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# ANALYSIS OF CHANGES IN BMI AND PERCEPTION OF THE QUALITY OF LIFE AND HEALTH IN OVERWEIGHT FEMALE PATIENTS. A STUDY WITH REPEATED MEASUREMENTS DESIGN

## Analiza zmian BMI i percepcji jakości życia i zdrowia u kobiet z nadwagą. Badanie z zastosowaniem powtarzalnych pomiarów

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### Abstract

The aim of the study is to analyse the changes in Body Mass Index (BMI) and quality of life in a group of overweight women of the Obesity Treatment Ward within 3 months after participating in multicomponent weight loss program.

There were 120 obese women participating in the study, patients of the Obesity Treatment Ward. The research tool used in the study was *The World Health Organization Quality-of-Life Scale – WHOQL-BREF*. Variable measurements were made 3 times within 3 months.

Significant differences of BMI apply to each pair of comparisons ($p < 0.05$). A statistically significant difference between overall quality of life (WHOQOL-BREF) between I–III was observed. There are significant differences for each time point ($p < 0.05$). A statistically significant difference was found between the overall quality of health (WHOQOL BREF) between measurements I–III.

The multicomponent interventions for overweight and obese people help implement current recommended lifestyle and behaviour changes. The behaviour changes are associated with significant reductions in BMI and growth in the quality of life of obese people. The results of above study constitute important theoretical and practical inputs, and they could contribute to the effectiveness of interventions in obesity treatment. Conclusions and practical implications resulting from the conducted research may contribute to scientific disciplines such as rehabilitation psychology, special pedagogy or health sciences in connection with therapy and rehabilitation of patients.

**Keywords:** obesity, quality of life, The WHOQOL-BREF, interdisciplinary interventions in weight reduction, health education and health promotion.

## Streszczenie

Celem pracy jest analiza zmian wskaźnika masy ciała (BMI) i jakości życia w grupie otyłych kobiet Oddziału Leczenia Otyłości w okresie 3 miesięcy po udziale w wieloskładnikowym programie odchudzania.

W badaniu wzięło udział 120 otyłych kobiet, pacjentek Oddziału Leczenia Otyłości. Narzędziem badawczym wykorzystanym w badaniu była *Skala jakości życia Światowej Organizacji Zdrowia – WHOQL-BREF*. Pomiarów zmiennych dokonano 3 razy w ciągu 3 miesięcy.

Istotne różnice BMI dotyczą każdej pary porównań ($p < 0,05$). Zaobserwowano statystycznie istotną różnicę między ogólną jakością życia (WHOQOL-BREF) między I–III. Istotne różnice występują dla każdego punktu czasowego ($p < 0,05$). Stwierdzono statystycznie istotną różnicę między ogólną jakością zdrowia (WHOQOL BREF) między pomiarami I–III.

Wieloskładnikowe interwencje dla osób z nadwagą i otyłością pomagają wdrożyć obecnie zalecane zmiany stylu życia i zachowania, które wiążą się ze znacznym obniżeniem BMI i wzrostem jakości życia osób otyłych. Wyniki powyższych badań stanowią ważny wkład teoretyczny i praktyczny oraz mogą przyczynić się do zwiększenia skuteczności interwencji w leczeniu otyłości. Wnioski i praktyczne implikacje wynikające z przeprowadzonych badań mogą przyczynić się do rozwoju dyscyplin naukowych takich jak psychologia rehabilitacji, pedagogika specjalna czy nauki o zdrowiu w powiązaniu z terapią i rehabilitacją pacjentów.


**Słowa kluczowe:** otyłość, jakość życia, WHOQOL-BREF, interdyscyplinarne interwencje w redukcję masy ciała, edukacja zdrowotna i promocja zdrowia

