Obezitenin Yaşlılarda Yeme Bozuklukları ve Hayat Kalitesi Üzerine Etkisi

Impact of Obesity on Eating Disorders and Quality of Life Among the Elderly

İbrahim Halil TÜRKBEYLER[1], Ahmet ÇİĞİLOĞLU[2], Mehmet GÖL[3], Melek Sena TARAKÇIOĞLU[4], Zeynel Abidin ÖZTÜRK[2]

[1] *Ersin Arslan Education and Research Hospital, Department of Internal Medicine, Division of Geriatric Medicine, 27100 Şahinbey, Gaziantep, Turkey.*

[2] *Gaziantep University, Faculty of Medicine, Department of Internal Medicine, Division of Geriatric Medicine, 27100 Şahinbey, Gaziantep, Turkey.*

[3] *Gaziantep University Faculty of Medicine, Department of Physiology, 27100 Şahinbey, Gaziantep, Turkey.*

[4] *Department of the Biochemistry, Faculty of Medicine, Gaziantep University, Gaziantep, Turkey*

Özet

Amaç: Obezite yaşlı nüfus arasında giderek artan bir sıklıkta görülmektedir. Obezite, çok sayıda kronik hastalığın gelişmesine ve ilerlemesine katkıda bulunmasının yanı sıra, yaşam kalitesinde bozulmaya ve yeme bozukluklarının artmasına katkıda bulunmaktadır. Bu çalışmada yaşlı hastalarda obezitenin yaşam kalitesi ve yeme bozuklukları üzerine etkileri araştırıldı.

Gereç ve Yöntemler: Bu kesitsel çalışmaya 65 yaş ve üstü toplam 281 birey dahil edilmiştir. Tüm hastalara kapsamlı geriatrik değerlendirme yapıldı. Sağlığa bağlı yaşam kalitesi Kısa Form (SF)-36 kullanılarak ölçüldü. Yeme bozuklukları Yeme Tutum Testi (EAT)-26 kullanılarak ölçüldü.

Bulgular: Çalışmaya 125 obez ve 156 obez olmayan geriatrik hasta alındı. Obez ve obez olmayan geriatrik hastalarda yeme tutumu bozukluklarının görülme sıklığı sırasıyla %17.8 ve %8.6 idi (p <0.05). Geriatrik hastalarda obezitenin yaşam kalitesi ortalama puanlarını bozduğu saptandı. Bu farklılık SF–36'daki ruh sağlığı yaşam alanı puanlarının kalitesi dışında istatistiksel olarak anlamlı kabul edildi (p <0.05).

Sonuç: Yeme tutum bozuklukları, yaşlı obez hastalarda, obez olmayan yaşlı hastalardan daha yaygındır. Ek olarak, obezitenin komorbiditeden bağımsız olarak yaşlı bireylerin yaşam kalitesini de düşürdüğü görülmüştür.

Anahtar kelimeler: Obezite, yaşlı, yeme bozuklukları, yaşam kalitesi

Abstract

Objective: Obesity contributes to the development and progression of numerous chronic diseases as well as decreased quality of life and increased eating disorders, is noteworthily prevalent among the elderly population. The current study investigated the effects of obesity on quality of life and eating disorders in elderly patients.

Materials and Methods: A total of 281 individuals aged 65 years or older were included in this cross-sectional study. Comprehensive geriatric assessment was performed on all patients. Health–related life quality was measured by using the Short Form (SF)–36. Eating disorders were measured by using the Eating Attitudes Test (EAT)–26.

Results: 125 obese and 156 non–obese geriatric patients were included in the study. The prevalence of eating attitudes disorders in obese and in non–obese geriatric patients was 17.8% and 8.6%, respectively (p<0.05). Obesity was found to compromise the quality of life mean scores in the geriatric patients. This difference was considered statistically significant except for quality of mental health life domain scores in SF–36 (p<0.05).

