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Nutritional Status and Lifestyle of the Oraon Scheduled Tribe Population of North 24 Parganas, West Bengal, India

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KEYWORDS

BMI, physical activity, wealth index, alcohol consumption, indigenous population

ABSTRACT

Malnutrition (underweight and overweight) is regarded as a risk factor for several cardio-vascular morbidity and mortality. Indigenous groups, due to their daily hardship and poverty, generally remain underweight, but recent studies reported that prevalence of overweight is increasing among them. However, the studies are still scanty. In view, the aims of the study are to know the nutritional status in terms of BMI values and to find out the association between socio-economic status, lifestyle variables with underweight and overweight status of the Oraon of North 24 Parganas, West Bengal. Findings reveal the presence of both underweight and overweight in the population where lifestyle variables play a significant role. The study will contribute to explore the lifestyle of this indigenous group and its role in eradicating malnutrition.

Introduction

Eradicate malnutrition in the recent decade is an important aim for the countries of South-East Asia including India (WHO 2016), as it is well reported that malnutrition in terms of both underweight and overweight are rapidly increasing especially in several low and middle income countries of the region (Popkin et al. 2019) which further causes morbidity and mortality due to several non-communicable diseases globally (UNSCN 2018) and in India (Joy et al. 2017). Further, Indians are facing an increased risk of non-communicable diseases at a lower nutritional status (BMI) compared to white Caucasians (Behl and Misra 2017). To cope with the problem the Government of India formulated a number of strategies (NITI Aayog 2017), but before implementing any action, there is an utmost need to know the prevalence of malnutrition and its associated reasons, especially among the indigenous population, as they still are largely marginalized from mainstream societies with their exclusive way of living. However, data on them were largely lacking.

Globally, the body mass index (BMI) is used widely as a measure of nutritional status including underweight and overweight/obesity (WHO 2004). Using BMI values several studies reported the prevalence of obesity among Indian populations (Little et al. 2016; Girdhar et al. 2016; Chauhan et al. 2015; Rajkamal et al. 2014). These studies reported that the prevalence of overweight and obesity was relatively low in India compared to western countries, except in some urban and high socio-economic groups, while underweight status was high (Wang et al. 2009). However, prevalence of

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overweight status was reported to be increasing and spreading from urban to rural as well as from the rich to rural poor (Sengupta et al. 2015). Again, recent studies reported coexistence of underweight and overweight/obesity status among the Indian population (Dutta et al. 2019; Ravishankar 2012). These studies mostly examined association of socio-economic factors with nutritional status, but largely ignored lifestyle related behaviour. Little and colleague (2016) although documented that economic status, physical activity patterns and substance use habits contribute to the prevalence of underweight and overweight/obesity status among Indians, they omitted ethnic variability between communities, which also causes differences in malnutrition status (Mungreiphy et al. 2012). Again, India is the home of several indigenous population who, according to Sajeev and Soman (2018) are more vulnerable to malnutrition than other populations.

The indigenous populations of India were mostly underweight (Gautam and Adak 2006), but prevalence of overweight was increasing among them and the prevalence greatly varies across different communities (Kshatriya and Acharya 2016). Several other studies also documented malnutrition status and other anthropometric traits among different indigenous populations living in rural areas (Maken and Verte 2016; Ghosh 2015; Das and Roy 2013; Mungreiphy et al. 2012; Chakrabarty and Bharati 2010) and few living in urban areas (Das and Roy 2013; Chakrabarty and Bharati 2010; Ghosh and Bharati 2006). However, the associated reasons for their malnutrition were largely unknown. In view of the above, the objective of the present study are to know the (1) prevalence of underweight and overweight/obesity status in terms of BMI values and (2) to find out the association between socio-economic status, lifestyle variables with underweight and overweight status of the Oraon tribes of West Bengal, India.

Materials and Methods

Population and area

This cross sectional study was restricted to a single ethnic group, the Oraon, to eliminate the possible ethnic/genetic effects on health traits. The Oraons are the 2nd largest scheduled tribe population (6, 43,510 Oraon) of West Bengal (Census of India 2011). They originally are a Dravidian speaking, endogamous ethnic group with specialized knowledge in agriculture (Roy 1915). Few scholars (Chakraborty et al. 2011; Datta Banik 2008) reported nutritional status and body composition of this community, but the associated reasons were largely unknown.

