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Prevalence of Overweight and Obesity and Its Associated Factors among Adult People at Chitwan, Nepal

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Abstract:
Background: *Overweight and Obesity is a major public health issue in both developed and developing countries in which excess body fat has accumulated to the extent that may impair health leading to reduced life expectancy and increase the risk of different health problems. Therefore, this study is conducted to find out the prevalence of overweight and obesity and its associated factors among adult people at Chitwan.*
Materials and Methods: *A descriptive, cross-sectional research design was used among 158 respondents aged between 20-60 years residing at Ratnanagar Municipality 16, Chitwan. Probability systematic random sampling technique was used to select the sample and face to face interview was carried out to collect the data by using structured interview schedule as well as anthropometric measurement was taken to calculate the Body Mass Index. Collected data was entered and analyzed by IBM SPSS version 20 using descriptive statistics (frequency, percentage, mean and standard deviation) and chi-square test has been adopted to find the association considering p<0.05 as significant.*
Results*: The findings of the study showed that prevalence of overweight and obesity among the respondents were 31.7% and 13.3% respectively. On the basis of statistical analysis ethnicity (p=0.003), family type (p=0.036), frequency of meat consumption (p=0.001), habit of cigarette smoking (p=0.027), walking or using bicycle (p=0.049) and time spent in sedentary behavior everyday (p<0.001) was significantly associated with overweight and obesity.*
Conclusion: *Based on the finding of the study it is concluded that prevalence of overweight and obesity is high among the adults. So the concerned municipality, health care personnel and related health organization should conduct programme to reduce the overweight and obesity through awareness raising programme and behavioral modification activities.*
Keywords: *Overweight, Obesity,Adult People*

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I. Introduction

Overweight and obesity are defined as abnormal or excessive fat accumulation that impairs health. Body mass index (BMI) is a simple index of weight for height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2). Overweight is a BMI greater than or equal to 25 and obesity is a BMI greater than or equal to 30. BMI provides the most useful population level measure of overweight and obesity as it is the same for both sexes and for all ages of adults. However, it should be considered a rough guide because it may not correspond to the same degree of fatness in different individual. [1]

Overweight and obesity is a significant public health concern affecting more than half a billion people worldwide. Overweight and obesity rise is not only limited to developed countries, but to developing nations as well. [2] Obesity is associated with five out of ten leading causes of death and disability such as heart disease, diabetes, cancer, hypertension and stroke. An estimated 300,000 people die each year of illnesses related to obesity, more than the number killed by pneumonia, motor vehicle accidents and airlines crashes combined. [3] Obesity usually results from a combination of causes and contributing factors including genetics, family lifestyles, inactivity, unhealthy diet, medical problems (e.g. prader-willi syndrome, Cushing's syndrome, arthritis), certain medication (such as some anti-depressants, anti-seizure medications, diabetes medications, anti-psychotic medications, steroids and beta blockers), social and economic issue, age, pregnancy, quitting smoking, lack of sleep. [4]

In 2014, more than 1.9 billion adults aged 18 years and older were overweight. Of these over 600 million adults were obese. Overall, about 13% of the world's adult's population (11% of men and 15% of women) were obese in 2014. In 2014, 39% of adults aged 18 years and over (38% ofmen and 40% of women)

were overweight. The worldwide prevalence of obesity more than doubled between 1980- 2014. [1] A study conducted on United States found that today, 2.1 billion people – nearly one-third of the world's population – are overweight or obese. The number of overweight and obese individuals in the world has increased from 857 million (20%) in 1980 to 2.1 billion (30%) in 2013. [5] In northeast China the overall prevalence of overweight was 32.3%. (male 34.3 %; female 30.2 %), and the prevalence of obesity was 14.6 % (male 16.3%; female 12.8%) in Jilin Province. The prevalence of both overweight and obesity were higher in men than women. Influencing factors included sex, age, marriage status , occupation , smoking, drinking, diet and hours of sleep.[6]

In India the prevalence of overweight and obesity were observed to be high among both the male (23.67% and 9.67%) and the female (20.33% and 29.33%) individuals.Sex, age, monthly income, marital status, education and alcohol intake were observed to have significant effects on obesity. Sex, age, monthly income and marital status also showed significant effects with combined overweight-obesity (BMI $\geq$ 23.00 kg/m^2). [7] Comparative study conducted in Nepal and Bangladesh found that the prevalence of obesity and overweight was respectively 13.5% and 14% for Nepal and 15.3% and 24.2% for Bangladesh. Among Bangladeshi women, the odds of being obese in richest households were 4.62 times and among Nepalese women 8.54 times higher compared with those in poorest households. [8]

In Nepal the prevalence of obesity and overweight were 1.8% and 24.5% respectively. Among all respondents 81.7% of them, who consumed fruits more than five times a week had low BMI, whereas 44% of respondents, who consumed fruits less than once a week in their diet had high BMI indicating overweight and obesity. [9] Overweight and obesity has become serious public health problem and it has been increasing at an alarming rate in both developed and developing countries. [10] The large numbers of people from Nepal suffer from the unrecognizable health problem of overweight and obesity. Few studies have been conducted on prevalence of overweight and obesity and its associated factors among adult people in Nepal. The main objective of this study was to assess the prevalence of overweight and obesity and its associated factors among adult people in Nepal.