Conclusion: Eating attitude disorders are more common in obese than in non–obese geriatric patients. In addition, obesity decreases the life quality of elderly individuals regardless of comorbidity.

Keywords: Obesity, elderly, eating disorders, life of quality

Yazışma Adresi:İbrahim Halil Türkbeyler Ersin Arslan Education and Research Hospital, Department of Internal Medicine, Division of Geriatric Medicine, 27100 Şahinbey, Gaziantep, Turkey.**Mail:** ihturkbeyler@gmail.com **Phone:** +90 505 488 2185

ORCID No (Sırasıyla): 0000-0002-5489-1692; 0000-0002-2307-8682; 0000-0003-4593-3990; 0000-0001-5649-3965; 0000-0002-7781-688

INTRODUCTION

According to the National Institute on Aging, elderly population all around the world has increased dramatically over the past few decades and continues to do so at an unprecedented rate. This phenomenon has especially affected developed countries, whose elderly individuals comprise over 15% of the total population. It has also been estimated that by 2020, the elderly will comprise 22% of the whole world population (1, 2).

One of the most prevalent health problems among today's elderly population is obesity, which triggers the development and progression of numerous chronic diseases as well as results in a decreased quality of life. Obesity also causes chronic morbidity, functional failure, and early mortality during old age (3).

Eating disorders (EDs) might manifest a variety of symptoms that severely impair physical, mental and social aspects of everyday life. Studies have shown that patients with EDs prWesent lower health–related quality of life (HRQOL). Eating disorders in the elderly are often disregarded, however they cause significant morbidity and mortality (4). Health–related quality of life has been poor in participants who have reported having had a type ED in comparison to other people in the population or healthy controls in most of the surveys (5). These findings suggest that assessment of quality of life might provide a useful clarifying adjunct to the management of disease–specific measures in outcome studies of ED patients.

When we search the literature, we didn't encounter any study confronting with impact of EDs on the quality of life (QOL) of geriatric patients. Eating disorders and the most conspicuous resultant entity of them, the obesity —the most canonical description of obesity refers to having excess fat— highly probably influence the QOL in the elderly. Existing studies regarding the relationship between obesity and eating attitudes as well as quality of life have focused largely on children and adolescents; however, few have considered this relationship within elderly population. Therefore, the current study investigated the effects of obesity on life of quality and eating attitudes in elderly population.

MATERIALS and METHODS

Study design and subjects:

In this cross-sectional study, geriatric patients referred to the outpatient clinic of the Department of Internal Medicine, Division of Geriatric Medicine at Gaziantep University Hospital for comprehensive geriatric assessment were included between January 2016 and January 2017. Those patients who were under 65 years of age, debilitated and having deformities, displaying terminal stage of a disease, having chronic liver and kidney diseases or a malignant disease, with a history of trauma and infection in the last month, experiencing poor cognitive function that could curb implementation of tests, exhibiting unwillingness to participate, and using a physician–prescribed receipt that potentially affect body composition were excluded from the study. The study protocol was approved by the Gaziantep University Local Research Ethics Committee. All participants gave written informed consent and the study was conducted in accordance with World Medical Association Declaration of Helsinki.

Comprehensive geriatric assessment tests:

Patients underwent a complete and standardized comprehensive geriatric assessment. We gathered detailed information about the medical history of each patient by using several clinical testing modalities including the geriatric depression scale (GDS) with 15 questions, the mini–mental state examination (MMSE), Barthel index of activities of daily living (ADL) and Lawton Brody index of the instrumental activities of daily living (IADL), short form of the Mini Nutritional Assessment Tool (MNA–SF), 36–Item Short Form Survey (SF–36) and a 26–Item Eating Attitudes Test (EAT) (6-12).