The Oraon of the present study, live in the rural and urban areas of Barrackpore subdivision, North 24 Parganas, West Bengal, India. In the rural area, three small settlements under Naihati police station and in the urban area five small settlements under Khardah and Ghola police station of Barrackpore subdivision were identified because these settlements were exclusively occupied by Oraon. All households in both the areas were completely enumerated for the collection of socio-demographic data. No statistical sampling was adopted for the selection of the households/individuals because it would create suspicion in the field and would hamper data collection. Prior rapport with the members of the community was established before data collection and they were well informed about the aim of the study. All adults were approached for anthropometric and lifestyle data, but these data had been collected from the willing participants after taking written consent. The study was conducted in compliance with the Scientific Ethical Committee for Protection of Research Risks to Humans of the parent institute (ISI) of the authors. To avoid inter-observer error one of the authors (TKC) collected the entire data. Finally, data were collected from 475 adult individuals including 148 males and 327 females.

Data

Data include demographic, socio-economic, habitual physical activity, food habit, substance use habit and anthropometric (only height and weight) traits of each individual. Demographic data include age, sex, area of living, marital status; that were collected using the well tested household census schedule. Socio-economic data include educational attainment, occupational pursuits and economic status and that were collected using the standard questionnaire/schedule. Data on household characteristics and household assets were collected following a standard questionnaire. The National Family Health Survey 3 (IIPS and Macro International 2007) method was used to calculate wealth index score. [Wealth index is an indicator of the level of wealth that is consistent with expenditure and income measures]. Wealth index score for each household/individual was then divided into two parts on the basis of median value to assess economic status. Data on habitual physical activity include physical activity level, occupational activity, leisure time activity and sleeping hours which were collected using well tested questionnaires. Physical activity have been assessed in terms of energy expenditure, calculated considering the type and duration of each activity (Bouchard et al. 1983). The total energy expenditure (TEE)/day have been calculated by adding energy expenditure of all the activies in a day. Data on food habit variables include total energy consumption calculated by adding cereal consumption all day long following dietary guidelines for Indians (Gopalan et al. 1971), number of days of consumption of fruits and vegetables in a week, consumption of animal protein like fish, egg, meat in a week, milk products consumed in a week and street food consumption in a week, which were collected using well tested questionnaires. Data on substance use include tobacco consumption (smoking and chewing) and alcohol consumption, and that were collected using well tested questionnaires. Anthropometric data including height and weight were collected following standard instruments and technique (Weiner and Lourie 1981) and body mass index (BMI) values have been calculated using the following formulae—

$$\textit{Body Mass Index } (kg/m^2) = \textit{Body weight } (kg.) / \textit{Stature } (m)^2.$$

Classification of data

Individuals were classified based on sex. All other data considerations and classifications used in the study are given in table 1 (see Table 1).

Analysis of data

Descriptive statistics of BMI values across socio-demographic and lifestyle groups were calculated. Multinomial logistic regression was performed taken underweight category and overweight category as dependent variable where the normal weight category was taken as reference. All the socio-demographic and lifestyle variables were considered as independent variables. Age, wealth index score, total energy expenditure and total energy consumption were added in the analysis as continuous independent variables and all the other variables were considered as categorical variables. The association between independent and dependent variables were presented in terms of odds ratios (OR) and 95% confidence interval (CI) level. The data were analyzed using SPSS version 16.0 (SPSS Inc., Chicago, IL, USA).

