EFFECT OF GENDER VARIATIONS ON BODY MASS INDEX AND QUALITY OF LIFE OF OBESE ADULTS ATTENDING AMINU KANO TEACHING HOSPITAL, KANO, NIGERIA

BY

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Abstract

Obesity is defined as "an excessive deposit of body fat (BF) which may result in adverse metabolic consequences, may impair short- and long-term physical health and create psychological disorders which should not be overlooked" The aim of the study is to assess the effects of Gender variations on Body mass Index and quality of life of obese adults attending Aminu Kano Teaching Hospital, Kano. Quasi-experimental research designs were used in the current study which is the hypothesis testing research design that tests the hypotheses of causal relationships between variables under Study. Stratified sampling technique was used in this study. The target populations were stratified based on demographic characteristic of gender into non-overlapping sub-populations or groups of males and females which formed the sampling frame of all the list of obese adult patients. Simple random sampling, were used to select the sample from the strata. Statistical Package for Social Sciences (SPSS) Version 20 was used to compute mean and

standard deviation, percentages, chi square, t-test, F-test and ANOVA. The result shows that 40.40% within 30-40 years, follow by 41-50years which represent 36.70% for study group, also followed by 31.25% within 41-50years for control group. 62.5% were female for studied groups and 40.8% were males for control group. 81.25% of studied groups were married, 68.75% were professionals, 56.25% attended post-secondary education and 81.25% of studied groups were urban settlers. 37.1% of the studied groups belongs to Obese class III with 35.95±7.5. The means of weight of physical functioning is 36.3±4.8 after intervention. Based on the findings from the present study, quality of life had improved with physical role functioning of 40.6±25.0 before intervention and 33.8±10.3 after intervention, furthermore, emotional role functioning of 35.4±20.1 before intervention and 21.8±6.9 after intervention. it can be concluded that obesity is more common among higher group with female preponderance and with a link with rural-urban migration and there is an observed cause and effect relationship between obesity and quality of life as behavior influences individual choices of decision towards maintaining optimal health.

Keywords: Gender variations, Body mass index, obesity, quality of life, Health education program, obese adults.

Introduction

Obesity is rapidly becoming one of the most important health concerns in developed countries. In Canada, the proportion of adults meeting the accepted criterion for obesity, body mass index (BMI) ≥ 30 kg/m² has more than doubled over the past 40 years, from 10% in 1970 to 26% in a 2009/2011 survey (WHO, 2015). Similar increases in rates of overweight and obesity ('abnormal or excessive fat accumulation that may impair health') have been observed in other industrialized countries (WHO, 2015). Worldwide, the prevalence of obesity has reached epidemic proportions. In Denmark one third of all pregnant women are overweight and 12 % are obese. The obesity epidemic is not simply a consequence of poor diet or sedentary lifestyles. (Tanvig et al., 2014).

In the United States, about 36.5% of adults were obese in 2011-2014, with females having a higher burden of obesity than males (38.3% female and 34.3% male respectively). Australia has a unique distribution of obesity among men and women of 27.5% in 2012. Approximately 25% of European women are obese while 22% of the adult male populations are obese. Region-wise, Southeast Asia is the region of the world with least obese men (3%) and women (7%) in 2014. Africa has prevalence rates of 6% and 15% for adult males and females respectively (Chigbu, 2018). The estimated prevalence of overweight and obesity in Saudi Arabia is 30.7 and 28.7%, respectively. Obesity affects almost every organ system of the human

body, and its effect appeared to be mediated largely, but not solely, by the metabolic burden of the excessive adipose tissues (Alsaleh & Algarni, 2017)

The National Health and Morbidity Survey (NHMS) Malaysia in 1996 reported 15.1% of adult males were overweight and 2.9% obese, while 17.9% and 5.7% adult females were overweight and obese respectively. The report stated that there existed very negligible differences between rural and urban populations, the Malays and Indians had higher incidences as compared to Chinese (Thamby, Sarriff, Pandian, et al., 2017). Overweight and obesity present a growing health problem among Africans from all socioeconomic status. In Sub Saharan African, obesity is not only a consequence of over-nutrition but possibly from excessive consumption of unbalanced diet dominated by carbohydrates and saturated fats. Poor nutrition coupled with low levels of physical activity associated with urbanization as well as other factors has resulted in high rates of metabolic syndrome and other non-communicable diseases in the sub-continent (Ijoma, Chime, Anyim et al., 2019)

