ABSTRACT

On

OBESITY AND SELF-REPORTED MORBIDITY IN RELATION TO LIFESTYLE AND DIET AMONG THE MEITEI OF MANIPUR

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Obesity is a condition that develops from a chronic quantitative imbalance between energy intake and energy expenditure leading, in turn, to an excessive accumulation of adipose tissues within the body (Bray and Bellanger 2006). The Department of Health, UK (2011) defines overweight and obesity as clinical terms used to describe the excess of body fat. Both overweight and obesity are often used interchangeably, yet they do not represent the same situation. Some individuals may be overweight but not obese, while obese individuals are overweight above a certain degree.

Obesity is now known as a worldwide epidemic (Kaur et al. 2008). WHO (2002) declared overweight as one of the top ten health risks in the world and among the top five in developed countries. An estimate of 300 million adults and 22 million children below the age of five were reported to be overweight worldwide in the year 2000 (Finer 2003). By 2010, the prevalence of adults overweight was more than 1.4 billion while more than 400 million adults were reportedly obese (WHO 2011). Furthermore, more than 40 million children under the age of five were reported overweight in the same year (WHO 2011). Even in places like India and Africa, which are usually associated with under nutrition, the problem of obesity is emerging as a result of improvements in socio-economic condition of some sections of the population, a nutritional transitions as well as increasing urbanisation (Popkin 2004; Berman 2009). The situation in India is alarming, perhaps especially among the peoples of Northeast India among whom rural-urban migration is increasing rapidly (Khongsdier 2008). This Increasing rural-urban migration, Khongsdier (2008) continues, not only brings change in dietary and physical activity patterns but also predisposes many individuals to obesity, diabetes, hypertension and other risks of chronic heart disease (CHD). Little or no research has been done among the Meitei population of Manipur. Therefore, the present research has been undertaken to study the prevalence of overweight and obesity in relation to socio-economic conditions, lifestyles and dietary habits as determinant factors.

The data for the present research were collected from the Meitei population living in the urban areas of Lamphel sub-division, Imphal West district, Manipur. No statistical sampling of households and individuals was applied for the collection of data. Instead, an attempt was made to include in the sample all those individuals who
were willing to co-operate in order to get enough sample size. A sample size of 1331 subjects, of which 606 men and 725 women was collected for the present study. Data on each subject was collected randomly following house to house visit during the months of November 2009 to October 2010.

**Objectives of the study**

The objectives of the study are the following:

1. To find out the incidence of overweight and obesity among the urban Meitei adolescents (aged 14-19 years) and adults (aged 20-60 years) using anthropometric measurements and indices.
2. To analyze how overweight and obesity associated with different variables such as socio-economic factors, lifestyles and dietary habits.
3. To understand the self-reported morbidity according to their BMI status.

**Anthropometry**

An anthropometric rod and a weighing scale to the nearest of 0.1cm and 0.5kg respectively was used to measure height and body weight with subjects wearing light clothes. The data on waist, hip and abdominal circumferences were measured to the nearest 0.1cm with a flexible tape.

**Data on socio-economic conditions**

The per capita monthly income of the households was classified as follows: above 75th percentile (>Rs. 2500) as high-income group (HIG), 50th to 75th percentile (Rs. 1600- 2500) as middle-income group (MIG) and below 50th percentile (<Rs. 1600) as low-income group (LIG). Data on educational attainment of individuals were classified into five categories, namely illiterate (those who cannot read and write), primary (study up to class V), secondary (class VI to X), higher secondary (class XI to XII) and graduate and above. Since the illiterate subjects were very negligible in number, I eventually grouped them with the category of primary education. Data on occupation were classified into five categories such as government employee, self-employed, business, student and housewife. Data on age and marital status were also collected for the present study.
Data on lifestyles and food habits

Information on lifestyles such as physical activity/exercise, television watching and sleeping hours were collected from each subject following a recalled method of two week periods. Physical activity was divided into two categories: less than one hour and one hour and above. The television time was classified into three groups, viz less than two hours, between two to four hours and more than four hours. The sleeping hours was divided into three groups: six hours, seven to eight hours and above eight hours a day. Data on food habits were collected following a recalled method of one month before the survey. The consumption of different foods were divided as daily, weekly, occasional and never.