Eating Attitudes Test (EAT):

Developed by Garner and Garfinkel in 1979, the EAT is psychological self–assessment test which assesses potential eating disorders in individuals (11). Scores correspond directly to levels of psychopathology and may indicate whether an individual is clinically unhealthy or susceptible to an eating disorder. The test is comprised of a six–point Likert scale containing forty items, and previous studies employing the EAT have considered individuals with scores greater than 30 as normal. Likewise, getting a score of 30 or less were considered in the present study as an indicator of a kind of eating disorder. The validity and reliability of the EAT in a Turkish context were determined based on Erol Savasır's 1989 assessment (12).

Health–Related Quality of Life (HRQOL):

Health–Related Quality of Life was measured in this study via the SF–36, a self–report questionnaire developed in 1992 by Ware (13). The items range in score from 0–100, with lower scores representing poorer life quality. The questionnaire's eight sub–scales are composed of the following individual chapters;

1. Physical functioning (PF): Involves the restriction of physical activity (such as pushing a table, carrying bags, climbing stairs, and walking) due to a medical problem.

2. Role–physical (RP): Pertains to role limitation (e.g. limited working hours) in ADL due to physical health problems.

3. Role–emotional (RE): Pertains to role limitation in ADL due to emotional problems (includes the effects of depression and other emotional problems such as anxiety).

4. Social functioning (SF): Regards the restriction of social activity (e.g. visiting friends and relatives) due to physical and emotional causes.

5. Vitality (V): Refers to an individual's energy and fatigue levels.

6. Mental health (MH): Refers to an individual's general well–being as being related to psychological distress.

7. Bodily pain (BP): Pertains to severity of pain and its effects on work ability.

8. General health (GH): Includes the individual's overall feelings about his/her health.

In the present study, the validity and reliability of the SF–36's Turkish version were verified based on the research of Kocyigit, et al. conducted in 1999 (14).

Statistical analysis

Statistical analyses were performed by using SPSS 22 software. Foremost, it was determined whether continuous variables in each group were distributed normally or not. Descriptive statistics were presented as mean ± standard deviation (SD) for groups exhibiting a normal distribution of continuous variables and median with its interquartile range (Q_1–Q_3) for groups exhibiting a skewed distribution. Descriptive statistics regarding the categorical variables were produced in the form of frequencies and percentages. To be able to perform univariate analyses, Pearson's chi–square and Mann–Whitney U tests were applied. Spearman's test was used for correlation analysis of non–normally distributed variables. One–way ANOVA was used to compare more than two independent samples displaying normal distribution. Levene test was used for assessment of homogeneity of variances. Tukey HSD and Tamhane T_2 tests were performed for further multiple comparisons (Post hoc analyses).

RESULTS

One hundred twenty five obese and 156 non–obese elderly patients, admitted to the geriatric outpatient clinic, were included in the study. The mean age of geriatric obese and non–obese patients was 70.83 ± 5.63 and 72.73 ± 6.71 years respectively (p>0.05). 60% of obese and 54.1% of non–obese patients were female (p>0.05). **Table 1** displays baseline clinical and socio–demographic characteristics of patients in four groups. Education level was statistically lower in obese patients (p=0.007). The obesity rate was significantly lower in patients who were married and living with a spouse (p=0.021, p=0.010). At the same time, smoking and alcohol–use was significantly lower in obese patients (p=0.002, p=0.038). The ADL assessment scores of obese patients were statistically lower (p<0.001) than those of non–obese patients. Finally, the number of medications used daily by obese patients was significantly higher than that of non-obese patients (p=0.001).

According to the results of the SF–36, the higher the score, the more promising health state in the elderly patient–

obese patients were found to be having lower scores in the PF, RP, VT, RS, RE, SF, BP, GH sub–scales (p<0.05). Notwithstanding the lower scores of obese patients when evaluated with the MH sub–scale of the SF–36, the difference did not indicate a statistically significance (p=0.10) **(Table 2)**. Also, a markedly significant negative correlation between Body–Mass Index (BMI) and SF–36 parameters was consistently identified, as being apart from the relationship between BMI and MH.