A systematic review of 75 publications on obesity and overweight in Nigeria published between 2001 and 2012, found only 4 of the studies meeting the inclusion criteria. In the review, the prevalence of adult obesity varied from 8.1% to 22.2% underscoring the vast heterogenicity of the country. Data for the 2008 demographic health survey indicated a national prevalence of female obesity of 5.2%. In the same 2008, the World Health Organization reported adult female obesity prevalence of 9% and adult male obesity prevalence of 5.1% giving an overall adult obesity prevalence of 7.1% (Chigbu, 2018). Concerning prevalence of obesity in women, results showed that 60% of women have a normal BMI, while 12% are thin and 28% are overweight or obese; the mean BMI among women is 23.3 (Demographic Health Survey, 2018)

In general, the prevalence of short stature decreases with increasing education and wealth, while the prevalence of overweight or obesity rises with increasing education and wealth. For example, 49% of women with a secondary education or higher are overweight or obese, as compared with 16% of those with no education. Similarly, 46% of women in the highest wealth quintile are overweight or obese, compared with only 9% of women in the lowest quintile (Demographic Health Survey, 2018).

The percentage of women who are overweight or obese is higher in urban than rural areas (36% versus 21%), whereas the percentage of women who are thin is higher in rural areas (14% versus 10%). Women in the southern zones (South East, South South, and South West) are more likely to be overweight or obese than women in the northern zones (North Central, North East, and North West). Forty percent, 43%, and 38% of women in the South East, South South, and South West zones, respectively, are overweight or obese, as compared with 26%, 15%, and 16% of

women in the North Central, North East, and North West zones (Demographic Health Survey, 2018).

Statements of Problems

Overweight and obesity are non-communicable disease medical disorders that have largely been attributed to sedentary lifestyle and affluence in Nigeria. It is usually defined as body mass index (BMI) $\geq$ 30 kg/m2 and is assuming an epidemic dimension globally. Obesity is a modifiable cardiovascular risk factor which predisposes to and occurs in combination with other non-communicable diseases such as type 2 diabetes mellitus (T2DM), metabolic syndrome and hypertension (Abullahi et al., 2019)

Globally, overweight and obesity were estimated to cause 3.4 million deaths, 3.9% of years of life lost and 3.8% of disability-adjusted life years in 2010. A rapid rise in obesity and being overweight due to nutrition alteration (fast food) and sedentary lifestyles have affected society health in an unprecedented way. Changes in urbanization, westernization of diets, lifestyle modifications and the consumption of a highly processed diet contribute to the rise in obesity, decreased physical activity and increasing risk of metabolic and cardiovascular diseases (Idung et al., 2014).

Quality of life (QoL) being a subjective and multidimensional concept, that is, how the individual perceives himself within certain contexts and in different dimensions. In this context, QoL can be determined through aspects related to physical, social, mental health, general perception of health and functional capacity (Mauricio et al., 2018). The Short-Form 12 (SF-12) is comprised of 12 items measuring eight concepts: physical functioning, role limitations due to physical health problems, bodily pain, general health, vitality, social functioning, role limitations due to emotional health, and mental health (Jia and Lubetkin, 2019).

Another tool used to evaluate the widely used QoL is the Short-Form 36 (SF-36), which is easy to understand and not as extensive as other existing questionnaires. It consists of a multidimensional questionnaire, divided into 8 domains: functional capacity, physical aspects, pain, general health, vitality, social, emotional and mental health aspects
 (Mauricio et al., 2018). Zwaan, et al., (2002) to compare the QoL of obese patients with and without binge eating disorder using two questionnaires, one of which was the SF-36 and another specific Impact of Weight on Quality-of-Life Questionnaire. The authors verified that both the use of SF 36 and that of the specific questionnaire confirmed the reduction of QoL in this population, especially in the physical domains, but not necessarily confirmed for the domains related to mental health.

In the study by Larsson, et al., (2002) the QoL of 30 obese class III patients in the 16- and

64-year age groups of both sexes were evaluated using the SF-36 as a tool.

