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Prevalence of Obesity in the Employees of Universities, Health and Research Institutions of Peshawar

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Abstract: Prevalence of obesity, over weight and under weight was determined in both sexes of high and low-income employees of 11 schools/colleges/faculties/institutions of University of Peshawar, Khyber Medical College, Khyber Teaching Hospital, Engineering University, Agricultural University, Peshawar and Pakistan Forest Institute, Peshawar, Pakistan. A random sample of 50 employees of both sexes and of both income groups was selected from all schools/colleges/faculties/institutions except Faculty of Law and Agricultural University, Peshawar where 46 and 88 employees were selected respectively. In this way, a total of 834 employees of the different institutions were studied. Age, sex, income level, food preparation, eating pattern and activity level were recorded. Weights and heights of the employees were taken. The prevalence of obesity, over weight and under weight was assessed on the method of body mass index. The over all prevalence of obesity, over weight and under weight was 8.0, 29.6 and 5.4% respectively. The prevalence of obesity, over weight and under weight in the male employees was 6.9, 29.1 and 4.6% respectively and in the female employees was 11.1, 31.4 and 7.15% respectively. The prevalence of obesity, over weight and under weight in the male employees of the high-income group was 7.5, 34.9 and 1.6% respectively and in the male employees of the low income group was 6.5, 24.9 and 6.8% respectively. The prevalence of obesity, over weight and under weight in the females employees of the high income group was 13.6, 31.8 and 4.6% respectively and in the females of the low-income group was 7.4, 30.5 and 11.6% respectively. The data indicated that prevalence of obesity and over weight was high. The incidence was more in female than male employees. Also the prevalence was more in the high income group than the low income group. Precautionary measures in terms of food preparations, eating pattern and physical activity/exercise are needed.

Key words: Obesity, overweight, sex, income group, exercise

Introduction

Obesity is a major health hazard all over the world and is becoming a major health threat in Pakistan. Obesity is either exogenous caused by excessive energy intake or endogenous caused by inherent metabolic problems (Krause and Mahan, 1984). Obesity may be due to genetic, dietary or environmental factors (Richard et al., 1994). Major causes of obesity are more energy intake than requirements and reduced activity level. Weight reduction may be life saving, so it is necessary to reduce weight. Obesity some times arises in early life (juvenile onset) and some times later (adult onset) and both states need to be prevented.

Genetic inheritance probably influences a person's chance of becoming fat more than any other factor. Within families, if one parent is obese, a child has a 40% chance of becoming obese, could be 80% if both parents are obese and only 7% if neither parent is obese (Foreman, 1983). It has been shown that Black women have higher prevalence of obesity than White women whereas White men have a higher prevalence of obesity than Black men (Ross and Mirowsky, 1983). Greater prevalence of obesity was found in the Black people (Rand and Kuldau, 1990).

Dietary habits of an individual also influence the prevalence of obesity. Excessive intake of carbohydrates and foods of animal origin may cause obesity in school going children (Carcassi et al., 1990). Over-eating has been attributed to be one of the principal causes of the obesity and this has been particularly reported in the obese females. In a study on 500 married women, obesity was due to greater energy intake in the form of fat and carbohydrate and less physical activity (Dua and Seth, 1988).

Childhood and early stages of puberty are the critical periods for becoming obese, particularly due to less physical activity and higher kcal intake. Aging also plays an important role in the development of obesity; both men and women tend to gain weight after 50 years because of lowered BMR and decreased physical activity (Brownell, 1984). Prevalence of obesity increases continuously with age up to 70 years in women and up to 65 years in men (Pakesch et al., 1992). Obesity is also linked to the economic status of a person and is more prevalent in the higher social classes than the lower (Goldblatt et al., 1965).

There are a number of health hazards associated with obesity, including diabetes, hypertension, cardiovascular problems, arthritis, pulmonary and renal problems, carbohydrate intolerance, surgical operation, anesthesia

risk, respiratory problems, breast cancer, menstrual abnormalities, ovarian dysfunction along with poor social image and rejection (Brownell, 1982; Leach *et al.*, 1973; Blitzer *et al.*, 1976; Rimm and White, 1979). According to Khan *et al.* (1999), 95% of male and almost all female diabetic individuals were overweight at the onset of diabetes on WHO standard.