II. Material and Methods

A descriptive cross-sectional study was carried out on adult people between ages 20 - 60 years residing at Ratnanagar Municipality 16, Chitwan from 2017/06/25 to 2017/07/08.

Study Design: Descriptive cross-sectional research design

Study Location: The study was conducted at Ratnanagar Municipality-16 (Ra. Na. Pa-16), Chitwan, Nepal.

Study Duration: Two weeks duration from 25/06/2017 to 08/07/2017

Sample Size: 158

Sample size calculation:

Required sample for this study was calculated by using the formula,

$n_o = z^2 pq/d^2$

Where,

p= 0.316 (prevalence of obesity is 31.6% in previous study[10])

q= 1-p, hence q=0.684

d=permissible error set at +/-7% or 0.07

n is the desired sample size

z is the confidence level set at 95% which is (1.96). So,

$n_o = z^2 pq/d^2$

= (1.96×1.96) (0.316) (0.684)/ (0.07×0.07)

= 169.456896

For finite population, where N = Total households i.e. 964 (as per report of Ratnanagar Udhyog Banijya Sangha, 2073BS)

$n= [n_o/ \{1+ (n_o-1/N)\}]$

= [169.456896/ {1+ (169.456896-1/964)}]

=144.24959424

≈ 144

To reduce the non-response error, 10% sample was added

n = 144+10% of 144

=144+14.4

=158.4

≈158

Therefore, the desired sample size (n) = 158

Subjects and selection method: Probability systematic random sampling technique was used to select the sample. The required sample size (n) was 158. The total household (N) was 964. So, sampling interval (K) was 964/158=6.1012658228 ≈6. The first respondent was between 1 and 6 which was selected by simple random

sampling technique. The second respondent was selected by adding the value of K to the first number and so on until the desired sample was obtained. In case of more than one people between the ages 20-60 years in one household, respondent was selected by lottery method of simple random sampling technique.

Inclusion criteria:

1. All those adult people ages between 20-60 years residing at Ra. Na. Pa-16, Chitwan during the period of data collection.
2. All those adult people who are willing to participate in the study.

Exclusion criteria:

1. All those people who were below 21 years and above 59 years of age
2. Those adult people who are not mentally healthy
3. Those women who are pregnant
4. Those adult people who are not willing to participate in the study

Procedure methodology

Prior to data collection, informed consent was taken from each respondent and ethical clearance was also taken. Structured interview schedule along with Anthropometric measurement of respondents was taken to find out the BMI of respondents as research instrument. The research instruments consisted three parts:

Part I: Questions related to socio-demographic Variables

Part II: Questions related to lifestyle related variables, present health statusrelated variables and family history of overweight and obesity

Part III: Information's related to Anthropometric measurement of respondents

Height and weight of the respondent was taken using valid weighing machine and inch tape. Standing height was measured with the bare feet and without cap, back square against the wall and eyes looking straight ahead. Height was recorded in centimeters. Weight was measured by placing the weighing scale on a firm, flat surface. This instrument was standardized to 0 before each use. Respondents were requested to remove footwear and socks, wear light clothes, stand on the scale with one foot on each side of the scale, face forward, place arms at their side and wait until asked to step off. Weight was recorded in kilograms.

The content validity of the instrument for its completeness and clarity was established by consulting research advisor, subject experts and statistician. Instrument was translated into Nepali version. For data collection valid equipment (weighing machine and inch tape) was used.

Statistical analysis:

All collected data was analyzed by IBM SPSS (Statistical Package for Social Science) version 20 using descriptive statistics (frequency, percentage mean, standard deviation) and inferential statistics (chi-square test) according to the nature of the data.

III. Result

The obtained data were analyzed according to the research questions and objectives of the study. The findings are presented in different tables.

