

Cover Letter

An acknowledgement that the manuscript has not been published or submitted to other journals previously is included

An acknowledgement that all authors have contributed significantly and that all authors are in agreement with the content of the manuscript is included.

An acknowledgement that all authors agree to the conditions outlined in the copyright assignment form is included.

Prevalence of Obesity in Relation to Education and Socioeconomic Level in Students and working women

Sadaf Shakoor¹, Misbah Nawaz¹, Naheed Abbas¹, Aslam Mirza² and Sana Arif¹

¹Institute of Rural Home Economics, National Institute of Food Science and Technology, University of Agriculture, Faisalabad.

²Institute of Animal Nutrition, University of Agriculture, Faisalabad

Corresponding Author's Email: sadaf.shakoor@yahoo.com cell: +92 300 7975564

ABSTRACT

Prevalence of obesity has become more common and major problem that has been increasing worldwide particularly among women. There are many factors leading to obesity categorized into internal factors and external factors. External factors include socioeconomic level, education, income, occupation, physical activity, different dietary patterns and food quality while internal factors include genetic, psychological and physiological conditions, different eating and other disorders. This research was designed to study the incidence of obesity in students and working women. 60 samples of females were taken from each of 3 categories including teachers, students and employees. First group of 20 samples of females were taken from teachers, second group of 20 samples from students and third group of 20 samples from employees (manual employees, non-manual employees and self-employees). Data of 60 samples from each group was collected by using anthropometric measurements, BeurerGmBH Black 64 (type) machine and obesity related questionnaire. Then the data was subjected to the frequency distribution of chi-square. Obesity was directly associated and increases with different levels of socioeconomic status (9.797), income (61.191), diet (48.704), diseases (21.273), age (60.00), weight (82.48 ± 1.30), BMI (33.28 ± 0.43), body fat (40.51 ± 0.42), genetic problem (6.088) while inversely related to education (34.036), physical activity level (13.733), body muscles (28.84 ± 0.56) but not linked with height (5.14 ± 0.05) and waist-hip ratio (0.82 ± 0.01) (body shape and body frame). From present study it is concluded that obesity in female students and industrial employees is strongly associated with bad eating

habits, sedentary lifestyle and physical inactivity, stress of work load because of differences in socioeconomic level and to some extent with diseases and genetic problem. In teachers incidence of obesity is less because of higher education level and knowledge. It is seen that occurrence of obesity in teachers is mostly associated with diseases and to some extent genetic problems.

INTRODUCTION

Increasing prevalence of obesity has become global health issue (WHO, 2003). In 2006 the prevalence of obesity in females in rural areas of Asia was 20.4% and in urban areas of Asia was 50% (Snehalatha *et al.*, 2002; Baskar *et al.*, 2004; Ramachandran *et al.*, 2008). Obesity is a medical condition which leads to the accumulation of excess body fat in the body (Haslam and James, 2005). Obesity is a complicated multifaceted chronic disorder which develops from interaction of genotype and environment. Factors leading to the development of obesity are combination of social, behavioral, educational, cultural, physiological, psychological, metabolic and inherited (NIH, 2004). Increasing predominance of obesity reflects the powerful impact of standard of living involving factors diet, on its etiology (Azadbakht and Esmailzadeh, 2007).

Socioeconomic level is a fundamental determinant which is strongly associated with wider surroundings, community, economic, employment and learning policies. The association among socioeconomic level and obesity is complex and different patterns of obesity are more inflated in women compared to men and children. Difference in socioeconomic status is a leading cause of increased prevalence of obesity (Molarius *et al.*, 2000; Ball and Crawford, 2005).

In comparison to obese persons with high socioeconomic rank, the overweight persons with low socioeconomic rank possibly less recognize their weight trouble, and these deprived people cannot pay for healthy foods like fruits and vegetables that may assist them to preserve their normal body weight. Even in poor districts there are more scarcity of parks, fast-food outlets and restaurants and other leisure conveniences. Those environments that

encourage the expenditure of energy rich foods and discourage bodily activity contribution are called Obeseogenic environment (Wardle and Griffith, 2001; Drewnowski, 2004; Frank, 2004).

Many studies have explained the important factors of socioeconomic level such as education; income and occupation tend to affect the health and obesity in women. Education symbolizes the person's knowledge and tells about occupation and income strongly. Income refers to the material situation that may be foundation for health-promoting environment and fitness. Occupation is related to the social levels and different constitutional rights (Galobardes and Lynch, 2007).

Sedentary life style and more consumption of alcohol and stress-related illness are linked with the increasing incidence of non-communicable unceasing illnesses. It is important to note that obesity is a major risk factor that is linked with death from non-communicable unceasing illnesses, and increasing rapidly. (Uauyet *et al.*, 2001). Bad diet and sedentary life style increase the occurrence of obesity in adults and children in relatively short time period (Kopelman, 2000; Ogden *et al.*, 2000).