Losing weight and keeping the weight off are extremely difficult. This is particularly true for those individuals who are 25% or more overweight and it is further difficult to manage in the individuals whose obesity is due to inherited problems (Shils and Young, 1988). The problem of obesity can be managed, when it is not genetic in nature, by a number of treatments e.g. dietary managements, exercise, and appetite suppression (Craddock, 1978) and with the help of surgical procedures (Mason, 1979). Diet may play an important role for the maintenance of weight loss and treatment of obesity. Low energy diet at proper time in addition to exercise and other surgical procedures should be adopted (Garrow, 1994).

Proper nutritional planning and precautionary measures are needed to reduce/prevent the incidence of obesity in Pakistan. The purpose of this study was to know the prevalence of obesity in the selected universities and affiliated institutions of Peshawar, Pakistan so that better planning can be done for the prevention and control of the condition.

Materials and Methods

Location of the study: The survey was conducted in the various institutions of Peshawar University, Khyber Teaching Hospital, Khyber Medical College, University of Engineering and Technology Peshawar, NWFP Agricultural University Peshawar and Pakistan Forest Institute, Peshawar. The names of the institutions are given in Table 1.

Sample size and criteria for sample selection: A random sample of 50 individuals, of both sexes and of age range 30-60 years, was selected from the schools, colleges and faculties/Institutions of University of Peshawar, Khyber Medical College, Khyber Teaching Hospital, University of Engineering and Technology, and Pakistan Forest Institute, Peshawar. The sample size from Agricultural University was 88 individuals, which included the individuals from Agricultural University Public School. From Faculty of Law 46 individuals were selected randomly. The total sample size for the selected institutions was 834 individuals. The sample was selected in a way that about 50 percent individuals were from low-income group (employees of basic pay scale 16 or below or those employees whose monthly income was less than or equal to Rs.5000/month) and 50% were from high income group (employees of basic pay scale 17 or above or whose monthly income was

more than Rs. 5000/month).

Collection of data: Information about age, sex, designation and pay scale of each individual was collected. Food preparation, intake pattern and activity level were also recorded. For height, the individual was asked to stand against the wall without shoes, backing the wall and looking straight in the front. Ruler was kept on his head touching on one side his head and on the other side the wall. A sign on the wall was made with pencil, and then the individual was asked to move from his place. Height from the sign on the wall to the bottom for each individual was taken with ordinary measuring tap. The height was taken in centimeter. For weight, the employee was asked to remove his sweater, jacket, and shoes etc. Then he was asked to step up on the health scale. The weight was taken in Kg and rounded to whole number.

Calculation of obesity and other weight profile: Obesity and other weights were determined by body mass index (BMI). BMI was calculated according to the procedure of Bray, (1978). BMI = Height in Kg/(Height in Meter)^2 = kg/m^2

Results

The names of institutions and the number of individuals selected from each institution for the study is given in Table 1. The selected sample has covered the schools, colleges and faculties of University of Peshawar, Khyber Medical College, Khyber Teaching Hospital, Engineering University, Agricultural University and Pakistan Forest Institute, Peshawar.

The income level and sex of the selected employees are given in Table 2. In total there were 834 employees. Out of these, 608 were males and 226 were females. Out of the 834 employees, 387 employees were of high-income group and 447 were of low-income group. Out of the 387 employees of the high-income group, 255 were males and 132 were females. Out of the 447 employees of the low-income group, 353 were males and 94 were females.

The prevalence of obesity and other weights profile in the employees of the universities and affiliated institutions is presented in Table 3. Out of the total 834 employees, 8.0% were obese, having mean BMI of 32.6±2.5, 29.6% were overweight, having mean BMI of 27.0±1.4 and 5.4% were under weight, having mean BMI of 17.0±0.9. The remaining 57.0% employees were of normal weight, having mean BMI of 22.2±1.8. The over all mean BMI of the 834 employees was 24.2±4.0, which was in the range of normal weight.