The production of estrogen and circulating levels of sex hormone binding globulin are correlated with the presence and distribution of body fat that could possibly leads to adiposities and excess weight. Obesity has been associated with reduced fertility in females, particularly among those with central adiposity (Academy of Nutrition and Dietetics, 2016). Women with a BMI _25, who were overweight, had a fecundity ratio of 0.72, while obese women had a fecundity ratio of 0.60, and very obese women had the lowest fecundity ratio of 0.48 after controlling for waist circumference. Women who had experienced a weight gain of 15 kg after age 17 years had significantly lower fecundity ratio than those whose weight had remained steadier in early adulthood (Robker, Akison, Benett et al., 2009). Obesity is a significant cause of anovulatory infertility; it has been estimated that among obese women, the infertility rate may increase by 4% per BMI unit. Racial disparities in infertility and fecundity rates have been noted and populations with high preconception obesity rates are also more likely to report experiencing infertility (Chandra, Copen, & Stephen, 2013)

Methodology
Hypothesis-testing Quasi experimental research design that tests the hypotheses of causal relationships between variables under study. The study requires procedures that will not only reduce bias and increase reliability, but permit drawing inferences about causality. In Quasi experimental design, one of the essential components of true experimental research is conspicuously absent and, in this case, it is randomization. The study population comprises of all patient who were obese attending Specialty and General Out-Patient Department Clinics in Aminu Kano Teaching Hospital, Kano. The target population for this study is not finite as patients visit the specialty clinics on weekly basis for medical attentions.

Sample size determination
The sample sizes were calculated using Sample Size for Comparison formula as follows; (Araoye, 2003). It is used to test the differences (d) between two sub-samples regarding a proportion and can assume an equal number of cases (n1 = n2 = n) in the two sub-samples, the formula is
Sample Size formula for comparison groups is given as $n = 2z^2pq \mid d^2$
Where n = sample size for the study
z = standard normal deviation (a constant) which is 1.96 at 95% confidence interval (Abhulimen et al., 2016)
P = Prevalence of obesity in Nigeria = 8.1% (Chukwuonye et al., 2013)
q= 1- p = 1 – 0.081
q= 0.919
d= 5% = 0.05
z= 1.96
$n= 2[1.96^2 \times 0.081 \times 0.919 \mid (0.05)^2]$

n =2 [3.8416 x 0.081 x 0.919 │0.0025]

n = 2[114.386]

n = 229

Therefore, the sample sizes used were 240 with 5% attrition for overweight and obese adults, hence, 240 each for the two subgroups to be compared i.e intervention and control groups.

Sampling Techniques

 A total of 240 obese adult patients were recruited for the study using Stratified sampling technique. 240 samples each for intervention and control groups, making a total of 480 recruited obese adults. The sample frame comprises of the list of all obese patients attending clinics and were counted based on their sitting arrangement. Male obese patients had separate sitting arrangement from their female counterparts. The target populations were stratified based on demographic characteristic of gender into non-overlapping sub-populations or groups of males and females. Then using a simple random sampling, the samples were obtained. Random sampling was done using paper basket method where number are written on papers and folded to prevent the patients from knowing what number was written. These random numbers are written from 1 to 240 and squeeze, folded and put in a basket, asking every obese patient to pick a number randomly from the basket, whoever pick one first were attended to in a serial manner until all the numbers were exhausted

Research Tools

(A)Tool (1) Education Session Plan/modules on Weight reduction Strategy (Health education on dietary modifications). It was structured in such a way that questions were formulated according to a standard format so that nurses and other allied health care professional were able to ask the same questions during a patient's admission or pre-admission visit. This questionnaire serves to initiate the process of altering patients' unhealthy behaviours, promote wellness and improve quality of life. Examples of questions asked at the end of education session plan include what is the meaning of health, mental health, psychological and emotional wellbeing? How is height and weight measured using height and weight measuring scales in comparing with the standard weight and height for an adult? What is the meaning of overweight and obesity and how are they classified? What is the meaning of Body mass index (BMI) according to World Health Organization? What are the important of weight reduction and its overall effect on quality of life?