Physical idleness is a well-known hazard issue for the expansion and upholding of obesity. Latterly, considerable deliberation has been given to the role of inactive behavior (TV watching, using skype and indoor activities) in obesity and it is observed that inactive behaviors are linked with obesity separately of bodily activity. However, the present suggestions about physical activity do not warn about inactive behaviors (Salmon *et al.*, 2000; Jakes *et al.*, 2003; Mummery *et al.*, 2005). Overweight and obesity are positively linked with growing age, low levels of leisure time physical activity and different eating behavior. Overweight and obesity are also linked with subordinate levels of education and low socioeconomic level (Lindstro *et al.*, 2003; Geliebter and Aversa, 2003; Stergren *et al.*, 2001).

Objectives:-

- To evaluate the prevalence of obesity in relation to education and socioeconomic level in students and working women.

- To determine different eating habits/pattern for assessing the prevalence of obesity.

MATERIAL AND METHODS

The present research was conducted on obese students and working women. 60 samples of women were categorized into three groups. Each group was included 20 samples. Group 1 included 20 samples of female students living on 5000-10,000/=. Group 2 included 20 samples of female teachers having salary ranging from 25,000-40,000, 41,000-60,000, 61,000-80,000, 81,000-100,000 and above 100,000/=. Group 3 included 20 samples of female industrial employees (manual, non-manual and self) having salary ranging from 5,000-10,000, 11,000-15,000 and above 15,000/=. The research was carried out at Nutrition Laboratory of National Hospital, Faisalabad, and Institute of Rural Home Economics in the University of Agriculture, Faisalabad. Data for each of 60 samples of women was collected from obesity related questionnaire and anthropometric measurements was taken following the methodology described by (Visscheret *al.* 2000). Age was recorded in years by asking them. Body weight and height was measured barefooted and lightly dressed by using electronic weighing balance and stadiometer (Chumlea et al., 1990). BMI was calculated by using the given formula (Visscheret *al.* 2000).

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m}^2\text{)}}$$

Waist and hip measurements for waist: hip ratio was measured by using flexible inches tape (Seidell and Molarius, 1998). Body fat/ muscle/ mass was measured by using bioelectric scale (Beurer GmbH BLACK Blr.64). For the interpretation of results data collected were

subjected to statistical analysis using frequency distribution of Chi-square and analysis of variencetechniques. Means of treatment were compared by Duncan’s new multiple range test (Steel *et al.*, 1996).

RESULTS

Table 4.1: Frequency distribution of socioeconomics level in obese students and working women

Socioeconomic Status	Student	Teacher	Employ	Total
Low	9	5	14	28
	45.0%	25.0%	70.0%	46.7%
Medium	1	4	2	7
	5.0%	20.0%	10.0%	11.7%
High	10	11	4	25
	50.0%	55.0%	20.0%	41.7%
Total	20	20	20	60
	100.0%	100.0%	100.0%	100.0%
Chi-Square = 9.797 df = 4 P<0.044*				
*Significant at P<0.05				

Education	Student	Teacher	Employ	Total
Matric	0	0	2	2
	.0%	.0%	10.0%	3.3%
F.A/F.Sc	0	0	4	4
	.0%	.0%	20.0%	6.7%
BA/B.Com/B.Sc	9	0	6	15
	45.0%	.0%	30.0%	25.0%
M.A/M.Sc./M.Phil	11	14	8	33
	55.0%	70.0%	40.0%	55.0%
Ph.D/Other	0	6	0	6
	.0%	30.0%	.0%	10.0%
Total	20	20	20	60
	100.0%	100.0%	100.0%	100.0%
Chi-Square = 34.036 df = 8 P<0.000** Highly Significant				
Income	Student	Teacher	Employ	Total
1000-10000	10	6	8	24
	50.0%	30.0%	40.0%	40.0%
10001-20000	8	0	4	12
	40.0%	.0%	20.0%	20.0%

above 30000	2	14	6	22
	10.0%	70.0%	30.0%	36.7%
Total	0	0	2	2
	.0%	.0%	10.0%	3.3%
Chi-Square = 61.191 df = 4 P<0.000**				
Highly Significant				
Expenditure on food	Student	Teacher	Employ	Total
1000-10000	15	0	12	27
	75.0%	.0%	60.0%	45.0%
10001-20000	5	8	8	21
	25.0%	40.0%	40.0%	35.0%
20001-30000	0	6	0	6
	.0%	30.0%	.0%	10.0%
above 30000	0	6	0	6
	.0%	30.0%	.0%	10.0%
Total	20	20	20	60
	100.0%	100.0%	100.0%	100.0%
Chi-Square = 38.857 df = 6 P<0.000**				
Highly Significant				
Effect of work control in term of occupation	Student	Teacher	Employ	Total