The prevalence of obesity and other weights profile in the male employees of the universities and institutions is shown in Table 4. Out of 608 male employees, 6.9% were obese, having mean BMI of 32.1±1.8, 29.1% were

Table 1: Location and Number of Individuals Selected for the Study

Name of Institution	No. of Employees
Institute of Management Sciences, University of Peshawar	50
Faculty of Arts, University of Peshawar	50
Faculty of Science, University of Peshawar.	50
Faculty of Law, University of Peshawar	46
Islamia college, University of Peshawar	50
College of Home Economics, University of Peshawar	50
Jinnah College For Women, University of Peshawar	50
Islamia Collegiate School for Boys, University of Peshawar	50
University Public School, University of Peshawar	50
University Model School, University of Peshawar	50
Islamia collegiate School for Girls, University of Peshawar	50
Khyber Teaching Hospital, Peshawar	50
Khyber Medical College, Peshawar	50
University of Engineering & Technology, Peshawar	50
NWFP Agricultural University, Peshawar	88
Pakistan Forest Institute, Peshawar	50
Total	834

Table 2: Income Level and Sex of the Employees of Universities and Affiliated Institutions

Sex of Employees	Number of Employees		
	High Income Group	Low income Group	Total Employees
Both Sexes	387	447	834
Males	255	353	608
Females	132	94	226

overweight, having mean BMI of 26.8±1.4 and 4.6% were under weight, having mean BMI of 16.9±0.9. The remaining 59.4% male employees were of normal weight, having mean BMI of 22.2±1.8. The over all mean BMI of the 608 male employees was 24.0±3.7, which was in the normal range of weight.

The prevalence of obesity and other weights profile in the male employees of the high income group is given in Table 5. Out of the 255 male employees of the high income group, 7.5% were obese, having mean BMI of 32.2±1.8, 34.9% were overweight, having mean BMI of 26.9±1.4 and 1.6% were under weight, having mean BMI of 16.6±0.6. The remaining 56.1% employees were of normal weight, having mean BMI of 22.6±1.7. The over all mean BMI of the 255 male employees of the high income group was 24.8±3.4, which was in the range of normal weight.

The prevalence of obesity and other weights profile in the male employees of the low income group is presented in Table 6. Out of the 353 male employees of the low income group, 6.5% were obese, having mean BMI of 32.0±1.9, 24.9% were over weight, having mean BMI of 26.7±1.3 and 6.8% were under weight, having mean BMI of 17.0±1.0. The remaining 61.8% were of normal weight, having mean BMI of 21.9±1.9. The over all mean BMI of the 353 male employees of the low income group was 23.4±3.8, which was in the range of normal weight.

The prevalence of obesity and other weights profile in female employees of the universities and institutions is given in Table 7. Out of the 226 female employees, 11.1% females were obese, having mean BMI of 33.4±3.2, 31.4% females were over weight, having mean BMI of 27.3±1.4 and 7.1% females were under weight, having mean BMI of 17.2±0.8. The remaining 50.4% females were of normal weight, having mean BMI of 22.1±1.6. The over all mean BMI of the 226 female employees was 24.6±4.6, which was in the range of normal weight.

The prevalence of obesity and other weights profile in the female employees of the high income group is presented in Table 8. Out of 132 female employees of the high income group, 13.6% females were obese, having mean BMI of 33.8±3.6, 31.8% females were overweight, having mean BMI of 27.3±1.4 and 4.6% females were under weight, having mean BMI of 17.1±0.6. The remaining 50.0% females were of normal weight, having mean BMI of 22.2±1.6. The over all mean BMI of the 132 female employees of the high income group was 25.2±4.8, which was in the range of over weight.

The prevalence of obesity and other weights profile in the female employees of the low income group is given in Table 9. Out of the 94 female employees of the low income group, 7.4% females were obese, having mean BMI of 32.3±1.6, 30.5% females were over weight,

Table 3: Prevalence of Obesity and Other Weights Profile in the Employees of Universities and affiliated Institutions in Peshawar[1]

Weight Profile	Number of Employees	Mean BMI	Percent of Total
Obesity (BMI > 30)	67	32.6±2.5	8.0
Over Weight (BMI= 25.0 – 29.9)	247	27.0±1.4	29.6
Normal Weight (BMI= 18.5 – 24.9)	475	22.2±1.8	57.0
Under Weight (BMI < 18.5)	45	17.0±0.9	5.4
Total	834	24.2±4.0	100

[1]Classification of BMI in this table is that of WHO (WHO, 1997).