Results

Table 2 (see table 2) shows demographic, socio-economic and lifestyle characteristics of the studied group. Mean (SD) age of male was 39.86 (14.12) years while mean (SD) age for female was 35.12 (12.92) years. Males (rural 58.11% and urban 41.89%) and females (rural 52.59% and urban 47.40%) live both in rural and urban areas. Most individuals of either sex were married (77.03%

males and 73.70% females). A higher percentage (63.51% males and 71.56% females) of individuals were involved in sedentary occupation like service, business, student and household work of females, but a good percentage (36.49% males and 28.44% females) were manually active. Most individuals were literate (89.19% males and 86.85% females), however, a good percentage of males and females were non-literate (10.81% males and 13.15% females). The Wealth Index Score of the group was categorized into two groups i.e. low and high based on median value (0.673033). Most individuals (86.49% males and 76.76% females) reported that they were occupationally active. However, a good percentage (43.92%) of males and most females (59.63%) were inactive in leisure time. Sleeping hours was adequate for the majority (88.51% males and 85.63% females) of the individuals. Mean (SD) values of total energy expenditure was 2656.72 kcal (738.09 kcal) for males and 2261.03 kcal (564.06 kcal) for females. Mean (SD) values of total energy consumption was 2065.07 kcal (839.73 kcal) for males and 1625.60 kcal (592.02 kcal) for females. Majority (91.22% males and 91.44% females) consume fish/egg/meat in a week. Most (64.86% males and 62.39% females) consume fruits in a week, although a good percentage of individuals (35.14% males and 37.61% females) do not consume any kind of fruits in a week. Most individuals (52.70% males and 51.07% females) do not consume milk/milk product in a week. Most individuals (66.89% males and 63.30% females) consume street food like egg roll, chowmin, paratha, fried snacks in a week. The majority (70.27% males and 63.91% females) do not consume adequate (four) meals in a day. Comparatively, a higher percentage of males (39.19%) was made of smokers compared to very little percentage of females (5.20%). A good percentage of males (58.11%) was made of tobacco chewers compared to a little percentage of females (23.24%). A good percentage of males (75.00%) consumed alcohol compared to a little percentage of females (18.35%).

Table 3 (see table 3) shows nutritional status in terms of BMI values of the studied group of either sex. Most participants (69.59% males and 62.08% females) had a normal weight. However, a good percentage of males were mild (14.19%) to moderate underweight (3.38%) and a good percentage of females were mild underweight (11.31%), followed by moderate underweight (3.98%),and severe underweight (3.36%). The percentage of overweight individuals (11.49% males and 15.29% females) was also notable.

Table 4 (see table 4) shows descriptive statistics of BMI values by socio-economic and lifestyle characteristics. Mean differences were significant between the socio-economic groups like areas of living ($p < 0.05$), occupational status ($p < 0.01$) and wealth index score ($p < 0.01$) for males. In the females, significant mean differences exist between the socio-economic groups like areas of living ($p < 0.05$), marital status ($p < 0.01$), wealth index score ($p < 0.01$) and lifestyle categories viz. occupational activity ($p < 0.01$), leisure time activity ($p < 0.05$), street food consumption ($p < 0.05$), smoking status ($p < 0.01$) and chewing tobacco status ($p < 0.05$).

The result of multinomial logistic regression showing the association between underweight and overweight status with socio-economic and lifestyle variables is presented in Table 5 (see table 5). In this analysis, the normal weight was taken as reference category. In respect of the normal weight category, the underweight category was found to be significantly associated only with the total energy expenditure (OR= 0.998, $p < 0.001$), which indicates that individuals with a higher total energy expenditure were less likely to be underweight. The overweight category was significantly associated with sex such as male (OR= 0.036, $p < 0.001$), sedentary occupations (OR= 3.866, $p < 0.05$), wealth index score (OR= 2.093, $p < 0.001$), total energy expenditure (OR= 1.003, $p < 0.001$), inadequate sleeping (OR= 0.182, $p < 0.01$) and alcohol consumption (OR= 2.964, $p < 0.05$) with reference to the normal weight category. In the overweight status the values of odds ratio indicate that being male and

inadequately sleeping were less likely whereas sedentary occupations, wealth index score, total energy expenditure and alcohol consumption were more likely to be associated with an overweight status.

Discussion

This study attempted to explore prevalence of underweight and overweight/obesity status and its association with socio-economic and lifestyle variables of the Oraon tribes of West Bengal, India. The findings reveal that the majority of the individuals belong to the normal weight category, but a notable percentage of males were mildly underweight, whereas females were mildly to severe underweight and overweight. In descriptive statistics, significant mean differences exist in BMI values for some socio-economic and lifestyle variables for males and a good number of socio-economic and lifestyle variables for females. The findings in the association table indicate lifestyle variables had a significant association with both underweight and overweight status. It seems, reducing socio-economic deprivation of the indigenous people was not enough to eradicate malnutrition among them, rather a lifestyle modification of this group through generating awareness and providing their traditional sustainable environment is required to minimize the prevalence of malnutrition of this group.