Data on blood pressure and Self-reported morbidity

Mercury sphygmomanometer was used to measure blood pressure of the individuals. Data on morbidity were collected based on self-reported illness of the information by taking into consideration the period of two week, three week and four week recalls of illness prior to the survey. The different self-reported morbidities collected for the present research include cardiovascular, gallstone, diabetic, hypertension, back pain, osteoarthritis, asthma and sleep apnea.

Statistical Analysis

The data were analysed using both MS-Excel software and SPSS/PC-18 version (Statistical Package for Social Sciences) for the present research. The parameters taken were analysed statistically to find out the mean, standard error of mean for the anthropometric measurements. The presence of overweight and obesity has been evaluated using WHO International value and Asian cut-off points (WHO 2000). According to WHO, BMI $\geq 30\text{kg/m}^2$ has been considered as obese and BMI between 25.0-29.9$\text{kg/m}^2$ considered as overweight. BMI between 18.5-24.9$\text{kg/m}^2$ indicates normal and BMI below 18.5$\text{kg/m}^2$, indicates underweight. According to Asian cut-off points, BMI $\geq 27.5\text{kg/m}^2$ has been considered as obese, BMI between 23.5-27.4 $\text{kg/m}^2$, considered as overweight and BMI between 18.5-23.4$\text{kg/m}^2$ indicates normal. Waist-hip ratio (WHR) was also analyzed along with BMI to understand the condition of central obesity in the study population. Prevalence of overweight and obesity was
calculated in relation to different socio-economic conditions, lifestyle factors, food habits and self-reported morbidities. In order to test the level of significance, both t-test and chi square have been used in the present research. Regression analysis has also carried out to find the risks of overweight/obesity in both the sexes. All analyses were carried out separately for men and women. Women who are pregnant at the time of the survey or women who had given birth during the two months preceding the survey were excluded from the analysis.

**Findings of the present study:** The findings of the present study are given below:

**Anthropometric traits**

The mean height was found higher among the adults in both men (165.1cm) and women (153.2cm). Similarly, the mean body weight was also higher among the adults in both men (63.1kg) and women (54.7kg). Age wise comparison showed that men were taller and heavier than women.

**Distribution of different BMI values**

The mean BMI value among the adult men (23.1) was significantly ($t=12.1; p<0.01$) higher than the adolescent boys (20.6). Similarly, the mean BMI value among the adult women (23.3) was also significantly higher ($t=13.5; p<0.01$) than the adolescent girls (20.8). The table further indicated that the mean BMI values showed more or less the same in both the sexes in each age group.

**Prevalence of overweight, obesity and abdominal obesity**

Abdominal obesity shows an increasing trend with increasing age. It was higher among women (10.4%) compared to men (4.6%). According to Asian cut-off points, the total frequency of overweight (19.6%) and obesity (6.1%) was higher among the women than men (overweight-16.8%; obesity-5.1%). Similarly, according to WHO analysis, the total frequency of overweight (14.2%) and obesity (2.5%) was found higher among women than overweight (10.9%) and obesity (1.6%) among men.
Prevalence of overweight and obesity in relation to different income groups according to Asian cut-off points

The prevalence of overweight and obesity was higher among the high-income families in both the adolescents and adults. The overall prevalence of overweight (32.4%) and obesity (13.5%) among men was significantly ($\chi^2=122.194$, df=6, p<0.001) higher in the high-income families. Similarly, overall overweight (33.5%) and obesity (18.0%) among women was also higher in the high-income families. The differences were significant at $\chi^2=131.753$, df=6, p<0.001.