Table 4: Prevalence of Obesity and Other Weights Profile in the Male Employees of Universities and affiliated Institutions in Peshawar[1]

Weight profile	Number of Employees	Mean BMI	Percent of Total
Obesity (BMI > 30)	42	32.1±1.8	6.9
Over Weight (BMI= 25.0 – 29.9)	177	26.8±1.4	29.1
Normal Weight (BMI=18.5 – 24.9)	361	22.2±1.8	59.4
Under Weight (BMI < 18.5)	28	16.9±0.9	4.6
Total	608	24.0±3.7	100

[1]Classification of BMI in this table is that of WHO (WHO, 1997).

having mean BMI of 27.4±1.6 and 11.6% females were under weight, having mean BMI of 17.2±0.9. The remaining 50.5% females were of normal weight, having mean BMI of 21.8±1.8. The over all mean BMI of the 94 female employees of the low income group was 23.8±4.3, which was in the normal range of BMI.

Discussion

Obesity, an excessive accumulation of body fat, is a pre existing condition for many diseases like hypertension, diabetes mellitus and atherosclerosis. To know the prevalence rate of obesity is important for planning to reduce and control the condition. Body mass index (BMI), standard weight tables and skin fold measurement are some of the methods used for determining body weight profile. WHO (1997) has recommended that BMI should be used for prevalence of over weight and obesity. BMI is a practical approach for assessing body fat in the clinical set ups. It provides a more accurate measure of total body fat compared with assessment of body weight alone (Heymsfield *et al.*, 1995). The typical body weight tables are based on mortality outcomes, and they do not necessarily predict morbidity. However, BMI has some limitations. For example, BMI over estimates body fat in persons who are very muscular, and it can under estimate body fat in persons who have lost muscle mass like many elderly. BMI is a direct calculation based on height and weight, regardless of gender (NIH, 2000). Obesity and over weight are mainly affected by age, sex, socio-economic status, food intake and physical activities level. In this study, employees of the universities and institutions in the age group 30-60 years were selected because obesity and over weight mainly prevail in this age group. Both sexes were included in the study as gender affect prevalence of obesity. Socio-economic status also affect the prevalence of obesity and over weight, therefore, employees of high and low income groups were included in the study. The general diet pattern and exercise status of the selected employees were noted because these factors mainly affect the prevalence of the condition.

The over all prevalence of obesity in the employees of the universities and affiliated institutions was 8.0% (Table 3), which is considerably high in terms of health risks. As the employees of the universities and institution were educated people, it was expected that they would be very much alert to their health care, but the data demonstrated that they were careless at least in eating and exercise. The prevalence of obesity indicated that they were taking more energy than their requirement and were doing less physical activities and exercise. During the study, it was observed that almost all employees of the universities and institution were taking 1-2 samosa or other bakery products in their mid day tea and 2-3 extra cups of tea during their office hours. This was in addition to their routine breakfast, lunch, dinner, tea and other drinks in their homes. Routine meals in the homes of the employees of the high income group were prepared with high fat and a sweet dish was usually served. Though the employees of the low income group were preparing their dishes with high fat but sweet dish was not their usual routine. High fat in the diet and sweet dish increase the energy content. Regular exercise was not a routine of many employees in the universities and institution. Their usual teaching and office activities were placing them in the light exercise group. Both more energy intake and less exercise resulted in obesity and overweight. However, the prevalence of obesity in the universities and other

Table 5: Prevalence of Obesity and Other Weights Profile in the Male Employees of the High Income group of Universities and affiliated Institutions in Peshawar[1]

Weight Profile	Number of Employees	Mean BMI	Percent of Total
Obesity (BMI > 30)	19	32.2±1.8	7.5
Over Weight (BMI=25.0 – 29.9)	89	26.9±1.4	34.9
Normal Weight (BMI=18.5 – 24.9)	143	22.6±1.7	56.1
Under Weight (BMI < 18.5)	4	16.6±0.6	1.6
Total	255	24.8±3.4	100

[1]Classification of BMI in this table is that of WHO (WHO, 1997).