Eating attitude test scores of the obese patients were discovered to be compromised and impaired eating attitude frequency was statistically higher among the obese patients (p<0.05) **(Table 3)**.

As it is the case for relevance between BMI and SF–36 sub–scale scores, a statistically significant negative correlation was found between the EAT scores and the PF, SF, BP and MH sub–scale scores of the SF–36. In addition, a markedly significant negative correlation was revealed between the EAT scores and BMI. (p<0.005) **(Table 4)**.

DISCUSSION

This is the first study about the effect of the obesity on the HRQOL and eating attitudes of Turkish geriatric patients and demonstrated a prominently negative impact of obesity on both the HRQOL and eating attitudes.

Recently, studies observed that obesity and its associated complications had produced a significant deterioration in patients' HRQOL (15). This finding is supported by various other studies which have demonstrated that an increase in BMI leads to a decrease in HRQOL, especially in terms of physical aspects and pain, even in the absence of any other chronic disease (16, 17). The only exception to this negative impact in the current study was the outcome of MH life domain evaluation of the SF–36. This outcome is in line with the majority of previously published findings, which demonstrated no or only a weak relationship between BMI and mental health domain of the quality of life scale (18-20). A meta-analysis conducted by Ul Haq et al. identified a negative correlation between BMI and the physical aspects of HRQOL in individuals aged 65 years and over, and several longitudinal studies have demonstrated that increased physical activity and mobility contribute to improvements in the physical aspects of HRQOL (21). Increased physical activity in obese patients may also positively affect self–perceptions of health status. Similarly, obesity is known to cause decreased levels of self–confidence in affected individuals alongside limitations in physical activity. Depression and stress, which may develop in obese elderly patients, also increase the risk of eating disorders and affect negatively HRQOL (22).

Table 1. The demographic characteristics of patients

	Obese (n: 125)	Non-Obese (n: 156)	P
Age	71.83 ± 5.63	72.73 ± 6.71	>0.05
Gender (Male/Female)	n: 50 / 75 40 % / 60 %	n: 95 / 61 45.9 % / 54.1 %	>0.05
Body Mass Index (kg/m²)	34.45 ± 3.87	25.70 ± 2.85	0.000(†)
Education (%) Primary school or no formal education Secondary School Above secondary school	58.1 32.6 9.3	40.8 34.9 24.3	0.007(‡)
Marital Status (%) Married Other	65.1 34.9	79.6 20.4	0.021(‡)
Living Alone (%)	19.4	6.6	0.010(‡)
Co-morbidity (%) Diabetes Mellitus Cardiovascular Neurological Musculoskeletal Gastrointestinal Respiratory Thyroid disease Benign prostate hyperplasia	39 22 12 4 5 9 8 1	22.9 34.3 12.4 5.7 10.5 6.7 3.8 3.8	0.074
Smoking (%)	10.1	24.3	0.002(‡)
Alcohol (%)	1.6	6.6	0.038(‡)
Barthel ADL score (/100 points) *	60.47 ± 27.07	72.64 ± 32.35	0.001(†)
Lawton IADL score (/8 points) *	5.41 ± 1.46	5.53 ± 1.80	0.553
Number of drug usage *	4.14 ± 2.95	3.01 ± 2.61	0.001(†)
GDS–SF score (/15 points) *	4.41 ± 3.22	4.83 ± 4.18	0.180
MNA–SF score (/14 points) *	12.35 ± 1.54	11.70 ± 2.45	0.070

* Continuous variables (mean ± SD), One-way ANOVA.
‡ Ordinal or Binary variable (%), Chi square test.
† Significant at p<0.05.
ADL, Activities of Daily Living; IADL, Instrumental Activities of Daily Living; MMSE, Mini-Mental State Examination.

Table 2. Comparison of groups according to scores of SF–36 quality of life domains.