This study reveals that the majority of the individuals irrespective of sex belong to the normal weight category, which was higher than that of the general population (NNMB 2006) and the tribal population (NNMB 2009) of rural India as well as West Bengal. However, the prevalence of underweight individuals was lower and the prevalence of overweight individuals was higher irrespective of sex than that of the general population (IIPS and Macro International 2007), rural populations (NNMB 2006) and tribal population of India and West Bengal as well (NNMB 2009). The prevalence of underweight people in the study was much lower and the prevalence of overweight was higher than that in several others studies among the Oraon (Roy and Kundu Chowdhury 2013; Chakraborty and Bose 2007; Mittal and Srivastava 2006), other studies among other indigenous populations of India (Agrawal 2013; Beck and Mishra 2011; Chakrabarty and Bharati 2010; Das and Bose 2010; Mukhopadhyay 2010), and the general population of North 24 Parganas (Kundu and Biswas 2014), but it is comparable with few others (Khongsdier 2001) and it is lower than that of few tribal groups of North-East India (Bam and Malagi 2016).

A notable percentage of males were mild to moderate underweight and females were severe, mild and moderate underweight in the present study. It seems, their way of living (lifestyle) can partially explain this health outcome. Ghosh-Jerath and colleague (2015) reported that the traditional food items of the Oraon were nutritious with several vitamin and mineral components and had some medicinal value. However, the Oraon of the present study were compelled to change their traditional way of living. At present they live in small villages or slum areas along with other communities and depend on daily wage earning activities. They need to buy food items from the market and are unable to maintain their traditional food habits due to its unavailability or due to high price. They mostly consume rice as their staple food with single vegetable or fish/meat/egg curry or even only with salt. The finding is corroborative with Kapoor and Dhall (2016), who also argued that due to rapid urbanization tribal people migrated from their traditional homeland, forced to change their traditional occupations, and food habits, thus are unable to get enough nutrition. Several studies (Deo et al. 2018; Das and Bose 2012) reported a higher prevalence of underweight people among the tribal communities and opined that socio-economic factors can partially explain this health conditions, rather social exclusion of the tribals from the mainstream society, play a role to explain the health gap (Haddad et al. 2012). The present study observed that not only the socio-economic status but also their ethnic identity and lifestyle had role in their nutritional status.

The percentage of overweight individuals in the study was higher than the national as well as state average among the scheduled tribes (NNMB 2009). Several studies reported that the prevalence of overweight and obesity is increasing among the tribal communities of India (Kshatriya and Acharya 2016; Sahani et al. 2010) and other south-east Asian countries (Wong et al. 2015), and opined that due to the rapid urbanization, the socio-cultural behavior, lifestyle and other habits (food, work, leisure time) of the tribes were changing, all of whom were showing their effects on their nutritional status (Kshatriya and Acharya 2016). Again, Devi and colleague (2018) argued that the tribal people used to be occupationally active but inactive in leisure times. The findings is corroborative with the present study, where it was observed that the Oraon are becoming used to fried street food like paratha, chowmin, egg roll and consume it regularly, but avoid fruits and leafy vegetables. Again, the habit of watching television at leisure time was prevalent, mostly among women. They also spend leisure time inactively by sitting, gossiping and watching television. All these habits may show effects on their nutritional status.

Again, the mean differences of BMI values across socio-economic and lifestyle variables shows some trend which was in line with other studies. Here, few traits were significant for males and most of the traits were significant for females, which may indicate a greater variability of nutritional status among females then males. Mean BMI was significantly lower in the rural areas than the urban areas both for males and females, which is corroborative with Neuman and colleagues (2013). The present study findings indicate that the low economic group showed significantly lower mean values in BMI than the high economic group. The single women showed significantly lower mean BMI values than the married women. The single women group comprises a fair number of aged widow women who live alone in separate homes and depend on their daily wage earning activities for getting food. Heavy physical activity, absence of adequate nutrition, old age and loneliness may all combine together for their lower BMI values. Again, the labourer group showed significantly lower mean BMI values than sedentarily active males and the finding is corroborative with the study of Bandyopadhyay (2008).