Prevalence of overweight and obesity in relation to different income groups according to WHO International value

According to WHO analysis, the total frequency of overweight (23.0%) and obesity (4.7%) was higher in the high-income families among men. The differences were significant statistically at $\chi^2=88.260$, df=6, p<0.001. Similarly, among women, the overall frequency of overweight (30.5%) and obesity (9.0%) was also found significantly ($\chi^2=118.315$, df=6, p<0.001) higher among the high-income families.

Prevalence of overweight and obesity in relation to marital status according to Asian cut-off points

The prevalence of overweight and obesity in relation to marital status shows variation between the adolescents and the adults. The overall frequency of both overweight (27.6%) and obesity (9.2%) was significantly ($\chi^2=65.431$, df=3, p<0.001) higher among the married men. Similarly, the total distribution of overweight (30.4%) and obesity (10.3%) was also significantly ($\chi^2=85.741$, df=3, p<0.001) higher among the married women.

Prevalence of overweight and obesity in relation to marital status according to WHO International value

The prevalence of overall overweight (18.9%) and obesity (3.4%) was found significantly ($\chi^2=48.138$, df=3, p<0.001) higher among the married men. Similarly, the occurrence of both overall overweight (23.8%) and obesity (4.3%) was also found significantly ($\chi^2=70.239$, df=3, p<0.001) higher among the married women.
Prevalence of overweight and obesity in relation to educational levels according to Asian cut-off points

The total frequency of overweight (44.4%) and obesity (7.8%) among men was significantly ($\chi^2=74.695$, df=9, $p<0.001$) higher among those who completed primary and graduate levels of education respectively. However, among women, both overall overweight (31.7%) and obesity (11.5%) was significantly ($\chi^2=74.254$, df=9, $p<0.001$) higher in those subjects who completed graduate level of education. The table further indicates an increasing trend in obesity with increasing the educational levels from secondary schooling onwards.

Prevalence of overweight and obesity in relation to educational levels according to WHO international value

The overall frequency of overweight (33.3%) was recorded higher among men who completed primary education. However, higher frequency of obesity (2.3%) was observed more or less the same between the higher secondary and the graduate levels of education. The differences were significant ($\chi^2=49.097$, df=9, $p<0.001$). Among women, the overall distribution of overweight (30.8%) and obesity (6.3%) was significantly ($\chi^2=69.326$, df=9, $p<0.001$) higher among those who completed the primary and the graduate education respectively.

Prevalence of overweight and obesity in relation to occupation according to Asian cut-off points

Overall frequency of overweight (42.0%) and obesity (17.9%) among men was significantly ($\chi^2=148.834$, df=12, $p<0.001$) higher among the government employees. Similarly, the total frequency of both overweight (46.0%) and obesity (20.0%) among women was also significantly ($\chi^2=127.496$, df=15, $p<0.001$) higher among the government employees.

Prevalence of overweight and obesity in relation to occupation according to WHO International value

Among men, the total frequency of both overweight (32.1%) and obesity (6.3%) was found significantly ($\chi^2=104.464$, df=12, $p<0.001$) higher among the government employees. Among women, the overall distribution of overweight (40.0%) and
obesity (10.0%) was also recorded significantly ($\chi^2=114.127$, df=15, p<0.001) higher among the government employees.

**Prevalence of overweight and obesity in relation to physical activity/exercise according to Asian cut-off points**

The prevalence of overweight and obesity was associated with low physical activity in both the sexes. The total frequency of overweight (25.2%) and obesity (8.7%) was significantly ($\chi^2=68.746$, df=3, p<0.001) higher among men who exercised below one hour. Similarly, the total frequency of both overweight (27.3%) and obesity (9.3%) was also recorded significantly ($\chi^2=87.951$, df=3, p<0.001) higher among women who exercised less than one hour.