(B)Tool (2) Socio-demographic Characteristics Regarding Obese Adult Questionnaire. It is divided into four (4) main parts as follows;

i. **Client Profile Characteristics**. It comprises of age, sex, marital status, educational status, occupation and place of residence

ii. **Physical Examination and Assessment Questionnaire**. It consists of weight, height, body mass index, previous medical diagnosis, and family history of obesity and classifications of obesity according to pattern of presentations.

iii. **Background Medical Conditions of Obese Adult Questionnaire.** This section deals with the background's health profiles and conditions of the patients including cardiovascular diseases, type II diabetes mellitus, dyslipidemia, sleep apnea, osteoarthritis cancers.

(C) **Tool (3) the Obesity Adjustment Survey (OAS) and SF-36- RAND-36 Quality of Life Assessment Questionnaire.** The tools were adapted from a study on quality of life and psychological well-being in obesity management (Vallis, 2016). The Obesity Adjustment Survey (OAS) is a brief questionnaire designed for use in primary and specialist care to focus specifically on an individual's level of distress over obesity. The SF-36 Health Related Quality of Life that focuses on life-style physical activity or a program of traditional aerobic activity for an obese or overweight adults and as a self-report measure of functional health and well-being, while RAND-36 Health Survey taps eight health concepts: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions. It also includes a single item that provides an indication of perceived change in health.

(D) **Tool (4) Follow-up Assessment Sheet/Questionnaire.** This is done to assess the impact of health education on dietary modification (weight reduction strategy) for obese adults. The intervention groups were given health education on dietary modifications for six (6) months and weights at both pre-and post-interventions were recorded. The control groups were exposed to health educations on weight monitoring and it's important to health including measuring their individual weights at pre-intervention were also recorded.

3.10 Validity and reliability

A face and content validity method were used to ensure the validity of the research instrument; this was achieved through the judgment of the researcher's supervisor and two jurists to assess the clarity of statement and relevance of the content. The instrument is reliable with reliability coefficient of 0.729. Content validity index was also measured to ascertained its applicability and feasibility.

Method of data Collection

Administrative approvals were obtained from the Aminu KanoTeaching Hospital Management to collect the data. Research assistants were also recruited from the department of nutrition and dietetics of Aminu Kano Teaching Hospital to assist in data collection especially on dietary module guidelines using work time table as follows. I initially gained entrance to the Specialty and GOPD Clinics along with the staff of the nutrition and dietetics department having recruited two of their staff as research assistant.

Ethical considerations

Ethical approval was sought and obtained from human research ethic committee of the Aminu Kano Teaching Hospital along with the reference code stating the approval to conduct the study. The reference code is AKTH/MAC/SUB/12A/P-3/V1/1997. Informed written consent were obtained from the patient for voluntary participation in the study after explanation of the study purpose; patient were informed about the privacy of information, confidentiality of data and their right to withdraw at any time of the study. Human subject research guidelines were followed so as to protect participants from any harm or injury during the course of the study in line with Helsinki declaration, Belmont report and CIOMS 2012 declaration.

Statistical Analysis

The collected data were organized, tabulated and statistically analyzed using SPSS version 20. Continuous variables were also expressed as mean, standard deviation of mean (SDM), and categorical variables as percentages and chi square statistical distribution test. Analysis of variance (ANOVA) test/analysis was also done for this study. The statistical differences between the averages of continuous variables also determined with the student's t-test or sample t-test distribution. For Chi-test which was used in this study were based on 95% confidence limit and 80% power of the study. Values of $p<0.05$ was considered significant.

Results
Table1.

Distributions of both study group and control group of obese adults according to their socio-demographic characteristics (n = 480)

Socio-demographic characteristics	Study Group n	%	Control Group n	%	χ^2	P
Age (years)						
30 – 40	97	40.40	89	37.08	51.800	0.026*
41 – 50	88	36.70	75	31.25		
51 – 60	48	20.00	53	22.08		
>60	7	2.90	23	9.58		
Mean±SD	44.7±9.2		47.8±8.5		t = -4.11	P = 0.000*
Gender						
Male	90	37.50	98	40.80	0.560	0.454
Female	150	62.50	142	59.20		
Marital Status						
Single	15	6.25	15	6.25	0.779	0.854
Married	195	81.25	190	79.17		
Divorced	15	6.25	20	8.33		