Table no1: Shows that out of 158 respondents, nearly half (48.7%) of the respondents were between the age 31-45 years and 19% of the respondents were up to the age 30 years. The age ranged from 21-59 years with (mean ±SD = 40.35±11.216). Regarding the sex, 67.1% of the respondents were female and 32.9% of the respondents were male. Concerning ethnicity, 35.4% of the respondents were Chhetri and 10.8% of the respondents were Dalit. Regarding religion most (93.7%) of the respondents followed Hinduism and only 2.5 % followed Christianity. Regarding educational status, majorities (89.2%) of the respondents were literate and 10.8% of the respondents were illiterate. Among 141 literate respondents, 36.9% had basic level education and only 5.7% had Bachelor and above.

TABLE 1: Age, Gender, Ethnicity, Religion and Educational Status of the Respondents

n=158

Variables	Number	Percentage
Age group(in completed years)		
Up to 30	30	19.0
31-45	77	48.7
≥46	51	32.3
Mean age±SD = 40.35±11.216, Min =21 years, Max=59 year		
Gender		
Male	52	32.9
Female	106	67.1
Ethnicity		

Brahmin	54	34.2
Chhetri	56	35.4
Janajati	31	19.6
Dalit	17	10.8
Religion		
Hinduism	148	93.7
Buddhism	6	3.8
Christianity	4	2.5
Educational status		
Literate	141	89.2
Illiterate	17	10.8
If literate, educational level(n=141)		
General literate(can read and write only)	41	29.1
Basic level(up to 8 class)	52	36.9
Secondary level(9-12 class)	40	28.3
Bachelor level and above	8	5.7

Table no2: Indicates that regarding marital status most (97.5%) of the respondents were married, and only 2.5% of the respondents were unmarried. Out of 154 married respondents, majorities (95.5%) of the respondents were living with spouse and 1.9% of the respondents were separated. As regard to family type more than half (52.5%) of the respondents belong to nuclear family and 47.5% of the respondents belong to joint family. Concerning Occupation of the respondents nearly half (47.5%) of the respondents were engaged in agriculture where as 4.4% of the respondents were engaged in laborer/daily wages. Regarding sufficiency of family income to support a year, majority (93%) of the respondents had sufficient family income to support a year whereas 7% of the respondent's do not have sufficient family income to support a year.

TABLE 2: Marital Status, Family Type, Occupation, Family Income of the Respondents

n=158

Variables	Number	Percentage
Marital status		
Married	154	97.5
Unmarried	4	2.5
If married (n=154)		
Living with spouse	147	95.5
Separated	3	1.9
Widowed/widower	4	2.6
Family type		
Nuclear family	83	52.5
Joint family	75	47.5
Occupation		
Service	20	12.7
Business	16	10.1
Agriculture	75	47.5
laborer/ Daily wages	7	4.4
Home maker	40	25.3
Sufficiency of family income to support a year		
Yes	147	93.0
No	11	7.0

Table no3: Indicates that out of 158 respondents, 15.8% of respondents had chronic disease among them, 36% of the respondents had high blood pressure and gastritis whereas 4% of the respondents had hypothyroidism. Regarding medicine taken by the respondents, 25(15.8%) take medicine among them 36% of the respondents use amlodipine and pantoprazole whereas 4% of the respondents use Thyroxine sodium. Majority (96.8%) of the respondent had no family history of overweight and obesity. Among those 5 respondents who have family history of overweight and obesity, 40%, 40% and 20% of the respondents had overweight and obesity problem in father, in siblings and in mother respectively.

TABLE 3: Present Health Status and Family History of Overweight and Obesity of the Respondents

n=158

Variables	Number	Percentage
Presence of chronic diseases		
Yes	25	15.8
No	133	84.2
Name of the chronic disease(n=25)		
High Blood Pressure	9	36.0
Diabetic Mellitus	3	12.0

Hypothyroidism	1	4.0
Asthma	3	12.0
Gastritis	9	36.0
Medications used by the respondents		
Yes	25	15.8
No	133	84.2
Name of the medicine(n=25)		
Amlodipine	9	36.0
Metformin hydrochloride	3	12.0
Pantoprazole	9	36.0
Seroflo Rotacaps	3	12.0
Thyroxine sodium	1	4.0
Family history of overweight and obesity		
Yes	5	3.2
No	153	96.8
Relationship of the respondents with those family members(n=5)		
Father	2	40.0
Mother	1	20.0
Siblings	2	40.0