**Prevalence of overweight and obesity in relation to physical activity/exercise according to WHO International value**

According to WHO International value, the overall prevalence of overweight (17.5%) and obesity (2.9%) was found significantly ($\chi^2=52.876$, df=3, p<0.001) higher among men who exercised below one hour. Similarly, the total frequency of both overweight (20.8%) and obesity (3.8%) was also found significantly ($\chi^2=65.986$, df=3, p<0.001) higher among women who exercised below one hour.

**Prevalence of overweight and obesity in relation to television watching according to Asian cut-off points**

The prevalence of overweight and obesity in relation to television watching shows variation between the adolescents and adults. Overweight (24.1%) and obesity (6.9%) was significantly ($\chi^2=34.468$, df=6, p<0.001) higher among adolescent boys watching television over four hours. Similarly, the prevalence of overweight (37.5%) and obesity (12.5%) was also significantly ($\chi^2=51.592$, df=6, p<0.001) higher among adolescent girls who watched television over four hours. The total frequency of overweight (24.2%) and obesity (7.8%) was found among men watching television for over four hours and below two hours respectively. However, the total frequency of both overweight (37.5%) and obesity (12.5%) was found higher among women watching television over four hours.
Prevalence of overweight and obesity in relation to television watching according to WHO International value

The prevalence of overweight among adolescent boys (10.3%) and girls (37.5%) was higher among subjects who watched television over four hours. The total frequency of both overweight (14.6%) and obesity (3.9%) was found higher among men who watched television less than two hours. However, the total frequency of overweight (30.7%) was found higher among women who viewed television over four hours. The frequency of obesity (2.7%) was observed more or less the same between those who watched below two hours and two-four hours. The differences were significant at $\chi^2=14.090$, df=6, $p<0.05$.

Prevalence of overweight and obesity in relation to sleeping duration according to Asian cut-off points

Prevalence of overall frequency of overweight (20.5%) was found higher among men sleeping six hours. However, the total frequency of obesity (5.5%) was found more or less the same between those who slept six and seven-eight hours. The result further shows that the total frequency of both overweight (20.3%) and obesity (6.7%) was observed higher in seven-eight hours sleeping time among women.

Prevalence of overweight and obesity in relation to sleeping duration according to WHO International value

The total frequency of overweight (11.2%) was found to be the same between those sleeping six and seven-eight hours. The frequency of obesity (4.1%) was higher among men sleeping six hours. Among women, the total frequency of overweight (15.1%) was higher among those who slept seven-eight hours. However, obesity (2.8%) was found slightly higher among those women sleeping six hours.

Risks of overweight/obesity by individual and family characteristics according to Asian cut-off points

The odd ratios revealed that the risks of overweight/obesity were significantly higher among the adult men (33.1%). Results further indicated that men belong to the high-income families (45.9%), married men (36.8%), primary education (44.4%), government employees (59.9%), exercise below one hour (33.9%), over four hours
television time (31.1%) and six hours sleeping time (26.0%) showed higher risks of overweight/obesity. Among women, adult women (37.7%), high-income families (51.5%), married women (40.7%), graduate education (43.2%), government employees (66.0%), exercise below one hour (36.6%), over four hours television time (50.0%) and seven-eight hours sleeping time (27.0%) showed higher prevalence of overweight/obesity.

**Risks of overweight/obesity by individuals and family characteristics according to WHO International value**

The risks of overweight/obesity were found higher among the adult men (19.5%), high-income families (27.7%), married men (22.3%), primary education (33.3%), government employees (38.4%), exercise below one hour (20.4%), below two hours television time (18.5%) and six hours sleeping duration (15.1%). Among women, adult women (25.0%), high-income families (39.5%), married women (28.1%), primary education (30.8%), government employees (50.0%), exercise below one hour (24.6%), over four hours television time (37.5%) and seven-eight hours sleeping time (17.5%) showed higher risks of overweight/obesity.

