untoward association of Body mass Index with the socio-demographic profile.

The major (modifiable) behavioural risk factors identified in the World Health Report 2002, are tobacco use, harmful alcohol intake, unhealthy diet (low fruits and vegetables consumption), and lack of physical activity. Of all the risk factors of NCDs, tobacco and alcohol use are two leading modifiable factors. On the other hand, the major biological risk factors identified are overweight and obesity, raised blood pressure, raised blood glucose levels, and raised total cholesterol. Common risk factors for most NCDs are preventable.[3]

The rapid industrialization, urbanization, and globalization is associated with high prevalence of risk factors such as unhealthy diet, physical inactivity, obesity, tobacco and alcohol abuse in low and middle income countries (SEANET-NCD, 2007). [3]

Overweight and obesity defined as having body mass index (BMI) has significant impact on health and has reached epidemic proportion, globally. Global Burden of Disease (GBD) 2013 study estimated that number of overweight and obese individuals has increased from 921 million in 1980 to 2.1 billion in 2013. [4] Worldwide, overweight and obesity is attributed to 3.4 million deaths and 3.8% of Disability Adjusted Life Years. High BMI, both directly and mediated through high blood pressure and cholesterol, is a major risk factor for cardiovascular deaths. [5]

In order to take effective prevention measures, identification of the risk factors is an essential prerequisite. Little is known about the prevalence of the risk factor coupled with

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little data available on the dietary habits, physical activity and other lifestyle associated factors in the District. As the disease burden has also shifted from the older age group to the more productive middle age group. Workplaces having productive populations need special attention owing to their higher vulnerability for NCDs. Therefore this study was conducted to know the association between sociodemographic profile and Body Mass Index (BMI) in Rural population of North India.

Introduction

Materials and Methods

Participants

The present study was conducted in Satrikh block of Barabanki district, Uttar Pradesh (catchment of Rural Health Training Centre). A total 1824 aged 25 years and above were enrolled during the time frame of study between August 2016 to July 2017. Initially a baseline survey was performed in six randomly selected villages (out of 16 villages under RHTC, Satrikh) in context to socio-demographic data and smoking habits with the help of accredited social health activist (ASHA) and Anganwadi worker (AWW).

Study Design

The study was a community based cross- sectional study. Equal numbers of individuals were enrolled from each village using simple random sampling. Prior to interview the selected individuals were briefed about the study and informed consent was taken. Data was collected by direct face to face interview method using a pre-designed questionnaire. It includes basic questions related to sociodemographic profile, physical activity and BMI(Body Mass Index) calculated with the formula. During the process of face to face interview the participant's height and body weight were noted and on that basis BMI was calculated.

Ethical approval

Permissions were obtained from competent authority and the clearance from Institutional Ethics Committee was sought before commencement of study.

Statistical analysis

All data was compiled on Microsoft Excel and statistical analysis was done using Epi Info software. Descriptive statistics were represented using frequencies and percentages while association was assessed between socio-demographic with physical inactivity and BMI generating chi-square values.

Results-:

Table1 Association between BMI with bio-social characteristics.(N=1824)

Body Mass Index(BMI)					
Characteristics		Overweight/ Obesity (n=636)	Normal (n=1188)	χ^2, df, p value	Odd Ratio CI
Age group (in years)	25-34	183	377	χ^2 =39.430 *df*=8, p=0.001	Reference
	35-44	207	331		OR=1.28(1.00-1.65)
	45-54	163	261		OR=1.28(0.98-1.67)
	55-64	55	129		OR=0.87(0.61-1.26)
	65 and above	28	90		OR=0.64(0.40-1.01)
Sex	Male	270	510	χ^2 =22.075 *df*=2, p=0.001	Reference
	Female	366	678		OR=1.01(0.83-1.23)
Marital status	Unmarried	5	25	χ^2 =17.547 *df*=6,	Reference
	Married	577	1013		OR=2.84

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				p=0.007	(1.08-7.48)
	Divorced/Separated/ Widower/Widowed	54	150		OR=1.80 (0.65-4.93)
Category	General	57	104		Reference
	OBC	319	646	χ^2 =16.101 *df*=6, p=0.013	OR=0.90 (0.63-1.27)
	SC/ST	260	438		OR=1.08 (0.75-1.54)

[ ]-row percentage, ( )-column percentage, *CI- Confidence interval*, OR- Odd Ratio.

Table 2 Association between BMI with background characteristics.

Body Mass Index (BMI)					
Characteristics		Overweight/ Obese (n=636)	Normal (n=1188)	χ^2, df, p value	Odd Ratio CI
Educational status	Illiterate	378	716	χ^2 =11.488	Reference
	Literate	258	472	*df*=2, p=0.003	OR=1.03 (0.85-1.26)
Occupation	Government-employed	29	58	χ^2 =41.236 *df*=10, p=0.001	Reference
	Non-government employed	49	130		OR=0.75 (0.43-1.31)
	Labour/Shopkeeper/ Agricultural	295	505		OR=1.16 (0.73-1.86)
	Unemployed	263	495		OR=1.06 (0.66-1.70)
Socio-economic Class*	Upper class	143	283		Reference
	Upper Middle class	134	217	χ^2 =3.237 *df*=8, p=0.919	OR=1.22 (0.91-1.64)
	Middle class	109	211		OR=1.02 (0.75-1.38)
	Lower Middle class	193	378		OR=1.01 (0.77-1.31)
	Lower class	57	99		OR=1.13 (0.77-1.67)

(N=1824)

[ ]-row percentage, ( )-column percentage, *Modified B G Prasad scale 2017, CI- Confidence interval, OR- Odd Ratio, *df*- degree of freedom.