Table no4: Depicts that out of 158 respondents, 91.8% of the respondents were non-vegetarian, 87.3% of the respondents consumed fruit less than or equal to 5 days per week whereas 12.7% of the respondents consumed fruit more than 5 days per week. All (100%) of the respondents eat vegetables daily. Among 145 non-vegetarian respondents, 57.2% of the respondents consume meat less than or equal to 5 times per month and only 1.4% of the respondents consume meat 11-15 times per month. Among all respondents 51.9% of the respondents eat meals outside home each week and 48.1% of the respondents do not eat the meal outside home each week. Likewise, 79.1% of the respondents drink tea or coffee every day whereas 20.9% of the respondents do not drink tea or coffee every day. Out of 125 respondents who drink tea or coffee every day, 82.4% of the respondents do not add sugar in tea or coffee whereas 17.6% of the respondents add sugar in tea or coffee. Regarding the addition of extra salt in the meal, 86.1% of the respondents do not add extra salt in the meal and 13.9% of the respondents add extra salt in the meal. More than half 93 (58.9%) of the respondents take junk food among them 77.4% of the respondents take junk food weekly whereas only 1.1% of the respondents take junk food daily.

TABLE 4: Life Style Related Information of the Respondents: Dietary Habit

n=158

Variables	Number	Percentage
Dietary pattern		
Vegetarian	13	8.2
Non-vegetarian	145	91.8
Fruit consumed in a typical week(in days)		
≤ 5 days	138	87.3
> 5 days	20	12.7
Meat consumption per month(n=145)		
≤5 times	83	57.2
6-10 times	60	41.4
11-15 times	2	1.4
Meals eaten outside home each week		
Yes	82	51.9
No	76	48.1
Drinking tea or coffee everyday		
Yes	125	79.1
No	33	20.9
Addition of sugar in tea or coffee(n=125)		
Yes	22	17.6
No	103	82.4
Addition of extra salt in the meal		
Yes	22	13.9
No	136	86.1
Habit of taking junk food#		
Yes	93	58.9
No	65	41.1
Frequency of taking junk food(n=93)		
Daily	1	1.1
Weekly	72	77.4
Monthly	20	21.5

#Junk food includes noodles, chips,etc.

Table no5: Illustrates out of 158 respondents, 17.1% respondents had habit of cigarette smoking among them 55.6% of the respondent smoke cigarette for above 28 years and 44.4% of the respondents smoke cigarette for less than or equals to 28 years. Total year of smoking ranged from 5 to 45 years with (mean ±SD =27.89±13.785). Regarding number of cigarette smoke per day, 40.7% of the respondents smoke 1 to 9 cigarettes per day and 7.4% of the respondents smoke 15 to 24 cigarettes per day. Regarding alcohol consumption,16.5% of the respondents had habit of alcohol consumption among them 53.8% of the respondents consume alcohol for above 17 years and 46.2% of the respondents consume alcohol for less than or equals to 17 years. The total duration of alcohol consumption ranged from 1 to 40 years with (mean ±SD =16.69±11.685). Regarding frequency of alcohol consumption, 61.5% of the respondents consume alcohol 1-4 days per week whereas 7.7% of the respondents consume alcohol 5-6 days per week and 1-3 days per month. Concerning sleeping hours at night, 82.3% of the respondents sleep for 7 to 9 hours whereas 5.1% of the respondents sleep for greater than 9 hours.

TABLE 5: Lifestyle Related Information of the Respondents: Smoking, Alcohol Consumption and Sleeping Habit

n=158

Variables	Number	Percentage
Habit of cigarette smoking		
Yes	27	17.1
No	131	82.9
Total year of smoking (n=27)		
≤28 Years	12	44.4
>28 Years	15	55.6
Mean ±SD =27.89±13.785, Min=5 years, Max=45 years		
Number of cigarette smoke per day (n=27)		
<5	11	40.7
5-9	11	40.7
10-14	3	11.2
15-24	2	7.4
Habit of alcohol consumption		
Yes	26	16.5
No	132	83.5
Total duration of alcohol consumption (n=26)		
≤17 years	12	46.2
>17 years	14	53.8
Mean ±SD =16.69±11.685, Min=1 Year, Max=40 Years		
Frequency of alcohol consumption (n=26)		
Daily	6	23.1
5-6 days per week	2	7.7
1-4 days per week	16	61.5
1-3 days per month	2	7.7
Sleeping hours at night		
<7	20	12.6
7-9	130	82.3
>9	8	5.1