**Prevalence of overweight and obesity in relation to food habits according to Asian cut-off points**

Higher prevalence of obesity (5.7%) was found more or the less the same between the daily and weekly consumers of fish among men. Meat consumption indicated higher prevalence of obesity among the weekly consumers (9.3%). The daily consumption of milk (9.3%), cooking oils (5.4%) and fast foods (8.3%) showed higher prevalence of obesity among men. However, consumption of egg (16.7%) and sweet (13.0%) indicated higher occurrence of obesity among the non-consumers. Among women, consumption of fish (8.9%) and meat (13.6%) showed higher prevalence of obesity among the daily and non-consumers respectively. Further, the daily consumption of milk (7.8%), cooking oils (6.7%) and fast foods (11.4%) indicated higher occurrence of obesity among women. However, consumption of egg (15.1%) and sweet (19.2%) showed higher frequency of obesity among the non-consumers.
Prevalence of overweight and obesity in relation to food habits according to WHO International value

The consumption of fish (2.4%) and meat (4.6%) showed higher prevalence of obesity among men in the weekly consumers. The consumption of egg (3.3%), milk (2.4%) and sweet (6.5%) recorded higher frequency of obesity among the non-consumers. However, the daily consumption of cooking oils (1.7%) and fast foods (2.8%) indicated higher occurrence of obesity. Among women, prevalence of obesity in fish (3.0%) consumption was more or less the same between the daily and weekly consumers. Consumption of meat (6.8%), egg (9.6%) fruit (3.5%) and sweet (13.7%) indicated higher prevalence of obesity among the non-consumers. However, the daily consumption of milk (5.2%), cooking oils (2.7%) and fast foods (6.8%) showed higher frequency of obesity.

Risks of overweight/obesity by food habits according to Asian cut-off points

The daily consumption of fish (28.9%) and cooking oils (23.5%) showed the higher risks of overweight/obesity among men. Meat consumption showed higher prevalence of overweight/obesity (34.9%) among the weekly consumers. The risks of overweight/obesity among the fast food consumers were more or less the same between the daily (22.2%) and the weekly consumers (22.6%). Higher prevalence of overweight/obesity was found among the non-consumers of egg (36.7%), milk (28.5%) and sweet (45.6%), whereas, fruits (28.4%) consumption was higher among the weekly consumers. Among women, the daily consumption of fish indicated the higher risks of overweight/obesity (41.1%), whereas, meat (39.8%), higher among the non-consumers. Prevalence of overweight/obesity in egg (46.6%), milk (30.5%) and sweet (37.0%) consumption were higher among the non-consumers, and fruits (28.3%) among the weekly consumers. Further, the result indicated that the daily consumption of cooking oils (27.0%) and fast foods (34.1%) observed higher occurrence of overweight/obesity.
Risks of overweight/obesity by food habits according to WHO international value

Among men, the prevalence of overweight/obesity was higher among the daily consumption of fish (14.9%), cooking oils (13.4%) and fast foods (16.7%). Result further indicated that meat consumption showed higher risk of overweight/obesity (24.4%) among the weekly consumers. Consumption of egg (20.0%), milk (18.2%) and sweet (28.2%) showed the higher risks of overweight/obesity among the non-consumers. Among women, the risks of overweight/obesity in fish (28.1%), cooking oils (17.5%) and fast foods (25.0%) consumption was found higher in the daily consumers. Meat consumption showed higher prevalence of overweight/obesity (30.3%) among the weekly consumers. Prevalence of overweight/obesity in case of egg (38.4%), milk (20.5%) and sweet (34.3%) consumption showed higher among the non-consumers, whereas, fruits (18.3%) higher among the weekly consumers.

Prevalence of overweight and obesity in association with different blood pressure groups according to Asian cut-off points

The prevalence of overweight and obesity in association with blood pressure shows variation among the adolescents and adults. The higher prevalence of both overweight (30.5%) and obesity (23.7%) was significantly ($\chi^2=80.482$, df=3, $p<0.001$) associated with high blood pressure among men. Similarly, among women, the overall distribution of overweight (24.6%) and obesity (26.1%) was also significantly ($\chi^2=71.904$, df=3, $p<0.001$) associated with high blood pressure.