## Introduction

Obesity is a global-scale epidemic of the 21st century (Imes, Burke, 2014). According to research, worldwide obesity has more than doubled in the last 4 decades (Centers for Disease Control and Prevention, 2008). There are more than 1.5 billion adults qualified as overweight all over the world (WHO, 2011; Donna et al., 2011). In Poland, every second adult is overweight, and one in six is obese (Obara-Gołębiowska, 2020). Depending on the severity of psychophysical complications, obesity may lead to psychophysical disability of both the individual and the society (Rahmanil, et al., 2015). It leads to numerous psychophysical complications and may considerably reduce the quality of human life (Wang et al., 2015; Obara-Gołębiowska, Przybyłowicz, 2014). For instance, research conducted by Groessl et al. (2004) present that obese persons show lower quality of life in comparison to persons with proper body weight. Moreover, a non-linear correlation is observed between the quality of life and BMI value, and in the case of normal BMI, the quality of life has a positive value. BMI exceeding the normal range generates the risk of deterioration of the state of health (Damush et al., 2002). Approximate results were also obtained by the Polish research team comparing the quality of life of obese persons with overweight persons by means of the WHOQOL-BREF questionnaire (Gnacinska-Szymanska et al., 2012). Research on the quality of life in the population of obese persons provides important information concerning their subjective perception of self. Psychological practice in the scope of therapy of overweight persons shows that psychological destabilisation leading to a decrease in the quality of life of an

individual frequently results in excessive eating. Unfortunately, such a form of compensation directly results in overweight, or obesity, and sometimes also in the appearance of deeper psychopathological disorders (Salokangas et al., 2012). On the other hand, studies clearly show that weight reduction programs involving patient collaboration with physician, psychologist, and dietitian lead to a significant increase in their quality of life (Pratt et al., 2013).

Successful lifestyle interventions draw on the skills of experienced professionals who use a variety of therapeutic techniques to improve self-regulation capabilities in goal achievement. Examples of those techniques are self-monitoring, modeling, environmental restructuring, and group or individual support (Gade et al., 2014, Obara-Gołębiowska, 2020). Results of Welsh et al. (Welsh et al., 2015) show that lifestyle interventions containing, among others, self-regulation techniques for obesity can produce modest, but clinically significant reductions in weight with minimal risk. Studies show that self-regulation training as an element of organized obesity treatment improves the body image and quality of life of people with a body mass index above 30 (Wing et al., 2006; Sohrabi et al., 2016).

Obesity is a factor leading to disability due to the psychophysical complications it causes in patients (Rahmanil et al., 2015). For this reason, the problems of people with excess body weight are considered in the field of scientific disciplines such as special education, or rehabilitation psychology. Also, in terms of legal provisions, obesity can constitute a disability within the meaning of the Employment Equality Directive. This condition is included in the concept of disability if, under certain conditions, it makes it difficult for the affected person to participate in professional life fully and effectively, on an equal footing with other employees (Rahmanil et al., 2015). For this reason, it is very important to conduct research focused on finding effective ways to fight obesity.

The objective of this paper is to analyse the changes in Body Mass Index (BMI), perception of quality of life and health in a group of obese female patients of the Obesity Treatment Ward within 3 months after participating in multicomponent, interdisciplinary weight loss program.

## Material and Methods

All participants gave verbal consent to participate, and the study was approved by the Bioethics Committee of University of Warmia and Mazury, Olsztyn, Poland. The study group comprised of 120 overweight females of the Obesity Treatment Ward. Initially the study group comprised 200 overweight females and males of the Obesity Treatment Ward. However, after 3 months, 120 women remained in the study. The mean age of the patients amounted to 48.5 *SD* = 3.62 (range: 34-65 years of age). All subjects had been admitted to an obesity management clinic which organizes weight loss programs

that teach patients to make healthy lifestyle choices with the assistance of an interdisciplinary team of experts, including a dietician, physician, psychologist, physiotherapists, and physical education trainers. The participated patient's in-group and individual therapeutic activities employing cognitive-behavioural strategies aimed at the development of better self-regulatory capabilities and self-efficacy in the scope of observing a diet. All patients receive a 1200 calorie diet. At the end of a two-week stay, patients receive an individual diet and physical activity program.

The applied research tool was T*he World Health Organization Quality-of-Life Scale – WHOQOL-BREF* (Gnacinska-Szymanska et al., 2012; Lemstra, Rogers, 2016). The questionnaire comprises 26 items. It measures the following broad domains: physical health, psychological health, social relationship, and environment. Moreover, WHOQOL-BREFF includes items analysed separately: question 1: individual general quality of life; question 2: individual general quality of health. Respondent answers on the 5-degree scale and obtains up to 20 points in each domain. In the study, questions 1 and 2 of the WHOQOL-BREFF were used.