Table no6: Indicates out of 158 respondents, 22.2% of respondents were involved in vigorous intensity activity among them 74.3% of the respondents involve in such activity for less than or equals to 2 days and 25.7% of the respondents involve in such activity for above 2 days. The number of days per week involved in vigorous intensity activity ranged from 1 to 7 days with (mean ±SD=2.37±1.911). Concerning time spent in such activity in a typical day, 80% of the respondents involve in such activities for less than or equals to 2 hours whereas 20% of the respondents involve in such activities for above 2 hours. Time spent in vigorous intensity activity in a typical day ranged from 1 to 8 hours with mean ±SD=2.03±2.051. Regarding involvement in moderate intensity activity, 98.1% of the respondents involves in such activity among them 67.1% of the respondents involve in such activity for greater than or equals to 6 days and 32.9% of the respondents involve in such activities for less than 6 days.The number of days per week involved in moderate intensity activity ranged from 1 to 7 days with mean ±SD =5.76±1.914. Concerning time spent in moderate intensity activity in a typical day, 64.5% of the respondents spent time in such activity for less than 2 hours and 35.5% of the respondents spent time in such activities for greater than or equals 2 hours. Time spent in moderate intensity activity in a typical day ranged from 1 to 6 hours with mean ±SD = 1.54±0.892.

TABLE 6: Lifestyle Related Information of the Respondents: Physical Activity Related to Work

n=158

Variables	Number	Percentage
Involvement in vigorous intensity activity #		
Yes	35	22.2
No	123	77.8
Involvement in vigorous intensity activity in a week(n=35)		
≤2 days	26	74.3
> 2 days	9	25.7
Mean ±SD=2.37±1.911, Min=1 Day, Max=7 Days		
Time spent in vigorous intensity activity in a typical day(n=35)		
≤2 hours	28	80.0
> 2 hours	7	20.0
Mean ±SD =2.03±2.051, Min=1 Hour, Max=8 Hours		
Involvement in moderate intensity activity##		
Yes	155	98.1
No	3	1.9
Involvement in moderate intensity activity in a week(n=155)		
< 6 days	51	32.9
≥6 days	104	67.1
Mean ±SD =5.76±1.914, Min=1 Day, Max=7 Days		
Time spent in moderate intensity activity in a typical day(n=155)		
<2 hours	100	64.5
≥ 2 hours	55	35.5
Mean ±SD =1.54±0.892, Min =1 Hour, Max=6 Hours		

#Vigorous intensity activity includes carrying or lifting heavy loads, digging or construction work.
Moderate intensity activity includes carrying light loads, manual washing clothes, mopping of floor, gardening at home.

Table no7: Illustrates out of 158 respondents, 62.7% respondents involve in walking or using bicycle. Among them, 70.7% of the respondents involve in walking or using bicycle for less than or equals to 2 days and 29.3% of the respondents involve in walking or using bicycle for more than 2 days. The number of days per week involved walking or using bicycle ranged from 1 to 7 days with mean ±SD = 2.22±1.549. Concerning time spent in walking or using bicycle for travel on a typical day, 97% of the respondents spent 1 hour for walking or using bicycle whereas only 3% of the respondents spent 2 hours for walking or using bicycle. Out of 158 respondents, 3.8% respondents involve in vigorous intensity sports, fitness or recreational activities among them 66.7% of the respondents involve in such activities for less than 3 days whereas 33.3% of the respondents involve in such activities for greater than or equals to 3 days. The number of days per week involved in vigorous intensity sports, fitness or recreational activities ranged from 1 to 6 days with mean ±SD = 2.67±1.966. Concerning time spent in vigorous intensity sports, fitness or recreational activities 100% of the respondents involve in such activities for 1 hour (Not shown in table).

Out of 158 respondents, 5.7% respondents involve moderate intensity sports, fitness or recreational activities. Among them 66.7% of the respondents involve in such activities for less than 4 days whereas 33.3% of the respondents involve in such activities for greater than or equals to 4 days. The number of days per week involved in moderate intensity sports, fitness or recreational activities ranged from 1 to 7 days with mean ±SD = 3.67±2.345. Regarding time spent in moderate intensity sports, fitness or recreational activities, 100% of the respondents involve in such activities for 1 hour (Not shown in table). Regarding time spent in sedentary behavior every day, 83.5% of the respondents spent time in such behavior for less than 5 hours whereas 16.5% of the respondents spent time in such behavior for 5 to 10 hours.