Table 6: Prevalence of Obesity and Other Weight Profile in the Low Income Male Employees of Universities and Affiliated Institutions in Peshawar[1]

Weight Profile	Number of Employees	Mean BMI	Percent of Total
Obesity (BMI > 30)	23	32.0±1.9	6.5
Over Weight (BMI= 25.0 – 29.9)	88	26.7±1.3	24.9
Normal Weight (BMI= 18.5 – 24.9)	218	21.9±1.9	61.8
Under Weight (BMI < 18.5)	24	17.0±1.0	6.8
Total	353	23.4±3.8	100

[1]Classification of BMI in this table is that of WHO (WHO, 1997).

institutions of Peshawar was much less than the prevalence of obesity in other countries. Dhurandhar and Kulkarni (1992) reported 11% obesity in students and 53% in male medical doctor in Bombay, India. Musaiger *et al.* (2000) reported 56 and 79.6% prevalence of obesity in males and females Bahraini natives. Smith *et al.* (1994) reported 43 and 11% overweight and obesity in men and 38 and 14% overweight and obesity in women in middle aged Scottish Population. The prevalence of obesity and over weight is lower in the universities and affiliated institution of Peshawar in comparison to the above reported literature.

The prevalence of over weight (29.6%) was really high (Table 3). Over weight usually results in obesity which is a potential hazard for health, hence precautionary measures must be adopted to control the condition. The most effective precautionary measures are reduction in energy intake and increase in physical activities. The over weight individuals are directed to consult a nutritionist or dietitians for controlling their over weight problem. Out of the total 834 employees, 5.4% individuals were under weight. These employees might have very low income and more family members and hence were not eating enough. Less intake of foods results in under weight.

The prevalence of obesity in the male employees of the universities and affiliated institutions of Peshawar was lower than the over all prevalence (6.9 vs. 8.0%; Table 3 and 4). The reason for the lower prevalence of obesity in male employees may be due to their relatively more alertness to health care and more physical work as they are responsible for the out door activities of their families in this part of the country.

The over weight prevalence in the male employees of the universities and affiliated institutions of Peshawar was 29.1% (Table 4). Over weight prevalence was quite high and must be controlled The prevalence of under weight in the male employees of the universities and affiliated institutions of Peshawar was 4.6% indicating that underweight was not a problem in educational institutions. Majority of the male employees of the universities and affiliated institutions of Peshawar were of normal weight indicating good eating habits and sufficient exercise level.

The prevalence of obesity in the high income male employees of the universities and affiliated institutions of Peshawar was higher than the prevalence of obesity in the low income male employees of the universities and affiliated institutions of Peshawar (7.5 vs. 6.5, Table 5 and 6). The reason for high prevalence of obesity in the high income group may be due to intake of more fatty diets which result in extra energy intake. Similarly, The prevalence of over weight in the high income male employees of the universities and affiliated institutions was higher than the prevalence of over weight in the low income male employees of the universities and affiliated institutions of Peshawar (34.9 vs. 24.9; Table 5 and 6). The reason could be the same as mentioned above. The prevalence of under weight in the high income male employees of the universities and affiliated institutions was lower than the prevalence of under weight in the low income male employees of the universities and affiliated institutions of Peshawar (1.6 vs. 6.8; Table 5 and 6). The reasonably high prevalence of under weight in the low income males demonstrated that these employees were not taking enough food particularly in terms of energy. The normal weight employees were more in the low income group than the high income group, indicating that the eating pattern of low income group was better than the high income group except that to

Table 7: Prevalence of Obesity and Other Weight Profile in the Female Employees of Universities and Affiliated Institutions in Peshawar[1]

Weight Profile	Number of Employees	Mean BMI	Percent of Total
Obesity (BMI > 30)	25	33.4±3.2	11.1
Over Weight (BMI 25.0 – 29.9)	71	27.3±1.4	31.4
Normal Weight (BMI 18.5 – 24.9)	114	22.1±1.6	50.4
Under Weight (BMI < 18.5)	16	17.2±0.8	7.1
Total	226	24.6±4.6	100

[1]Classification of BMI in this table is that of WHO (WHO, 1997).