Prevalence of overweight and obesity in association with different blood pressure groups according to WHO International value

Overall frequency of overweight (30.5%) and obesity (11.9%) among men was found associated with high blood pressure. The differences were significant statistically ($\chi^2=91.595$, df=3, $p<0.001$). Similarly, among women, higher occurrence of overall overweight (21.9%) and obesity (15.1%) was also significantly ($\chi^2=70.537$, df=3, $p<0.001$) associated with the high blood pressure.
Prevalence of overweight and obesity in association with self-reported morbidity according to Asian cut-off points

The proportion of different self-reported morbidities among the overweight/obese men and women are low while compared to the normal category. However, it was higher among the adult men and women when compared to the adolescent boys and girls. Among different self-reported morbidities, the total distribution of gallstone (33.3%) was found to be predominant among overweight men followed by sleep apnea (29.6%), diabetics (25.0%), back pain (24.2%) and hypertension (23.3%). Among obese men, higher frequency of gallstone (27.8%) and osteoarthritis (27.3%) was more or less the same. This was followed by cardiovascular (22.9%) and back pain (12.1%).

Among women, the total frequency of diabetics (36.0%) and asthma (35.3%) was found more or less the same among overweight. This was followed by hypertension (32.5%) and back pain (30.8%). The total frequencies of gallstone (29.2%), osteoarthritis (28.3%) and sleep apnea (27.8%) were also found high among overweight women. Among obese women, gallstone (25.0%) was found higher followed by diabetics (24.0%) and osteoarthritis (20.6%).

Prevalence of overweight and obesity in association with self-reported morbidity according to WHO International value

Overall frequency gallstone (38.9%) was found to be predominant among overweight men and osteoarthritis (18.2%) among obese. These were followed by sleep apnea (25.9%) among overweight and cardiovascular (14.7%) among obese. The distributions of other morbidities like osteoarthritis (25.0%), cardiovascular (22.9%), back pain (19.2%), hypertension (16.6%) and diabetes (12.5%) were found among the overweight men. Among the obese men, the frequency of back pain and hypertension was found between five to seven percent.

Among women, the overall distribution of diabetics (36.0%) was higher among overweight. Gallstone (29.2%), osteoarthritis (25.0%), Back pain (24.6%) and hypertension (24.1%) were also high among overweight women. The rest of the morbidities among overweight ranged between seventeen to twenty percent. Among
obese women, overall distribution of gallstone (12.5%), diabetics (12.0%) and osteoarthritis (11.9%) was found more or less the same. Asthma (8.8%) among obese women was also significantly high. The rest of the morbidities like hypertension, back pain and cardiovascular was recorded below five percent among obese women in the present study.

**Discussion and Conclusion**

The present study highlights the prevalence of overweight and obesity among the Meitei population of Manipur. The pattern of overweight and obesity varies by age and sex like shown in studies elsewhere (Matijasevich et al. 2009). The increasing prevalence of obesity with advancing age in the present study could be attributed to the increasing accumulation of fats, as there is a progressive increase in fat and decrease in fat-free mass with advancing age (Molarious et al. 2000). Furthermore, higher occurrence of obesity among women could also be traced through biological differences with women typically depositing more fat tissues than lean tissues when they gain weight (James et al. 2001).