TABLE 7: Lifestyle Related Information of the Respondents: Physical Activity Related to Transport, Recreation and Time Spent in Sedentary Behavior

n=158

Variables	Number	Percentage
Walking or using bicycle *		
Yes	99	62.7
No	59	37.3
Involvement in walking or using bicycle in a week (n=99)		
≤2 days	70	70.7
> 2 days	29	29.3
Mean ±SD =2.22±1.549 ,Min=1 Day, Max=7 Days		
Time spent in walking or bicycling for travel in a day(n=99)		
1 Hour	96	97.0
2 Hours	3	3.0

Involvement in vigorous intensity sports, fitness or recreational activities #		
Yes	6	3.8
No	152	96.2
Involvement in vigorous intensity sports, fitness or recreational activities in a week (n=6)		
<3 days	4	66.7
≥3 days	2	33.3
Mean ±SD =2.67±1.966, Min =1 Day, Max=6 Days		
Involvement in moderate intensity sports, fitness or recreational activities ##		
Yes	9	5.7
No	149	94.3
Involvement in moderate intensity sports, fitness or recreational activities in a week (n=9)		
< 4 days	6	66.7
≥4 days	3	33.3
Mean ±SD =3.67±2.345, Min =1 Day, Max=7 Days		
Time spent in sedentary behavior everyday ###		
<5 Hours	132	83.5
5-10 Hours	26	16.5

** Physical activity related to transport includes travel to work or market, to place of worship by walking or using bicycle for at least 10 minutes continuously.*
 # Vigorous intensity sports, fitness or recreational activities includes running or playing football.
Moderate intensity sports, fitness or recreational activities includes playing volleyball, badminton, yoga.
Sedentary behavior includes behavior where an individual spend time in sitting or reclining at work, at home, sitting with friends, reading, playing cards or watching television on a typical day

Table no8: Shows that out of 158 respondents, more than half (55.0%) of the respondents had normal Body Mass Index, 31.7% of the respondents were overweight and 13.3% of the respondents were obese.

TABLE 8: Body Mass Index (BMI) of the Respondents

n= 158

Variables	Number	Percentage
Normal (BMI ≤24.9 kg/m^2)	87	55.0
Overweight (BMI 25.0-29.9 kg/m^2)	50	31.7
Obese(BMI ≥ 30 kg/m^2)	21	13.3
Total	158	100.0

Table no9: Reveals the association between overweight and obesity with selected socio- demographic information of the respondents. There is significant association between overweight and obesity with ethnicity (*p*=0.003) and family type of the respondents (*p*=0.036).

TABLE 9: Association between Overweight and Obesity of Respondents with Selected Socio-demographic Variables

n=158

Variables	Body Mass Index			χ^2	*p*-value
	Normal No. (%)	Overweight No. (%)	Obese No. (%)		
Age group (in years)					
≤40 Years	44(52.4)	30(35.7)	10(11.9)	1.432	0.489
> 40 Years	43(58.1)	20(27.0)	11(14.9)		
Gender					
Male	28(53.8)	16(30.8)	8(15.4)	0.295	0.863
Female	59(55.6)	34(32.1)	13(12.3)		
Ethnicity					
Brahmin/Chhetri	70(63.6)	30(27.3)	10(9.1)	11.827	0.003*
Others	17(35.4)	20(41.7)	11(22.9)		
Religion					
Hinduism	84(56.8)	44(29.7)	20(13.5)	3.721^{I}	0.156
Non Hinduism	3(30.0)	6(60.0)	1(10.0)		
Educational status					
Literate	77(54.6)	46(32.6)	18(12.8)	0.728^{I}	0.695
Illiterate	10(58.8)	4(23.5)	3(17.7)		
Family type					
Nuclear family	46(55.4)	31(37.4)	6(7.2)	6.636	0.036*
Joint family	41(54.7)	19(25.3)	15(20.0)		
Occupation					
Employed	16(44.4)	11(30.6)	9(25.0)	5.168^{I}	0.075
Self employed	71(58.2)	39(32.0)	12(9.8)		

**Significance level p-value< 0.05* *[l]Likelihood ratio*
Employed includes service and business
Self employed includes farming, laborer/daily wages and home maker

Table no10: Shows theassociation between overweight and obesity with present health status related information of the respondents. There is no significant association between overweight and obesity with presence of chronic diseases and medications used by the respondents.

TABLE 10: Association between Overweight and Obesity of Respondents with Present Health Status Related Variables

n=158

Variables	Body Mass Index			χ^2	*p*-value
	Normal No. (%)	Overweight No. (%)	Obese No. (%)		
Presence of chronic diseases					
Yes	13(52.0)	7(28.0)	5(20.0)	1.077[l]	0.584
No	74(55.6)	43(32.4)	16(12.0)		
Medications used by the respondents					
Yes	13(52.0)	7(28.0)	5(20.0)	1.077[l]	0.584
No	74(55.6)	43(32.4)	16(12.0)		

**Significance level p-value< 0.05* *[l]Likelihood ratio*

Table no11: Indicates association between overweight and obesity with selected dietary habit of the respondents. There is significant association between overweight and obesity with frequency of meat consumption (*p*=0.001).