The result of the multinomial logistic regression showed that in reference to the normal weight category, individuals with a higher total energy expenditure were less likely to be underweight and more likely to be overweight. Devi and colleague (2018) also reported the prevalence of the overweight status among the physically active Bhil indigenous population of India. Westerterp (2017) explained that the body maintenance metabolism was the largest component of the total energy expenditure which increases according to body size and thus, the total energy expenditure tend to be higher among overweight individuals. However, physical activity (especially in leisure time) and diet related modification was required to maintain healthy weight, which was largely absent in this group. The association table also reveals that males were less likely to be overweight than females. Again, higher wealth index score and alcohol consumption were more likely to be associated with overweight. Other studies also reported that a higher socio-economic status, physical inactivity especially in leisure time and alcohol consumption were significantly associated with a higher prevalence of overweight status among different tribal groups of India (Sajeev and Soman 2018; Patel and Deonandan 2017; Mungreiphy and Kapoor 2010) thus, partly corroborative with the present study.

Conclusion

This study found the Oraon people were facing a double burden of malnutrition and the trend is similar with other studies which opined that rapid urbanization and changes in physical environment were responsible for the condition. However, the present study holds the notion that a rapid urbanization causes changes in the traditional way of living of the Oraon people and compels them to

adjust with the situation, that affects adversely in their nutritional status. The study lacks larger data size and other confounding variables which may have effect on nutritional status. It seems, a health campaign is required among the tribal communities to make them aware of their health conditions and teach them the benefits of leisure time physical activity, and a nutrient rich diet within affordable cost. Again, Government initiative is required to give them a sustainable environment through promoting and preserving their traditional way of life, including their songs, dances, rituals and festivals which will give them the scope to live with peace and dignity.

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Tables

Table 1: Classification of the demographic, socio-economic, lifestyle and BMI data

Variables	Classification/consideration of data	
Socio-demographic data		
Sex	Male / Female	
Area of living	Rural / Urban	
Marital status	Single (Unmarried, widowed, separated) / Married	
Occupational status	Manual active (Agricultural labour, daily wage earner)	
	Sedentary active (Business, service, student, unemployed, dependent, household work)	
Educational status	Non-literate / Literate	
Wealth index score	Low (< -0.673)/ High (≥ - 0.673) [Based on Median value -0.6730)	
Physical activity data		
Occupational activity	Inactive (Unemployed, dependent, student, sitting posture in job)	
	Active (≥ 6 hours of work for 5 days or more in a week with standing or bending posture)	
Leisure time activity	Inactive (Sitting, gossiping, watching T.V., playing indoor game)	
	Active (Participated in exercise, outdoor games, sports)	
Sleeping hours	Inadequate (<6 hours of sleep at night)	
	Adequate (≥6 hours of sleep at night)	
Food habit data		
Fish/Egg/Meat in week	Yes / No	
Fruits in week	Yes / No	
Milk/ Milk product in week	Yes / No	
Street food in week	Yes (Fried snacks, egg roll, chowmin, paratha) / No	
Taking four meals in a day	Yes (Meal at morning, noon/afternoon, evening and night) / No	
Substance use data		
Smoking status	Yes / No	
Chewing tobacco	Yes / No	
Alcohol consumption	Yes / No	
Anthropometric data	Height (cm) & Weight (kg.)	
Classification of Body Mass Index (kg/m^2) values		
Severe Underweight	<16.00	
Moderate underweight	16.00-16.99	
Mild underweight	17.00-18.49	
Normal weight	18.50-24.99	
Overweight	25.00-29.99	
Obese	≥30.00	

Table 2: Demographic, socio-economic and lifestyle characteristics of the studied group