Variables*	Obese (n: 125)	Non-Obese (n: 156)	P
PF	47.50 ± 32.80	65.16 ± 29.63	0.000(†)
RP	23.18 ± 23.04	30.46 ± 22.89	0.008(†)
VT	45.35 ± 21.63	53.56 ± 20.53	0.001(†)
RE	55.49 ± 19.88	63.28 ± 16.66	0.000(†)
SF	58.91 ± 30.98	73.59 ± 27.40	0.000(†)
BP	51.00 ± 29.36	61.67 ± 27.18	0.002(†)
GH	46.08 ± 19.10	53.64 ± 19.34	0.001(†)
MH	31.01 ± 23.08	37.80 ± 20.78	0.10

*Continuous variables (mean ± SD), One-way ANOVA; † Significant at p<0.05. PF, physical functioning; RP, role limitation due to physical problems; BP, bodily pain; GH, general health; VT, vitality; SF, social functioning; RE, role limitation due to emotional problem; and MH, mental health.

Table 3. EAT scores and impaired eating attitude test frequency of patients.

Variables*	Obese (n:125)	Non–obese (n:156)	p
Frequency of disordered eating attitudes (%)	17.8 (23)	8.6 (13)	0.020(†)
Eating attitude score (/40 points) *	17.15 ± 8.72	21.16 ± 9.21	0.000(†)

*Continuous variables (mean ± SD), One–way ANOVA; † Significant at p<0.05

Table 4. The correlations between EAT, BMI parameters and SF–36 quality of life domains.

Variables	Life domains of the SF–36 scale								
	PF	RP	V	RE	SF	BP	GH	MH	BMI
EAT Score	r: 0.176 p: 0.004 (†)	r: 0.089 p: 0.139	r: 0.110 p: 0.067	r: 0.083 p: 0.169	r: 0.166 p: 0.005 (†)	r: 0.246 p: 0.000 (†)	r: 0.013 p: 0.825	r: 0.182 p: 0.002 (†)	r: -0.213 p: 0.000 (†)
BMI	r: −0.322 p: 0.000 (†)	r: −0.168 p: 0,005 (†)	r: -0,167 p: 0,005 (†)	r: -0,174 p: 0,004 (†)	r: -0.193 p: 0,001 (†)	r: -0,202 p: 0,001 (†)	r: -0,149 p: 0,012 (†)	r: -0,080 p: 0.182	r: 1

r: Pearson correlation coefficient; † Significant at p<0.05. EAT, eating attitudes test; BMI, Body mass index; PF, physical functioning; RP, Role limitation due to physical problems; BP, bodily pain; GH, general health; V, vitality; SF, social functioning; RE, role limitation due to emotional problem; and MH, mental health.

In the present study, HRQOL scores were lower in obese patients regardless of the chronic disease or patient's current state of health. On the other hand, it should be noted that in older men and women, a BMI below 25 is associated with increased total mortality. Overweight individuals with BMI's of 25–29.9 exhibit the lowest risk of mortality, whereas moderately obese individuals display only a modest increase in mortality risk (23). These previously revealed findings point out that prevention of excessive weight loss in elderly patients also has an essential importance. Proactively identifying patients with a BMI less than 25 and improving their eating habits may prevent lethal outcomes. If we attempt to consider all aspects in the light of the outcomes of the current study and previous ones, a novel healthy range for BMI I for the elderly might be assumed.

Eating disorders comprise a variety of symptoms and have a profound impact on everyday life. They are associated with high morbidity and mortality. An eating disorder is characterized by an abnormal eating behavior with either insufficient or excessive food intake, accompanied by feelings of distress or concern about weight or body shape, sometimes in combination with compensatory behavior to the detriment of the person's physical health, such as misuse of laxatives, misuse of diuretics, overuse of compulsive exercise etc. Studies have observed that individuals eat more when they are angry and depressed while they eat less when experiencing fear, stress, and pain. Moreover, obese individuals are known to have lower arousal thresholds than normal–weighted individuals (24). Thus, when these lower thresholds combine with increased responses to external stimuli, the result is often excessive eating. While numerous other factors may cause obesity in