TABLE 11: Association between Overweight and Obesity of Respondents with Selected Dietary Habits Related Variable

n=158

Variables	Body Mass Index			χ^2	*p*-value
	Normal No. (%)	Overweight No. (%)	Obese No.(%)		
Fruit consumed in a typical week (in days)					
≤ 5 days per week	78(56.5)	41(29.7)	19(13.8)	1.809[l]	0.405
> 5 days per week	9(45.0)	9(45.0)	2(10.0)		
Meat consumption per month(n=145)					
≤5 times	44(53.0)	34(41.0)	5(6.0)	14.835	0.001*
> 5 times	34(54.8)	12(19.4)	16(25.8)		
Meals eaten outside home in a week					
Yes	42(51.3)	28(34.1)	12(14.6)	1.026	0.599
No	45(59.3)	22(28.9)	9(11.8)		
Drinking tea or coffee everyday					
Yes	73(58.4)	35(28.0)	17(13.6)	3.628[l]	0.163
No	14(42.4)	15(45.5)	4(12.1)		
Addition of sugar in tea or coffee(n=125)					
Yes	12(54.6)	5(22.7)	5(22.7)	1.770[l]	0.413
No	61(59.2)	30(29.1)	12(11.7)		
Addition of extra salt in the meal					
Yes	15(68.2)	5(22.7)	2(9.1)	1.828[l]	0.401
No	72(52.9)	45(33.1)	19(14.0)		
Habit of taking junk food					
Yes	53(57.0)	29(31.2)	11(11.8)	0.532	0.767
No	34(52.3)	21(32.3)	10(15.4)		

**Significance level p-value<0.05[l]Likelihood ratio*

Table no12: Reveals the association between overweight and obesity with selected lifestyle related information of the respondents. There is significant association between overweight and obesity with habit of smoking (*p*=0.027).

TABLE 12: Association between Overweight and Obesity of Respondents with Selected Lifestyle related Variables

n=158

Variables	Body Mass Index			χ^2	*p*-value
	Normal No. (%)	Overweight No. (%)	Obese No. (%)		
Habit of cigarette smoking					
Yes	21(77.8)	4(14.8)	2(7.4)	7.254[l]	0.027*
No	66(50.4)	46(35.1)	19(14.5)		
Habit of alcohol consumption					
Yes	11(42.3)	10(38.5)	5(19.2)	2.163[l]	0.339
No	76(57.6)	40(30.3)	16(12.1)		

**Significance level p-value<0.05[l]Likelihood ratio*

Table no13: Shows the association between overweight and obesity with selected physical activity related information of the respondents. There is significant association between overweight and obesity with walking or using bicycle (p=0.049) and time spent in sedentary behavior everyday (p<0.001) by the respondents.

TABLE 13: Association between Overweight and Obesity of Respondents with Selected Physical Activity Related Variables

n=158

Variables	Body Mass Index			χ^2	*p*-value
	Normal No. (%)	Overweight No. (%)	Obese No. (%)		
Involvement in vigorous intensity activity					
Yes	22(62.9)	12(34.3)	1(2.8)	5.568[l]	0.062
No	65(52.8)	38(30.9)	20(16.3)		
Walking or using bicycle					
Yes	61(61.6)	29(29.3)	9(9.1)	6.050	0.049*
No	26(44.1)	21(35.6)	12(20.3)		
Time spent in sedentary behavior everyday					
<5 Hours	83(62.9)	40(30.3)	9(6.8)	30.127[l]	<0.001*
5-10 Hours	4(15.3)	10(38.5)	12(46.2)		

**Significance level p-value<0.0 5[l]Likelihood ratio*

IV. Discussion

The study revealed that prevalence of overweight and obesity among adult people was 31.7% and 13.3% respectively. The findings of the study are consistent with the finding of the study conducted among adult of Northeast China which revealed that the prevalence of overweight and obesity was found to be 32.3% and 14.6% respectively[6]. Similarly, the finding of the present study is similar with the finding of the study conducted among Spanish adults which showed that prevalence of overweight and obesity among adult people was 37% and 17% respectively. [11]

Present study shows that overweight and obesity is not significantly associated with the age (p=0.489) and educational status (p=0.695) of the respondents. The finding of the study is similar with the finding of the study conducted among adult women of Nepal which revealed that there was no association between overweight and obesity with the age (p=0.762) and educational status (p=0.267) of the respondents. [9]

Present study shows that overweight and obesity is not significantly associated with the gender of the respondents (p=0.863). The finding of the study is inconsistent with the finding of the study conducted among adult of Northeast China which revealed that the prevalence of both overweight and obesity were higher in men than women (p<0.001). [6] The reason behind this may be due to difference in sample size, sampling technique and study setting.