Widowed	15	6.25	15	6.25		
Occupation						
Non-skilled	30	12.50	31	12.92	0.028	0.986
Skilled	45	18.75	44	18.33		
Professional	165	68.75	165	68.75		
Educational Status						
No formal education	0	0.00	33	13.75	2.025	0.000*
Primary School	60	25.00	104	43.33		
Secondary School	45	18.75	103	42.92		
Post- Secondary School	135	56.25	0	0.00		
Place of residence						
Rural	45	18.75	127	52.92	60924	0.000*
Urban	195	81.25	113	47.08		

P<0.05

Table1 Distributions of study group and control group of obese adults according to their socio-demographic characteristics (n = 480). This tables shows that in terms of age 40.40% within 30-40years, follow by 41-50years which represent 36.70% for study group, whereas, 37.08% are within the age range of 30-40years, also followed by 31.25% within 41-50years for control group at $\chi^2 = 51.8$, p = 0.026. The mean and standard deviation of the age for both study group and control group are 44.7±9.2 and 47.8±8.5 respectively with t = -4.11 at P = 0.000. Also, in relation to gender distribution, more than half of the study group of obese adults were females (62.5%) and 59.2% for the control group. In terms of marital status, (81.25%) more than three-quarter of the study group of obese adults were married and 79.17% for the control group. 68.75% more than half of the studied obese adults were professional for both study and control group and 56.2% attended post-secondary education. 81.25% of the studied obese adult, more than three-quarter resides in urban areas and 52.92% of control group are from rural areas.

Table2

Distribution of both study group and control group according to their classifications of body mass index (BMI) (n = 480)

Classifications of BMI (Kg/m^2)	Study group		Control group		t	P
	n	%	n	%		
Overweight	13	5.4	10	4.2	0.422	0.673
Pre-obese	53	22.1	66	27.5		

Obese class I	39	16.3	32	13.3
Obese class II	46	19.2	47	19.6
Obese class III	89	37.1	85	35.4
Mean±SD		35.95±7.5		35.66±7.2

P<0.05

Check list/Scales: BMI (25) signifies over weight, 25 – 29.9 (pre-obese), 30 -34.9 (obese class I), 35 – 39.9 (obese class II), and 40 (obese class III) (Idung et al., 2014)

Table 2 Distribution of both study group and control group according to their classifications of body mass index (n = 480). This table shows the distributions of study group and control group according to their body mass index with 5.4% of study group were overweight and for control group, 4.2% were also overweight. For obesity class III, the study group had 37.1% and control group had 35.4% with

t = 0.422 at P = 0.673

Table3.

Comparing mean of both study group and control group according to their gender and body mass index (n = 480)

Comparing means of gender and BMI	Study group			Control group			t	P
Gender	n	%	BMI(kg/m^2)	n	%	BMI(kg/m^2)		
Male	90	37.5	33.65±9.2	98	40.8	33.95±6.8	51.89	0.000*
Female	150	62.5	37.33±5.8	142	59.2	36.78±7.3	76.5	0.000*

P<0.05

Table 3 Comparing means of both study group and control group according to their gender and body mass index (n = 480)

This table shows that male obese adult has a BMI of 33.65±9.2 for study group and a BMI of 33.95±6.8 with t = 51.89 at P = 0.000. Furthermore, the female obese adult has a BMI of 37.33±5.8 for study group and a BMI of 36.78±7.3 with t = 76.5 at P = 0.000.

Table 4

Comparing the means of weight of study groups according to their quality of life before and after intervention (n = 480)

Components of RAND-36/SF-36 Quality of Life (QoL)	Study group before Mean±SD	Study group after Mean±SD	F	P
Physical functioning	41.8±14.2	36.3±4.8	134.16	0.000*
Physical role functioning	40.6±25.0	33.8±10.2	204.43	0.000*
Bodily Pain	41.9±26.1	32.5±12.9	139.12	0.000*
General Health	49.0±12.1	42.3±6.5	124.10	0.000*
Mental Health	42.0±13.1	36.5±12.3	47.56	0.000*
Emotional role functioning	35.4±20.1	21.8±6.9	520.29	0.000*
Vitality	51.3±21.1	42.5±20.5	94.38	0.000*
Social functioning	49.9±15.7	56.4±10.8	6.98	0.000*