Table 8: Prevalence of Obesity and Other Weights Profile in the High Income Female Employees of Universities and Affiliated Institutions in Peshawar[1]

Weight profile	Number of Employees	Mean BMI	Percent of Total
Obesity (BMI > 30)	18	33.8±3.6	13.6
Over Weight (BMI 25.0 – 29.9)	42	27.3±1.4	31.8
Normal Weight (BMI 18.5 – 24.9)	66	22.2±1.6	50.0
Under Weight (BMI < 18.5)	6	17.1±0.6	4.6
Total	132	25.2±4.8	100

[1]Classification of BMI in this table is that of WHO (WHO, 1997).

Table 9: Prevalence of Obesity and Other Weights Profile in the Low Income Female Employees of Universities and Affiliated Institutions in Peshawar[1]

Weight profile	Number of Employees	Mean BMI	Percent of Total
Obesity (BMI > 30)	7	32.3±1.6	7.4
Overweight (BMI 25.0 – 29.9)	29	27.4±1.6	30.5
Normal Weight (BMI 18.5 – 24.9)	48	21.8±1.8	0.5
Underweight (BMI < 18.5)	10	17.2±0.9	11.6
Total	94	23.8±4.3	100

[1]Classification of BMI in this table is that of WHO (WHO, 1997).

some of the individuals enough food was not available. The low income status might have compelled for better eating. Al-Mahroos and Al-Roomi (2001) reported 25% and 32% of obesity in adult Bahraini (aged 40-69 years) men and women respectively. The prevalence of obesity was significantly higher among female subjects than males in all the age groups. Overweight and obesity were more prevalent among those with higher levels of education and people with high incomes.

The prevalence of obesity in the female employees of the universities and affiliated institutions of Peshawar was higher than the over all prevalence (11.1 vs. 8.0%) and higher than the prevalence of obesity in male employees (11.1 vs. 6.9, Table 3, 4 and 7). The reason for the higher prevalence of obesity in the female employees was perhaps due to their lower physical activities as they mostly stayed homes after returning from their jobs. During their stay in homes, they were having easy excess to food and hence were eating more which could be a possible reason. High prevalence of obesity has been reported in literature. Stam-Moraga *et al.* (1999) reported 12.1 and 18.4% obesity in male and female Belgium population.

The over weight prevalence in the female employees of the universities and affiliated institutions of Peshawar was 31.4% (Table 7). The prevalence of over weight in the female employees of the universities and affiliated institutions was almost equal to the over all prevalence

(31.4 vs. 29.6%) and little lower than the prevalence of obesity in male employees (31.4 vs. 34.9, Table 3, 4 and 7). However, the over weight prevalence was quite high and must be controlled. The prevalence of under weight in the female employees of the universities and affiliated institutions of Peshawar was 7.1% indicating that underweight was a problem in the female employees of the educational institutions. Their food intake should be increased. Half of the female employees of the universities and affiliated institutions of Peshawar were of normal weight indicating that were eating balanced diet and were physically active.

The prevalence of obesity in the high income female employees of the universities and affiliated institutions of Peshawar was higher than the prevalence of obesity in the low income female employees of the universities and affiliated institutions of Peshawar (13.6 vs. 7.4, Table 8 and 9). The reason for high prevalence of obesity in the high income group may be due to intake of more fatty diets which result in extra energy intake. The prevalence of over weight in the high income female employees of the universities and affiliated institutions was similar with the prevalence of over weight in the low income female employees of the universities and affiliated institutions of Peshawar (31.8 vs. 30.5; Table 8 and 9). The reason could be the same as mentioned above. The prevalence of under weight in the high

income female employees was lower than the prevalence of under weight in the low income female employees (4.6 vs. 11.6; Table 8 and 9). The high prevalence of under weight in the low income females demonstrated that these employees were not taking enough food particularly in terms of energy. The normal weight employees were more in the low income group than the high income group, indicating that the eating pattern of low income group was better than the high income group. However, to some of the individuals enough food was not available.

In conclusion, the over all prevalence of obesity in comparison to other countries was not high, however, together with over weight, it was sufficiently high. The prevalence was more in females than males and high income group than low income group. Obesity and over weight are risk factors for health, therefore. It is recommended that less fat should be used for food preparations, sugar use should be reduced and bakery and confectionary products along with tea should be reduced during office hours. Regular exercise or hard physical work should be included in the daily routine of the employees.

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