Current study shows that there is significant association between prevalence of overweight and obesity with the ethnicity of the respondents (p=0.003). The finding is supported by the study conducted among adult women in Selangor, Malaysia which revealed that obesity was significantly associated with the ethnicity of the respondents (p=0.001). [3]

Regarding family type, there is significant association between prevalence of overweight and obesity with the family type of the respondents (p=0.036). The finding of the study is inconsistent with the finding of the study conducted among urban adult individuals belonging to the Bengalee Hindu Caste Population which showed that there was no significant association between prevalence of overweight and obesity with the family type of the respondents (p>0.05). [7] This might be due to difference in sample size and different setting. In Nepalese context people living in joint family tend to become more obese than people living in nuclear family

as people gets older they become physically inactive due to availability of large number of people for performing task in the family.

Current study shows that there is no significant association between prevalence of overweight and obesity with the occupation of the respondents (p=0.075). The finding of the study is inconsistent with the finding of the study conducted among adult Kabul citizens of Afghanistan which revealed that home maker were 3 times more obese than those whose occupation was business, agriculture and government employee. [12] The reason behind this might be due to difference in sample size, sampling technique and study setting.

Present study reveals that there is no significant association between prevalence of overweight and obesity with the presence of chronic diseases (p=0.584). The finding of the study is consistent with the finding of the study conducted among a group of Iraqi women which showed that there was no significant association between prevalence of overweight and obesity with the presence of chronic diseases (p=0.638). [13]

Concerning the frequency of fruit intake, there is no significant association between prevalence of overweight and obesity with frequency of fruit intake by the respondents (p=0.405).The finding of the study is inconsistent with the finding of the study conducted among adult women of Nepal which revealed that those who consumed fruits more than five times a week had low BMI whereas those who consumed fruits less than once a week in their diet had high BMI indicating overweight and obesity (P=0.013). [9] This might be due to difference in sampling technique, income status of people for fruits consumption and difference in dietary pattern as little number of people was vegetarian in the current study.

Current study shows that there is significant association between prevalence of overweight and obesity with the frequency of meat consumption by the respondents (p=0.001).The finding of the study is inconsistent with the finding of the study conducted among adult Kabul Citizens of Afghanistan which revealed that there was no significant association between prevalence of overweight and obesity with the frequency of meat consumption by the respondents[12]. This might be due to difference in sample size, sampling technique and study setting and difference in dietary pattern as more people were non vegetarian in the current study. Animal-based foods contain more fat than other foods and regular consumption of high fat contained foods will lead to weight gain.

Current study shows that there is significant association between prevalence of overweight and obesity with habit of cigarette smoking by the respondents (p=0.027). The finding of the study is supported by the finding of the study conducted among adult of Northeast China which revealed that there was significant association between prevalence of overweight and obesity with habit of cigarette smoking by the respondents (p=<0.05). [6]

Present study reveals that there is no significant association between prevalence of overweight and obesity with habit of alcohol consumption (p=0.339).The finding of the study is consistent with the finding of the study conducted among urban adult individuals belonging to the Bengalee Hindu Caste Population which showed that there was no significant association between prevalence of overweight and obesity with habit of alcohol consumption by the respondents (p>0.05). [7]

Current study shows that there is significant association between prevalence of overweight and obesity with walking or using bicycle by the respondents (p=0.049). The finding of the study is consistent with the finding of the study conducted among adult Kabul Citizens of Afghanistan which revealed that there was significant association between prevalence of overweight and obesity with the habit of walking by the respondents (p=0.022). [12] Present study reveals that there is significant association between prevalence of overweight and obesity with the time spent in sedentary behavior everyday by the respondents (p<0.001).The finding of the study is consistent with the finding of the study conducted among women in Kibera division, Nairobi which showed that there was significant association between overweight and obesity with time spent in sedentary behavior everyday (p=0.014). [14]

Present study reveals that prevalence of overweight and obesity was not significantly associated with the involvement of the respondents in vigorous intensity activity (p=0.062). The finding of the study is inconsistent with the finding of the study conducted among women in Kibera division, Nairobi which showed that there was significant association between prevalence of overweight and obesity with the involvement of the respondents in vigorous intensity activity (p<0.001). [14]

V. Conclusion

The finding of the study shows that nearly half of the adult people were overweight and obese. The associated factors of overweight and obesity among adult people were found in ethnicity, family type, frequency of meat consumption, habit of cigarette smoking, walking or using bicycle and time spent in sedentary behavior everyday by the respondents. So the concerned municipality, health care personnel and related health organization should conduct programme to reduce the overweight and obesity through awareness raising programme and behavioral modification activities.

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