$P<0.05$

Table4. Comparing the means of weight of study groups according to their quality of life before and after intervention (n = 480). This table shows that the means of weight of physical functioning is 36.3±4.8 after intervention with F = 134.16 at P = 0.000; for physical role functioning, the mean weight is 33.8±10.2 with F = 204.43 at P = 0.000; for bodily pain, the mean weight is 32.5±12.9 with F = 139.12 at P = 0.000; for general health, the mean weight is 42.3±6.5 with F = 124.10 at P = 0.000; for mental health, the mean weight is 36.5±12.3 with F = 47.56 at P = 0.000; for emotional role functioning, the mean weight is 21.8±6.9 with F = 520.29 at P = 0.000; for vitality, the mean weight is 42.5±20.5 with F = 94.38 at P = 0.000 and for social functioning, the mean weight after intervention is 56.4±10.8 with F = 6.98 at P = 0.000

Conclusion

Based on the findings from the present study, it can be concluded that obesity is more common among higher group with female preponderance and with a link with rural-urban migration.

It can also be concluded that the intervention program had improved the Quality of Life among study group and there is an observed cause and effect relationship between obesity and quality of life as behavior influences individual choices of decision towards maintaining optimal health at $P<0.05$

Recommendations

i. Effort should be intensified by health workers particularly the nurses in health educating their client on out-patient basis on healthy nutrition and general well-being of the body

ii. There should be a policy to ban on importation of all those food items that have high cholesterol diet and a link with coronary artery diseases

iii.   Regular exercise should be encouraged as sedentary life style can trigger buildup of cholesterols and fats which have a direct link with coronary artery disease and subsequent reduction in quality of life.

iv.   Government should intensify a campaign against unhealthy lifestyle using posters, jingles and radio stations criminalizing bad behavior including smoking, alcoholism

References

Abdullahi I. N, Babandina, M. M, Emeribe, A, U, Shuwa, H, A. (2019). Inter-relationship between type-2 diabetes mellitus, obesity and hypertension. Borno Med J. Vol 16(1) Academy of Nutrition and Dietetics on Position of the Academy of Nutrition and Dietetics: Obesity, Reproduction and Pregnancy Outcomes. J Acad Nutr Diet. 2016; 116:677691.

Alsaleh, M. M, & Algarni, A. M. (2017) Dietary approach to manage obese patient. Saudi J Obesity; 5:28-34

Araoye M. O. (2003) Sample size determination. In: Araoye MO (ed.). Research methodology with statistics for health and social sciences. Nathadex publishers Ilorin.12: 115- 121.

Australian Institute of Health and Welfare. Impact of overweight and obesity as a risk factor for chronic conditions: Australian burden of disease study Canberra: AIHW; 2017.

Chandra, A, Copen, C. E, Stephen E. H. (2013). Infertility and impaired fecundity in the United States, 1982-2010: Data from the national survey of family growth. Natl Health Stat Report (67):1-18. 1 following 19

Chibuike C. (2018). Epidemiology of Adult obesity in Enugu Southeast Nigeria. Doctoral Thesis at the Medical Faculty of Ludwig-Maximilians-University, Munich.

Chukwuonye II, Chuku A, Onyeonoro U, Ukegbu A, Anyabolu E,.(2015) Body Mass Index, Prevalence and Predictors of Obesity in Urban andRural Communities in Abia State South Eastern Nigeria. J Diabetes Metab 6: 570.doi:10.4172/2155-6156.1000570

Demographic Health Survey, 2018

Grunvald E. Medical management of obesity: a comprehensive review. *Clin Obstet Gynecol*2014; 57: 465– 84

Idung, A. U, Abasiubong F, Udoh S.B, Ekanem U.S. Overweight and obesity profiles in Niger Delta Region, Nigeria. Afr J Prm Health Care Fam Med. 2014;6(1), Art. #542, 5 pages. http://dx.doi.org/10.4102/ phcfm. 6i1.542

Ijoma, U.N.,Chime, P., Onyekonwu, C., Ezeala-Adikaibe,B.A., Orjioke, C., Anyim, O.B., Onodugo,O.D., Aneke, E., Nwatu, C.B., Young, E. Mbadiwe, N., Ekenze, O.S., Okoye, J.U.(2019). Factors associated with overweight and obesity in urban area of south eastern Nigeria; Food and Nutrition Sciences Journal. Vol 10; 735-749

Imayama Ikuyo, Catherine M Alfano, Angela Kong, Karen E Foster-Schubert, Carolyn E Bain, Liren Xiao, Catherine Duggan, Ching-Yun Wang, Kristin L Campbell, George L Blackburn&Anne McTiernan ; Dietary weight loss and exercise interventions effects on quality of life in overweight/obese postmenopausal women: a randomized controlled trial. *International Journal of Behavioral Nutrition and Physical Activity* volume 8, Article number: 118 (2011).