The significant association of obesity with high income in the present study is consistent with other studies from the developing countries (Monteiro et al. 2004). The possible explanation could be the differences in the influence of income on people’s dietary pattern, physical activity and overall lifestyles (Goyal et al. 2010). Higher occurrence of overweight and obesity among married men and women in the Meitei population could be due to the role of the married individuals to the family and reduction in the habitual physical activities like in other studies (Hayes and Ross 1987). With the increasing awareness and importance of education in the present world, more and more people are well educated unlike in the past (Cheeseman and Bauman 2000). Such a changing educational composition of the population during the time of this upward trend in obesity could be the reason for the higher occurrence of obesity among the higher educated people in the present research. The significantly high occurrence of obesity among the government employees in the Meitei population could be due to the increasing relative sedentism and more sitting hours compare to other occupations.
The lifestyle factor such as television watching is significantly associated with the levels of overweight and obesity among the adolescent boys and girls in the present study that is consistent with other studies (Lutfiyya et al. 2007). Watching television has been hypothesized to result in increasing body weight by displacing more physically active leisure interests thereby decreasing total energy expenditure (Robinson 2001). The present study further indicates the negative association of physical activities with obesity. The higher amounts of physical activities might see larger reductions in body fat (Atlantis et al. 2006). Another situation in Manipur is the prevailing insurgency problems, kidnapping, neighbourhood crimes etc. could be considered for the relatively decrease in physical activity by restricting people to the confines of the home environment. Such a restriction could lead to more sedentary lifestyles, which in turn, lead to the development of obesity in due course of time. The association of obesity with short sleep duration in the present study is consistent with other findings (Cappuccio et al. 2008). Sleep deprivation results in tiredness, fatigue and daytime sleep; this could contribute to reduce daytime activity and less energy expenditure (Shi et al. 2010).

Of the nutritional factors related to obesity, dietary fat intake is widely believed to be primary determinant of body fat (Bray and Popkin 1998). Frequent consumption of meat shows a significant association with high occurrence of obesity among men, whereas it is negatively associated among women, which is consistent with other studies (Sherwood et al. 2000). High fat diets promote obesity by increasing energy intake, further increasing the likelihood of a positive energy balance and weight gain (Hill et al. 2000). Further, a positive association has been found between daily consumption of other fatty items (cooking oils) and level of obesity in both the sexes. Fruits, eggs and sweets consumption shows mixed results. Consumption of fast foods comes out as another important food items accounting for increasing levels of BMI. Higher prevalence of obesity in both the sexes is associated with daily consumption of fast foods. The increasing consumption of processed foods, fast foods, and meals prepared by roadside vendors indicates the rapidly changing food environments in Manipur (Dkhar and Singh 2012).
Studies have shown that increased risks of different morbidities are not only confined to obese people as healthy weight individuals are also at risk of co-morbidities (Manson et al. 1995). The present study shows the higher proportions of the different types of self-reported morbidities among men and women having normal BMI. However, some of the morbidity cases are very high among overweight and obese men and women. Results further indicate that the frequency of morbidities increased along with the increase in age and the level of obesity. High blood pressure is significantly associated with obesity in both the sexes. Among the specific morbidities, gallstone, osteoarthritis, cardiovascular, diabetic and back pain are found predominant in both the sexes.

In conclusion, this study highlights the increasing prevalence of overweight and obesity among Meitei population. It is essential to educate and create awareness programmes to check the increasing problems and its health consequences. Further studies designed to investigate dietary factors, physical activity patterns and other lifestyle factors related to weight change are needed to improve understanding of how obesity develops and how it can be prevented. Research work incorporating the different communities would be helpful to show the clear picture of overweight and obesity with above mention influencing factors in Manipur.

CHAPTERIZATION

The thesis is divided into seven chapters. The first chapter provides a general introduction on the scope and importance of this study. The objectives and statement of problem are also spelled out in this chapter. The second chapter deals with the review of literature. Chapter three describes the materials and methods of the study along with a brief description of the study population and study area. Chapter four presents the findings of the data analysis on overweight and obesity in relation to the socio-economic conditions, lifestyles and food habits. The association of overweight and obesity in relation to blood pressure and self-reported morbidity are subsequently discussed in chapter five. Chapter six discuss the findings of the present study while chapter seven, the final one, provides a summary and the main conclusions.
BIBLIOGRAPHY