elderly patients, the present study observed that eating disorder also can be a substantial factor (25). Studies have shown that patients with EDs present lower health–related quality of life (HRQOL) compared to other psychiatric disorders, including severe depression and compared to the general population (26). In the present study, we found higher frequency of impaired EAT and eating disorders in obese geriatric patients. Besides these results we found significant positive correlation between EAT scores and SF–36 parameters of PF–SF–BP and MH. Winkler et al. publish a meta–analysis and they confirm that HRQOL is affected in patients with an ED, as they have significantly lower SF–36 sub–scale scores compared to general population (27). Mitchison et al. implies that participants who are reported to have any or more of the three eating disorder behaviors had lower SF–36 scores than those who are reported to have none (all p<0.001) (28).

In addition to age, researchers have also begun to examine that whether an individual's gender relates to eating disorders or not; still, more studies are needed regarding this matter. In the present study, EAT scores were lower in obese women (Data not shown). Many studies have also shown that eating disorders are more frequent in women. This situation may be explained by a few differences, including more self–attention to appearance and weight among women, social differences between women and men, and higher stress and anxiety levels in women (29-31).

A key strength of this study is that, it is the first study about the quality of life of geriatric patients with eating disorders. Another strong aspect of its design is its large sample size.

Our study has several limitations that should be addressed. Because of the cross–sectional design of this study, no conclusions

regarding causal relationships among obesity, mental or somatic disorders and impaired HRQL or eating disorders can be drawn.

In conclusison, Obesity decreases the life quality of elderly individuals regardless of comorbidity. In addition, eating attitude disorders are more common in obese than in non–obese geriatric patients. This study has proven the need for additional research concerning how obesity affects the elderly demographic.

Conflict of Interest and Financial Status: Our study has not been financed by an institution and institution. In this study, there is no conflict of interest among the authors on any subject.

REFERENCES

1. World Health Organization. Ageing and health. http://www.who.int/newsroom/fact-sheets/detail/ageing-and-health access date: 01.08.2018

2. Turkish Statistical Institute. Elderly statistics, 2014. Publication Number: 4365. Printing Division, Ankara, 2015.

3. Amarya S, Singh K, Sabharwal M. Health consequences of obesity in the elderly. Journal of Clinical Gerontology and Geriatrics, 2014;5(3):63-7.

4. Bulut AE, Khouryb, Lee H, Grossbergb TG. Eating disturbances in the elderly: A geriatric-psychiatric perspective. Nutrition and Healthy Aging 2019;5:185–198.

5. Mond JM, Hay PJ, Rodgers B, Owen C, Beumont PJ. Assessing quality of life in eating disorder patients. Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation, 2005;14(1):171-8.

6. Yesavage JA, Brink TL, Rose TL, Lum O, Huang V, Adey M, et al. Development and validation of a geriatric depression screening scale: a preliminary report. Journal of psychiatric research, 1982;17(1):37-49.

7. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. Journal of psychiatric research, 1975;12(3):189-98.

8. Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index: a simple index of independence useful in scoring improvement in the rehabilitation of the chronically ill. Maryland state medical journal, 1965.

9. Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental activities of daily living. The Gerontologist, 1969;9(3):179-86.

10. Kaiser MJ, Bauer JM, Ramsch C, Uter W, Guigoz Y, Cederholm T, et al. Validation of the Mini Nutritional Assessment short-form (MNA-SF): a practical tool for identification of nutritional status. The journal of nutrition, health & aging, 2009;13(9):782-8.

11. Garner DM, Garfinkel PE. The Eating Attitudes Test: an index of the symptoms of anorexia nervosa. Psychological medicine, 1979;9(2):273-9.