Variables		Males (n=148)		Females (n=327)	
		No.	%	No.	%
Age (Years) (Mean±SD)		39.86 ± 14.12		35.12 ± 12.92	
Total energy expenditure (Mean±SD)		2656.72 ±738.09		2261.03±564.06	
Total energy consumption (Mean±SD)		2065.07±839.73		1625.60±592.02	
Area of living	Rural	86	58.11	172	52.59
	Urban	62	41.89	155	47.40
Marital status	Single	34	22.97	86	26.30
	Married	114	77.03	241	73.70
Occupational status	Manual active	54	36.49	93	28.44
	Sedentary active	94	63.51	234	71.56
Educational status	Non-literate	16	10.81	43	13.15
	Literate	132	89.19	284	86.85
Wealth index score	Low (<-0.673)	74	50.00	164	50.15
	High (≥-0.673)	74	50.00	163	49.85
Occupational activity	Inactive	20	13.51	76	23.24
	Active	128	86.49	251	76.76
Leisure time activity	Inactive	65	43.92	195	59.63
	Active	83	56.08	132	40.37
Sleeping hours	Inadequate (< 6 hours)	17	11.49	47	14.37
	Adequate (≥ 6 hours)	131	88.51	280	85.63
Fish/Egg/Meat in week	Yes	135	91.22	299	91.44
	No	13	8.78	28	8.56
Fruits in week	Yes	96	64.86	204	62.39
	No	52	35.14	123	37.61
Milk/ Milk product in week	Yes	70	47.30	160	48.93
	No	78	52.70	167	51.07
Street food in week	Yes	99	66.89	207	63.30
	No	49	33.11	120	36.70
Taking four meals in a day	Yes	44	29.73	118	36.09
	No	104	70.27	209	63.91
Smoking status	Yes	58	39.19	17	5.20
	No	90	60.81	310	94.80
Chewing tobacco	Yes	86	58.11	76	23.24
	No	62	41.89	251	76.76
Alcohol consumption	Yes	111	75.00	60	18.35
	No	37	25.00	267	81.65

SD: Standard Deviation

Table 3: Nutritional status of the study participants

Body Mass Index Categories	Males (n=148)		Females (n=327)	
	No.	%	No.	%
Severe Underweight	1	0.68	11	3.36
Moderate Underweight	5	3.38	13	3.98
Mild Underweight	21	14.19	37	11.31
Normal Weight	103	69.59	203	62.08
Overweight	17	11.49	50	15.29
Obese	1	0.68	13	3.98

Table 4: Descriptive statistics of BMI values by socio-economic and lifestyle characteristics

Variables		Males (n=148)			Females (n=327)		
		Mean	SD	t- value/ F value	Mean	SD	t- value/ F value
Area of living	Rural	20.9	2.87	2.220*	21.2	3.80	3.723**
	Urban	22.1	3.17		22.7	3.93	
Marital status	Single	22.2	3.21	1.755	20.9	3.41	2.896**
	Married	21.2	2.96		22.3	4.05	
Occupational status	Manual	20.4	2.63	3.276**	21.2	3.59	1.950
	Sedentary	22.0	3.11		22.2	4.04	
Educational status	Non-literate	20.5	2.85	1.243	22.6	3.73	1.176
	Literate	21.5	3.05		21.8	3.96	
Wealth index score	Low	20.4	2.47	4.244**	20.9	3.27	4.804**
	High	22.4	3.23		22.9	4.29	
Occupational activity	Inactive	21.5	2.72	0.091	23.2	4.70	3.439**
	Active	21.4	3.09		21.5	3.59	
Leisure time activity	Inactive	21.0	2.87	1.452	21.5	3.56	2.290*
	Active	21.7	3.14		22.5	4.38	
Sleeping hours	Inadequate	21.7	3.81	0.477	21.7	3.42	0.462
	Adequate	21.4	2.94		21.9	4.02	
Fish/Egg/Meat in week	Yes	21.4	3.05	0.097	21.9	3.82	0.393
	No	21.5	2.97		21.6	5.10	
Fruits in week	Yes	21.6	2.94	0.997	21.9	3.83	0.101
	No	21.1	3.21		21.9	4.13	
Milk/ Milk product in week	Yes	21.4	2.91	0.013	22.0	3.66	0.576
	No	21.4	3.17		21.8	4.19	
Street food in week	Yes	21.5	3.15	0.523	22.3	4.05	2.182*
	No	21.2	2.83		21.3	3.66	
Taking four meals in a day	Yes	21.2	3.32	0.473	21.7	3.84	0.624
	No	21.5	2.92		22.0	4.00	
Smoking status	Yes	21.0	2.78	1.248	18.2	4.18	4.070**
	No	21.7	3.18		22.1	3.83	
Chewing tobacco	Yes	21.7	3.33	1.518	20.9	3.64	2.505*
	No	21.0	2.54		22.2	3.98	
Alcohol consumption	Yes	21.5	3.07	0.479	21.7	4.69	0.362
	No	21.2	2.96		21.9	3.76	