The study measured 3 times the BMI and quality of life of patients (question 1: individual overall quality of life; question 2: individual overall quality of health). The first measurement was made on the first day of the patient's stay on the of the Obesity Treatment Ward. Second after two weeks (at the end of a two-week weight-reduction program), and measurement of the third after 3 months. Measurements 1 and 2 were performed directly while measurement 3 was made via telephone or internet.

### Statistical method

Calculations were performed using the Statistica 12 package. First, the normality of the distributions of the parameters tested was verified using the Shapiro-Wilk normality test. For variables, whose distributions differed from normal or additionally, the assumption of homogeneity of variance for comparison of parameters and results of questionnaires over time (measurement 1 vs 2 vs 3) was used non-parametric ANOVA test Friedman. In addition, Conover-Inman post-hoc test was used for significant differences. For the BMI variable where the assumption of normality of distribution was assumed, assumption of homogeneity of variance, but lack of fulfillment of spherical assumption (Mauchley test) – significance of differences was verified by multivariate tests. To identify the differences between specific measurements, Fisher's post-hoc test was used.

## Results

In the Table 1 a descriptive statistics has been shown.

By assuming the normality of the distribution of BMI at each moment, assuming normality of variance ($p = 0.298$), the ANOVA test for repetitive measurements should

initially be used, but due to the lack of a spherical assumption (Mauchley $p = 0.000$) to verify the significance of the difference (Table 3).

BMI scores for BMI I–III measurements was observed. The mean BMI in the first measurement is 34.9 ($SD \pm 6.0$) with a mean BMI of 32.9 (SD ± 5.9), a mean BMI of 30.9 ($SD \pm 5.2$) the third measurement (Table 4).

Significant differences apply to each pair of comparisons ($p < 0.05$). The WHOQOL-BREFF (overall quality of life, overall quality of health) (Table 5).

The overall quality of life in the first measurement is 3.4 ($SD \pm 0.8$) versus 4.3 ($SD \pm 0.9$) in Measure II, 4.6 ($SD \pm 0.7$) in Measure III (Table 6).

A statistically significant difference between overall quality of life (WHOQOL BREF) between I–III was observed. Significant differences are for each time point ($p < 0.05$) (Table 7).

The overall quality of health in the first measurement is 3.5 ($SD \pm 0.5$) against 4.2 ($SD \pm 0.8$) in Measure II, 4.4 ($SD \pm 0.7$) in Measure III (Table 8).

A statistically significant difference was found between the overall quality of health (WHOQOL BREF) between measurements I–III. There are significant differences for each time point ($p < 0.05$) (Table 9).

Table 1
*BMI – Descriptive statistics*

| Descriptive statistics | *N* important | Average | Median | Minimum | Maximum | Standard deviation |
|---|---|---|---|---|---|---|
| BMI I | 120 | 34.9 | 34.5 | 25.3 | 48.6 | 6.3 |
| BMI II | 120 | 32.9 | 33.2 | 23.9 | 45.8 | 5.9 |
| BM III | 120 | 30.9 | 30.3 | 23.7 | 42.4 | 5.24 |

Table 2
*BMI – Homogenity variance tests*

| Homogeneity variance tests | Hartley | Cochrane | Bartlett | a | *p* |
|---|---|---|---|---|---|
| | F-max | C | Chi square | St. dev | |
| BMI | 1.8 | 0.4 | 3.9 | 3 | 0.298 |

Table 3
*BMI – Mauchley's sphere test*

| Mauchley's sphere test | W | Chi square | St. dev | p |
|---|---|---|---|---|
| TIME | 0.4 | 75.5 | 5 | 0,000 |

Table 4
*BMI – Multidimensional tests for repeated measurements*

| Multidimensional tests for repeated measure-ments | Test | Value | *F* | Effect *df* | *P* |
|---|---|---|---|---|---|
| TIME | Wilks | 0.2 | 128.7 | 3 | 0,000 |
| | Pillai | 0.9 | 128.7 | 3 | 0,000 |
| | Hotelln. | 9.3 | 128,7 | 3 | 0,000 |
| | Roy | 9.3 | 128,7 | 3 | 0,000 |