In our study, majority 1014(55.7%) of the population belonged to normal BMI, 636(34.8%) were over-weight/obese and 174(9.5%) were under-weight. The association between body mass index and the age group was found to be statistically significant ($p < 0.05$). Maximum percentage of over-weight/obese was found 36.2% in the age group 25-34 year, 30.9% in age group 25-34 year and 32.5% in age group 35-44 year respectively. (Table 1)

Minimum percentage (4.4%) of (65 and above age group) was belonged to over-weight/obese category. (Table 1) In the table, the odd ratio between Body Mass Index and age group in the study population showed age group 35-44 and 45-54 years was 1.28(1.00-1.65) & 1.28(0.98-1.67) with reference to age group 25-34 years; odd ratio of age group of 55- 64 & 65 and above years was 0.87(0.61-1.26) & 0.64(0.40-1.01). (Table 1)

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The association between BMI and sex was found to be statistically significant (p <0.05). Out of total 1044 females, 58.2% were normal, 35.1% were over-weight/obese and only 6.8% found to be under-weight. (Table 1) Odd ratio between Body Mass Index and gender in the study population, females was 1.01(0.83-1.23) with reference to males. (Table 1)

With respect to marital status, out of 1590 married individuals majority (54.8%) was normal, 36.3% were over-weight/obese and only 8.9% were under- weight was statistically significant(p <0.05). (Table 28, 30)

Odd ratio between Body Mass Index and marital status in the study population, married and divorced/separated/widower/widowed was 2.84(1.08-7.48) & 1.80(0.65-4.93) with reference to unmarried population. (Table 1)

The association between body mass index and caste category found to be significant (p <0.05). Out of 965 OBC category individuals majority (56.6%) was normal, 33.1% were over-weight/obese and 10.4% were under-weight. (Table 1) Odd ratio between Body Mass Index and caste category in the study population, Schedule cast/scheduled tribe was 1.08(0.75-1.54) with reference to general category; odd ratio of OBC category was 0.90(0.63-1.27). (Table 1) Out of 730 literate peoples, majority 57.9% were normal, 35.4% were over- weight and only 6.7% were under-weight found to be statistically significant (p<0.05). (Table 2) Majority of illiterate individuals (54.0%) were normal was found to be significant (p<0.05). The odd ratio between Body Mass Index and educational status in the study population showed literates were 1.03(0.85-1.26) with reference to illiterates.

In our study population, the association between body mass index (BMI) and occupation was found to be statistically significant (p <0.05). The maximum percentage of under-weight belonged to labour/shopkeeper/agricultural (47.1%). (Table 2) Odd ratio between Body Mass Index and occupational status in the study population, self-employed and unemployed was 1.16(0.73-1.86) & 1.06(0.66-1.70) respectively with reference to government employed; odd ratio of non-government employee was 0.75(0.43-1.31).

In our study population, out of total 426 upper class participants 56.6% were normal, 33.6% were over-weight/obese and 9.8% were under-weight according to Modified BG Prasad scale, 2017, which was not found to be statistically significant (p>0.05). (Table 2) Odd ratio between Body Mass Index and socio-economic status in the study population, upper middle class, middle class, lower middle class and lower class was 1.22(0.91-1.64), 1.02(0.75-1.38), 1.01(0.77-1.31) & 1.13(0.77-1.67) respectively with reference to upper class. (Table 2)

Discussion-;

Our results showed a high burden of NCD risk factors in our study area. In terms of behavioural risk factors (STEP 1), about one fourth of the participants used tobacco products and consumed alcohol, three-fourth consumed a diet low in fruit and vegetable content and about one tenth consumed extra salt but physical inactivity was uncommon. In terms of anthropometric risk factors (STEP 2), the prevalence of overweight was high (35%) and 10% of study population had hypertension. The prevalence of all NCD risk factors increased with age. The prevalence of obesity (BMI $\geq$ 25 Kg/m^2) was almost similar in both men and women. The Overweight increased with age in all the age groups both in men and women except more than 55 years of age, finding that can be attributed to their decrease physical inactivity as age advances. This was similar to study done by Kumar et. al.[6] Our study draws attention to the fact that there exists a pool of women who were overweight in rural areas. In our study, married individuals had a higher BMI and waist circumference as compared to unmarried/divorsed. It is similar to previous studies done which show married men and women were more overweight than unmarried adults.[7] Based on the educational status there was a significant difference between literate and illiterate population in our study, as seen in table 2. This is in correspondence with existing studies, that show having a literate people are significantly associated with lower BMI. [8,9] In our study there was equal distribution of obesity based on the socio- economic groups. This indicates that once regarded as diseases of the affluent, NCD risk factors now burden even poorer and younger population and puts them at risk of NCD's. On the contrary Garg et. al., showed a higher prevalence of obesity in low socio-economic group.[10,11]

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Conclusion-

Increasing prevalence of obesity and its co-morbidities particularly among females need immediate attention in terms of prevention and health education. Long term prevention in terms of physical activity, healthy eating and active living is necessary to achieve obesity free life.

Periodic screening among high risk groups along with the provision of comprehensive health services should be provided at the grass-root level. There is need of population-based strategy through comprehensive health services so as to reduce the risk of NCD's.

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