Jia H, Lubetkin E.I. (2005). The impact of obesity on health-related-quality of life in the general adult US population. J Public Health (Oxf). June,27(2):156-64.

Job G Godino, Gina Merchant, Gregory J Norman, Michael C Donohue, Simon J Marshall, James H Fowler, Karen J Calfas, Jeannie S Huang,Cheryl L Rock, William G Griswold, Anjali Gupta, Fredric Raab, B J Fogg, Thomas N Robinson, Kevin Patrick.Using social and mobile tools for weight loss in overweightand obese young adults (Project SMART): a 2 year,parallel-group, randomised, controlled trial. Lancet Diabetes Endocrinol 2016 http://dx.doi.org/10.1016/S2213-8587(16)30146-2

Kaukua J, Pekkarinen T, Rissanen A. (2004). Health-related quality of life in a randomized placebo-controlled trial of sibutramine in obese patients with type II diabetes. Int J Obes; 28: 600-5.

Larsson U, Karlsson J, Sullivan M.(2002). Impact of overweight and obesity on health-related quality of life--a Swedish population study. *Int J Obes Relat Metab Disord*.;26(3):417-424

Mauricio de Sant' A., Ana Carolina Manzi, Marco, Orsini, Eduardo Tavares Lima Trajano and Marcos RG de Freitas (2018). Quality of Life and Obesity: Challenge of a Contemporary Society

Obilahi Abhulimen T.J, Ibrahim Isa A, N. Ugwueke(2016). Thaddeus Impact of obesity on male fertility in an Urban Nigerian town. International Journal of Contemporary Medical Research;3(8):2279-2282.

Rossouw H. A, Grant C. C, Viljoen M 2012. Overweightand obesity in children and adolescents: The SouthAfrican problem. S Afr J Sci, 108: 1-7

Sibhatu Biadgilign, Tennyson Mgutshini, Demewoz Haile, Bereket Gebremichael, Yonatan Moges, and Kelemu Tilahun. Epidemiology of obesity and overweight in sub-Saharan Africa: a protocol for a systematic review and meta-analysis.BMJ Open. 2017; 7(11): e017666.

Tanvig, M, Vinter C.A, Jorgensen, J. S, Wehberg, S, Ovesen, P.G. & Lamont, R.F (2014) Anthropometric and Body Composition by dual Energy X-ray in Children of Obese Women: A follow up of a randomized controlled trial (the life style in pregnancy and offspring. (LiPO) Study PLoS ONE 9(2) e89590

Thamby SA, Sarriff AB, Ping N, Y, Nicholas D, Pandian G, Parachuri S.(2017). Effectiveness of an interventional educational tool on certain overweight and obesity parameters among the general public in Sungai Petani, Kedah DarulAman, Malaysia. J Young Pharm.;9(4):588-92.

Umuerri, E.M, Ayandele C. O, Eze, G. U(2016). Prevalence and sociodemographic correlates of obesity and overweight in a rural and urban community of Delta State, Nigeria. Sahel Med J; 20:173-8

Vallis M. Quality of life and Psychological Well-being in Obesity management: improving the odds of success by managing distress. *Int. J Clinical practice* 2016; 70:3:196-205

World Health Organization (2016.). Obesity and overweight. Geneva: World Health Organization,

World Health Organization. Fact Sheet #311: Obesity and overweight, accessed February 2015. http://www.who.int/mediacentre/factsheets/fs311/en/index.html (accessed February 2015)

Zwann M, Mitchell J.E., Howell L. M. (2002). Two measures of health-related quality of life in morbid obesity. *Obes Res*.; 10(11):1143-1151.