*BMI: Body Mass Index; SD: Standard Deviation; *p value ≤ 0.05, **p value ≤ 0.01*

Table 5: Result of multinomial logistic regression showing the association between underweight and overweight status with socio-economic and lifestyle variables

Variables		Multinomial Logistic Regression			
		Underweight		Overweight	
		(Ref.: Normal weight)			
		Odds Ratio (95% CI)	p-value	Odds Ratio (95% CI)	p-value
Age		1.007 (0.984-1.030)	0.578	0.992 (0.961-1.024)	0.634
Sex	Male	1.725 (0.795-3.739)	0.167	0.036 (0.010-0.133)	<0.001
	Female	Ref.		Ref.	
Area of living	Rural	0.959 (0.467-1.966)	0.908	1.333 (0.553-3.212)	0.522
	Urban	Ref.		Ref.	
Marital status	Married	0.897 (0.463-1.738)	0.748	2.185 (0.916-5.216)	0.078
	Single	Ref.		Ref.	
Educational status	Literate	1.721 (0.701-4.222)	0.236	0.806 (0.292-2.219)	0.676
	Non-literate	Ref.		Ref.	
Occupational status	Sedentary	0.404 (0.202-0.807)	0.010	3.866 (1.311-11.400)	0.014
	Manual	Ref.		Ref.	
Wealth index score		0.781 (0.529-1.154)	0.215	1.802 (1.141-2.846)	0.012
Total energy expenditure		0.9976 (0.9969-0.9983)	<0.001	1.0034 (1.0025-1.0043)	<0.001
Occupational activity	Active	1.291 (0.571-2.918)	0.539	0.746 (0.306-1.821)	0.520
	Inactive	Ref.		Ref.	
Leisure time activity	Active	0.871 (0.477-1.590)	0.653	1.271 (0.628-2.573)	0.504
	Inactive	Ref.		Ref.	
Sleeping hours	Inadequate	1.393 (0.602-3.225)	0.439	0.182 (0.057-0.577)	0.004
	Adequate	Ref.		Ref.	
Total energy consumption		1.0000 (0.9996-1.0005)	0.916	1.0000 (0.9994-1.0005)	0.889
Fish/Egg/Meat in week	Yes	0.650 (0.249-1.695)	0.379	0.570 (0.171-1.903)	0.361
	No	Ref.		Ref.	
Fruits in week	Yes	1.260 (0.689-2.306)	0.452	1.113 (0.546-2.270)	0.768
	No	Ref.		Ref.	
Milk/Milk product in week	Yes	1.436 (0.802-2.571)	0.223	0.682 (0.340-1.366)	0.280
	No	Ref.		Ref.	
Street food in week	Yes	0.850 (0.468-1.545)	0.594	1.134 (0.546-2.355)	0.736
	No	Ref.		Ref.	
Taking four meals in a day	Yes	0.855 (0.471-1.553)	0.607	0.797 (0.378-1.682)	0.552
	No	Ref.		Ref.	
Smoking status	Yes	1.076 (0.454-2.551)	0.869	1.038 (0.283-3.802)	0.955
	No	Ref.		Ref.	
Chewing tobacco	Yes	1.838 (0.959-3.521)	0.067	0.709 (0.293-1.716)	0.446
	No	Ref.		Ref.	
Alcohol consumption	Yes	0.742 (0.348-1.583)	0.440	2.964 (1.129-7.783)	0.027
	No	Ref.		Ref.	
R^2 (Nagelkerke)		0.520			
Model correctly predicted		71.8%			

CI: Confidence Interval; Ref.: Reference Category