12. Savasir I, Erol N. Eating attitude test: anorexia nervosa symptom index. Psikoloji Dergisi, 1989;7:19-25.

13. Ware JE, Jr., Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. Medical care, 1992;30(6):473-83.

14. Kocyigit H, Aydemir O, Fisek G, Olmez N, Memis A. Validity and reliability of Turkish version of Short form 36: A study of a patients with romatoid disorder. J Drug Ther, 1999;12(2):102-6.

15. Mar J, Karlsson J, Arrospide A, Mar B, Martinez de Aragon G, Martinez-Blazquez C. Two-year changes in generic and obesity-specific quality of life after gastric bypass. Eating and weight disorders : EWD, 2013;18(3):305-10.

16. Yancy WS, Olsen MK, Westman EC, Bosworth HB, Edelman D. Relationship between obesity and health-related quality of life in men. Obes Res, 2002;10(10):1057-64.

17. Huang IC, Frangakis C, Wu AW. The relationship of excess body weight and health-related quality of life: evidence from a population study in Taiwan. International journal of obesity, 2006;30(8):1250-9.

18. Doll HA, Petersen SEK, Stewart-Brown SL. Obesity and physical and emotional well-being: Associations between body mass index, chronic illness, and the physical and mental components of the SF-36 questionnaire. Obes Res, 2000;8(2):160-70.

19. Makara-Studzińska M, Zaborska A. Obesity and body image. Psychiatr Pol. 2009 Jan-Feb; 43(1):109-14.

20. Lee CT, Strong C, Lin YF, Chou YY, Tsai MC. Metabolic correlates of health-related quality of life among overweight and obese adolescents. BMC Pediatr. 2018 Feb 3;18(1):25.

21. Ul-Haq Z, Mackay DF, Fenwick E, Pell JP. Association between body mass index and mental health among Scottish adult population: a cross-sectional study of 37272 participants. Psychological medicine, 2014;44(10):2231-40.

22. Pedrero-Chamizo R, Gomez-Cabello A, Melendez A, Vila-Maldonado S, Espino L, Gusi N, et al. Higher levels of physical fitness are associated with a reduced risk of suffering sarcopenic obesity and better perceived health among the elderly. The EXERNET multi-center study. Journal of Nutrition Health & Aging, 2015;19(2):211-7.

23. Wang YF, Tang Z, Guo J, Tao LX, Liu L, Li HB, et al. BMI and BMI Changes to All-cause Mortality among the Elderly in Beijing: a 20-year Cohort Study. Biomedical and Environmental Sciences, 2017;30(2):79-87.

24. Chang HH, Saeliw K. Does Eating Out Make Elderly People Depressed? Empirical Evidence from National Health and Nutrition Survey in Taiwan. J Ment Health Policy, 2017;20(2):63-73.

25. Leme ACB, Thompson D, Dunker KLL, Nicklas T, Philippi ST, Lopez T, et al. Obesity and eating disorders in integrative prevention programmes for adolescents: protocol for a systematic review and meta-analysis. BMJ open,2018; 8(4).

26. Heriseanu AI, Hay P, Touyz S. Grazing behaviour and associations with obesity, eating disorders, and health-related quality of life in the Australian population. Appetite. 2019 Dec 1;143:104396.

27. Winkler LA, Christiansen E, Lichtenstein MB, Hansen NB, Bilenberg N, Stoving RK. Quality of life in eating disorders: A meta-analysis. Psychiatry research, 2014;219(1):1-9.

28. Mitchison D, Hay P, Slewa-Younan S, Mond J. Time Trends in Population Prevalence of Eating Disorder Behaviors and Their Relationship to Quality of Life. PloS one, 2012;7(11).

29. Raevuori A, Keski-Rahkonen A, Hoek HW. A review of eating disorders in males. Curr Opin Psychiatr, 2014;27(6):426-30.

30. Afifi M. Gender differences in mental health. Singapore medical journal, 2007;48(5):385-91.

31. Asarian L, Geary N. Sex differences in the physiology of eating. American journal of physiology Regulatory, integrative and comparative physiology, 2013;305(11):R1215-67.