Table 5
*BMI – Post-hoc test NIR*

| Post-hoc test NIR | BMI I | BMI II | BM III |
|---|---|---|---|
| BMI I | | 0.000 | 0.000 |
| BMI II | 0.000 | | 0.000 |
| BM III | 0.000 | 0.000 | |

Table 6
*The WHOQOL-BREFF (overall quality of life)- Descriptive statistics*

| Descriptive statistics | N important | Average | Median | Minimum | Maximum | Standard deviation |
|---|---|---|---|---|---|---|
| Overall quality of life I | 120 | 3.4 | 3.2 | 1.0 | 5.0 | 0.8 |
| Overall quality of life II | 120 | 4.3 | 4.4 | 2.0 | 5.0 | 0.9 |
| Overall quality of life III | 120 | 4.6 | 4.3 | 3.0 | 5.0 | 0.7 |

Table 7
*The WHOQOL-BREFF (overall quality of life)- ANOVA Friedman Test*

| ANOVA Friedman | Average | Sum | Average | Standard deviation |
|---|---|---|---|---|
| Chi square ANOVA | Range | Range | | |
| Overall quality of life I | 1.8 | 73.0 | 3.4 | 0,8 |
| Overall quality of life II | 2.7 | 123.7 | 4.5 | 0,8 |
| Overall quality of life III | 3.1 | 136.6 | 4.7 | 0,7 |
| Value *p* – post-hoc | | | | |
| Overall quality of life I | | 0.000 | 0.000 | 0.000 |
| Overall quality of life II | 0.000 | | 0.010 | 0.276 |
| Overall quality of life III | 0.000 | 0.010 | | 0.000 |

Table 8
*The WHOQOL-BREFF (overall quality of health)- Descriptive statistics*

| Descriptive statistics | *N* important | Average | Median | Minimum | Maximum | Standard deviation |
|---|---|---|---|---|---|---|
| Overall quality of health I | 120 | 3.5 | 4.0 | 2.0 | 4.0 | 0.5 |
| Overall quality of health II | 120 | 4.2 | 4.0 | 2.0 | 5.0 | 0.8 |
| Overall quality of health III | 120 | 4.4 | 4.0 | 3.0 | 5.0 | 0.7 |

Table 9
*The WHOQOL-BREFF (overall quality of health) – ANOVA Friedman Test*

| ANOVA Friedman | Average | Sum | Average | Standard deviation |
|---|---|---|---|---|
| Chi square ANOVA (N = 120, df 3) = 42.6 p = 0,000 | Range | Range | | |
| Overall quality of health I | 2.3 | 90.5 | 3.9 | 0.6 |
| Overall quality of health II | 3.0 | 116.4 | 4.5 | 0.8 |
| Overall quality of health III | 3.3 | 135.3 | 4.6 | 0.7 |
| Value *p* – post-hoc | | | | |
| Overall quality of health I | | 0.000 | 0.000 | 0.000 |
| Overall quality of health II | 0.000 | | 0.002 | 1.000 |
| Overall quality of health III | 0.000 | 0.003 | | 0.003 |

## Discussion

Obesity is one of the leading causes of preventable premature death all over the world. The increase in this disease has created a growing demand for health professionals and psychologists to play a role in treating those affected by the obesity epidemic. As the statistics indicate, obesity increases, among others, the probability of uterus cancer, oesophageal cancer, kidney cancer, colorectal cancer, and breast cancer. A health-related effect of obesity, which usually resulting from sedentary lifestyle, is type II diabetes (Barnes, 2012). Moreover, a large part of the western society, and particularly persons with excessive body weight, have been determined to suffer from non-alcoholic fatty liver disease causing damage to the organ (Borrell, Samuel, 2014). Obesity is also the cause of atrial fibrillation, which considerably increases the risk of heart attack. Extreme obesity may lead to pulmonary thrombosis, deep vein thrombosis, chronic abdominal compartment syndrome, and heart enlargement, often leading to death (Wang et al., 2015; Barnes, 2012). The incidence of such diseases may also be largely determined by the so-called metabolic syndrome, often occurring in the obese. Its consequence can be type II diabetes, coronary heart disease, or stroke (Wang et al., 2015; Barnes, 2012). A decrease in the quality of life of obese patients in the psychological, social, and environmental sphere can be related to more frequent co-occurrence of obesity with depression-anxiety disorders, eating disorders, and personality disorders (Mannan et al., 2016;