Poor	10	6	8	24
	50.0%	30.0%	40.0%	40.0%
Medium	8	0	4	12
	40.0%	.0%	20.0%	20.0%
High	2	14	6	22
	10.0%	70.0%	30.0%	36.7%
Complete	0	0	2	2
	.0%	.0%	10.0%	3.3%
Total	20	20	20	60
	100.0%	100.0%	100.0%	100.0%
Chi-Square = 23.182 df = 6 P<0.001** Highly Significant				
Activity level	Student	Teacher	Employ	Total
Sedentary	4	2	12	18
	20.0%	10.0%	60.0%	30.0%
Moderate	12	12	6	30
	60.0%	60.0%	30.0%	50.0%
High	4	6	2	12
	20.0%	30.0%	10.0%	20.0%
Total	20	20	20	60
	100.0%	100.0%	100.0%	100.0%

Chi-Square = 13.733 df = 4 P<0.008**

Highly Significant

DISCUSSION

The present study was conducted to study the prevalence of obesity that has become more common major issue in the world. There are many factors leading to obesity including socioeconomic level, education, income, occupation, physical activity(Azadbakht and Esmailzadeh, 2007).

Socioeconomic level is a main parameter which includes other important factors such as education, occupation and income and classified into low, medium, high. The results of present study showed that obesity was more prevalent in women with low and high class and there was strong association (Chi-Square = 9.797) between socioeconomic status and obesity in women as move from medium to high and medium to low class as supported by (Sobal and Stunkard, 1989).

Education indicates the individual's knowledge has strong effect on person's health. The present study showed that there was inverse but strong association (Chi-Square = 34.036) among obesity and education. As education level increases the rate of obesity decreases. So, women with higher education were obese less as compared to those women with lower education as observed by (Molarius *et al.*, 2000).

The relationship between obesity, income and expenditures on food was highly significant (Chi-Square = 61.191). Income ramps varies person to person and within societies and has main effect on person's health. Women with high or low income level and higher expenditures on food were at higher risk of obesity because of bad consumption behaviors and food insecurity as resembled by (Gortmaker *et al.*, 1993).

Occupation is linked to social levels and different constitutional rights. There are varieties of occupations. Some occupations keep the person physically more active but in some occupations sitting time and work stress is more. Effect of work control in occupation is an important factor and was inversely associated with BMI and WHR (Chi-Square = 23.182) in obese persons as observed by (Overgaard *et al.*, 2004).

Activity level including physical activity, leisure-time physical activity and time spend in leisure-time physical activity is an important parameter to determine the risk of obesity. Physical activity has important role either in prevention or prevalence of obesity. Sedentary behavior or low physical activity and consumption of energy rich food leads to obesity (Haskell, 1996). Leisure-time physical activity includes television watching, massaging, using skyp, book reading, indoor and outdoor games and outing. The results of present study showed that those women who spend more time in leisure-time physical activity while sitting and snacking were at higher risk of obesity than those who spend time in recreational activities. Therefore, the association of obesity with activity level, physical activity, leisure-time physical activity and time spend in leisure-time physical activity was highly significant (Chi-Square = 13.733) as supported by (Leermakers *et al.*, 2000).

LITERATURE CITED

- Azadbakht, L and A. Esmailzadeh, 2007. Dietary and non-dietary determinants of central adiposity among Tehrani women. *Public Health Nutr*; 3:1–7.
- Ball, K and D. Crawford, 2005. Socioeconomic status and weight change in adults: a review. *Soc. Sci. Med.* 60: 1987–2010.