Hemmingsson, 2014; Izydorczyk, 2015). Moreover, the obesity stigma and the resulting discrimination lead to social isolation and contribute to the devalued social identity of the overweight persons. They are discriminated and victimised in many different spheres of life, including education, workplace, and health care (Puhl, Brownell, 2003). They face contempt, verbal, or physical abuse and social repression, becoming subject to isolation, neglect, ridicule, and gossip (Hussin et al., 2011). People with BMI>30, in particular women, find it more difficult to enter romantic relationships (Fikkan, Rothbloom, 2012). Stress and low self-esteem increase the probability of emotional overeating and adopting a sedentary lifestyle. Those behaviours perpetuate obesity and additionally create a risk of developing somatic disease caused by weight gain (Puhl, Brownell, 2003). Victims of weight stigma are also more susceptible to psychological disorders such as depression and are more likely to attempt suicide (Neumark-Sztainer, 2002). Deterioration of health-related quality of life is considered a risk factor for future weight gain (Lemstra, Rogers, 2016; Dickerson et al., 2004). Therefore, the assessment of the risk of future weight gain and a focus on health-related quality of life may be beneficial in weight management strategies.

According to studies (Welsh et al., 2015; Wing et al., 2006; Sohrabi et al., 2016) multicomponent lifestyle intervention is one of the most effective methods of inducing changes in body weight and psychosocial well-being. The most frequently reported changes are increased self-esteem, improved social activity and interpersonal relationships, and decreased depression and anxiety. However, the major challenge in the treatment of obesity is maintenance of weight loss. Multicomponent weight-reduction programs involving diet, exercise, and behavior modification produce initial weight losses of approximately 10%. Unfortunately, most dieters regain about one third of the weight lost during the next year (Obara-Gołębiowska, Przybyłowicz, 2014).

In this study, I wanted to evaluate what changes in BMI and quality of life of people will occur within 3 months after staying in a two-week weight loss program. A 3-fold repetition test showed a statistically significant decrease in kilograms over a 3-month period. The results obtained are in line with the results of studies showing efficacy of multicomponent interventions (Welsh et al., 2015; Wing et al., 2006; Sohrabi et al., 2016; Obara-Gołębiowska, Przybyłowicz, 2014). Similarly, measurement of quality of life indicated a systematic significant increase in this variable within 3 months. The results indicate that there is a need for multicomponent, interdisciplinary programs that target overweight people that teach them skills specific to the maintenance of weight loss. Studies (Obara-Gołębiowska, Przybyłowicz, 2014; Puhl et al., 2008) show that multidisciplinary programs that involve frequent follow-up with providers and use a cognitive behavioral approach are associated with the greatest weight loss. It is outlined that (Powell et al., 2007; Shaw et al., 2005; Wadden, 1993) major components of such cognitive behavioral approaches, should focus on including self-monitoring, problem solving, nutrition education, stimulus control, cognitive restructuring, slowing

down the rate of eating, and increasing exercise. Self-monitoring of physical activity and dietary intake (i.e., with a log), as well as monitoring of thoughts and emotions around food and eating can increase patients' awareness of their problematic behaviors and cognitions and track progress (Obara-Gołębiowska, 2020).

However, there are some limitations to the present study that should inform future work. The major limitation of the present study is small research group and lack of males respondents. Initially 200 people (females and males) were enrolled. However, only 120 people remained in the study for 3 months. Future research covering larger research groups with male respondents would be an interesting follow-up of the present study.

## Conclusion

The multicomponent interventions for overweight and obese people helps implement current recommended lifestyle and behaviour changes. These behaviour changes are associated with significant reductions in BMI and growth in the quality of life of obese people. The results of above study constitute important theoretical and practical inputs, and they could contribute to the effectiveness of multicomponent interventions in obesity treatment. The participation in weight loss programs that teach patients to make healthy lifestyle choices with the assistance of an interdisciplinary team of experts, including a dietician, physician, psychologist, physiotherapists, and physical education trainers significantly influences the process of weight loss maintenance and therefore return to self-regulation among obese people. Conclusions and practical implications resulting from the conducted research may contribute to scientific disciplines such as rehabilitation psychology, special pedagogy, or health sciences in connection with therapy and rehabilitation of patients.

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