- Baskar, A. D. S., Ramachandran and C. Snehalatha, 2004. Temporal changes in prevalence of diabetes and impaired glucose tolerance associated with lifestyle transition occurring in the rural population in India. *Diabetologia*. 47: pp. 860–865.
- Chumlea, W.C., A.F Roche and M.L Steinbaugh, 1990. Estimating stature from knee height for persons 60 to 90 years of age. *J Am Geriatr Soc*. 33: 116–120.
- Drewnowski, A, 2004. Poverty and obesity: the role of energy density and energy costs. *Am J Clin Nutr*. 79:6 –16.
- Frank, L.D., M.A. Andresen and T.L. Schmid, 2004. Obesity relationships with community design, physical activity, and time spent in cars. *Am J Prev Med*. 27:87–96.
- Galobardes, B., J. Lynch and G.D Smith, 2007. Measuring socioeconomic position in health research. *Br Med Bull*. 96: 1019–1024.
- Geliebter, A., and A. Aversa, 2003. Emotional eating in overweight, normal weight, and underweight individuals. *Eat Behav*. 3:341–7.
- Gortmaker, S.L., A. Must, J.M. Perrin, A.M. Sobal and W.H. Dietz, 1993. Social and economic consequences of overweight in adolescence and young adulthood. *N Engl J Med*. 329: 1008-1012.
- Haskell, W.L., 1996. Physical activity, sport, and health: toward the next century. *Res Q Exerc Sport*. 67: 37- S47.
- Haslam, DW., W.P James, 2005. Obesity. *The Lancet* 366: 1197–209.
- Jakes, R.W., N.E. Day, K.T. Khaw, R. Luben, S. Oakes, A. Welch, S. Bingham and N.J. Wareham, 2003. Television viewing and low participation in vigorous recreation are independently associated with obesity and markers of cardiovascular disease risk: EPIC-Norfolk population based study. *Eur J Clin Nutr*. 57: 1089–1096.
- Kopelman, P.G., 2000. Obesity as a medical problem. *Nature*. 404:635– 643.

- Leermakers, E.A., A.L. Dunn and S.N. Blair, 2000. Exercise management of obesity. *Med Clin North Am.* 84: 419- 40.
- Lindstro, M., S.O. Isacsson and J. Merlo, 2003. Increasing prevalence of overweight, obesity and physical inactivity. Two population-based studies 1986 and 1994. *Eur J Public Health.* 13:306–12.
- Molarius, A., J.C. Seidell, S. Sans, J. Tuomilehto and K. Kuulasmaa, 2000. Educational level, relative body weight, and changes in their association over 10 years: an international perspective from the WHO MONICA Project. *Am J Public Health.* 90:1260-8.
- Mummery, W.K., G.M. Schofield, R. Steele, E.G. Eakin and W.J Brown, 2005. Occupational sitting time and overweight and obesity in Australian workers. *Am J Prev Med.* 29: 91–97.
- NIH: National Heart, Lung and Blood Institute, 2004. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. Bethesda: 98–4083.
- Ogden, C.L., K.M. Flegal, M.D. Carroll and C.L. Johnson, 2002. Prevalence and trends in overweight among US children and adolescents. *JAMA.* 288:1728–1732.
- Overgaard, D., F. Gyntelberg and B.L. Heitmann, 2004. Psychological workload and body weight: is there an association? A review of the literature. *Occup Med (Lond).* 54: 35–41.
- Ramachandran, A., S. Mary, A. Yamuna, N. Murugesan and C. Snehalatha, 2008. High prevalence of diabetes and cardiovascular risk factors associated with urbanization in india. *Diabetes Care.* 31: 893–898.
- Salmon, J., A. Bauman, D. Crawford, A. Timperio and N. Owen, 2000. The association between television viewing and overweight among Australian adults participating in

- varying levels of leisure-time physical activity. *Int J ObesRelatMetabDisord.* 24: 600–606.
- Seidell, J.C., A. Molarius 1998. Selection of anthropometric indicators for classification of abdominal fatness—a critical review. *Int J ObesRelatMetab Disord*;22:719–27.
- Snehalatha, C., Ramachandran and V. Vijay, 2002. Temporal changes in prevalence of type 2 diabetes and impaired glucose tolerance in urban southern India. *Diabetes Res. Clin.Prac.* 58: 55–60.
- Sobal, J and A.J Stunkard, 1989. Socioeconomic status and obesity: a review of the literature. *Psychol Bull.* 105: 260–275.
- Stergren, P.O., M. Lindstro and B.S. Hanson, 2001. Socioeconomic differences in leisure-time physical activity: the role of social participation and social capital in shaping health related behaviour. *SocSci Med.* 52: 441–51.
- Steel, R. G. D., J. H. Torrie and D. A. Dickey, 1997 *Principles and Procedures of Statistics*.3rd Ed. McGraw Hill Book Co. Inc. New York.
- Uauy, R., C. Albala and J. Kain, 2001. Obesity trends in Latin America: Transiting from under to overweight. *JN.* 131:893-899.
- Visscher, T.L., J.C Seidell, A. Menotti , H. Blackburn , A. Nissinen , E.J.M Feskens and Kromhout, 2000. Underweight and overweight in relation to mortality among men aged 40–59 and 50–69 years. *Am. J. Epidemiol.* 151: 660–666.
- Wardle, J., and J.Griffith, 2001. Socioeconomic status and weight control practices in British adults. *J. Ep. Com Health.* 55:185–90.
- World Health Organization, 2003. *Diet, Nutrition, and the Prevention of Chronic Diseases*. Joint WHO/FAO Expert Consultation. WHO Technical Report Series no. 916. Geneva: WHO.