Body fat and quality of life in women treated for breast cancer

Urszula Czerniak, Anna Demuth, Magdalena Krzykała, Ewa Ziółkowska-Łajp

Department of Anthropology and Biometry, University School of Physical Education in Poznań, Poland

ABSTRACT

Introduction. Subjective quality of life is a total of perceived fulfillment and satisfaction with various aspects of life in reference to a person's individual system of values. Subjectively perceived level of satisfaction with life may determine one's attitude towards further existence and, as a consequence, cause undertaking or not undertaking health-oriented activities.
Aim of Study. The aim of this study was to estimate the extent of obesity in post-mastectomy women and the impact of obesity on their quality of life.
Material and Methods. The research material consisted of results of anthropometric measurements, including body composition using bioelectric impedance analysis (Akern – BIA 101) as well as results of a quality of life questionnaire survey [1] conducted among 69 women after mastectomy from all over Poland. The age of examined women ranged from 38 to 68 years, with more than half of subjects aged between 50 and 65 years.
Results. The division of examined women into those with better and worse perception of their quality of life enabled an assessment of the influence of obesity on their personal and social life. Fat tissue content using BIA in women with better perception of quality of life was shown to be lower as compared with their counterparts with worse perception of their quality of life. A large percentage of obese women was noted in both groups.
Conclusions. Most post-mastectomy women who had a sense of better quality of life at the end of the treatment were likely to have lower fat tissue than women with a low level of subjective quality of life. Obesity can be one of factors influencing the level of quality of life perception, whereas muscle mass and extracellular water levels do not have a negative effect on perceived quality of life in women after mastectomy.

KEY WORDS   mastectomy, life quality, obesity.

Introduction

An area for scientific inquiries with regard to the environment examined for cognitive purposes is the hedonistic approach to the concept of quality of life and its health-related biomedical perspective. Kowalik [1] emphasizes the significance of research on quality of life related to health, regarding disease as an independent variable, and types of physical and mental status as well as ways of processing information about oneself and the surrounding reality as dependent variables.

The perception of quality of life is a total of perceived fulfillment and satisfaction with various aspects of life in reference to a person's individual system of values. The subjectively perceived level of satisfaction with life may determine one's attitude towards further existence and, as a consequence, lead to undertaking or not undertaking of health-related behaviours [2].

The question of perception of quality of life gains special significance in the case of cancer hazards. The etiology of malignant breast cancers, in spite of extensive research, has not been sufficiently explained. The risk of developing breast cancer is determined by genetic conditions as well as a number of endogenous and exogenous factors [3, 4, 5].

The results of years of research on quality of life show that patients after mastectomy have an inferior body image, and that their lives are more disturbed than before cancer diagnosis [6].

Researchers emphasise the effect of bad diet on abnormal proportions of body composition. A raised level of body fat component increases the risk of developing breast cancer, in particular, in women after menopause [7, 8, 9]. On the other hand, maintaining normal weight after menopause results in a reduction of the risk of malignant breast disease [10, 11, 12]. The mortality rate in post-menopausal women was also shown to be higher in obese women than in slim women [13].

Aim of Study

The aim of this study was to estimate the extent of women's obesity after mastectomy due to breast malignant tumors and the influence of obesity of women's quality of life.

Material and Methods

The research material consisted of results of anthropometric measurements, including body composition measured using bioelectric impedance analysis (BIA) [14] as well as results of a quality of life questionnaire survey [15] conducted among 69 women after mastectomy from all over Poland. An Akern – BIA 101 body composition analyser was used for the measurements. The BIA uses the change in the value of electric field generated by a human body in the process of electric induction. In order to carry out the test of body composition it is necessary to determine the values of two basic somatic features (body height and body mass) and determine the subject's chronological age. During the test an electric current of negligible intensity (approx. 0.8 microampere) passes through the body, which causes the test to be imperceptible. The electric current is an analysing factor which changes in two parameters: resistance – indicating the total content of water in the body, and reactance – indicating the size of protein and lipid cell membranes. This factor informs the researcher about the levels and mutual relations between body mass components. The levels of the following body components were assessed: fat mass (FM), fat free mass (FFM), body cell mass (BCM), total body mass and total body water (TBW) as well as extracellular water (ECW). Water, which is a good electrical conductor, is an indicator of the level of fat and fat free content in the body. A considerable water content is indicated by low electric resistance, and since it is present mainly in fat free body, the low resistance indirectly shows a high content of fat free body – and the other way around. Thus, treating the body mass as a total of fat and fat free body, data may be obtained about body content using simple mathematical equations. Mutual relations between resistance and reactance are established on the basis of correlation equations. The reliability of the BIA method has been confirmed in many studies [16, 17, 18].

The questionnaire comprised 18 items pertaining to the patient's own quality of life assessment. The respondents described their attitudes to various aspects of life using a five-degree Likert scale: from definite dissatisfaction (1) to full satisfaction (5).

Scale of Life Quality Perception (LQP scale):
– personal life (6 items),
– working life (6 items),
– socio-economic aspect (6 items).

The perception of quality of life by post-mastectomy women was determined by dividing the sample into two groups. Group I with better results of their quality of life assessment consisted of 30 females who scored top on the LQP scale. Group II consisted of women who attained the lowest scores on this scale. Also self-perceived quality of life was determined by adding up the scores of all three aspects of life satisfaction assessment. The higher the score obtained, the greater the satisfaction with subsequent aspects of patients'

life was achieved. From the whole sample of 69 participants, 30 women who obtained the highest scores (the group with the highest level of life quality perception) and 30 women with the lowest score (the group with the lowest level of life quality perception) were subsequently selected.

The chronological age of examined women ranged from 38 to 68 years, however, over 50% of the subjects were between 50 and 65 years old. Women from 1 to 5 years after the operation made up a significant percentage of the research sample (46%). It should be emphasized that the longest post-surgery period amounted to 15 years. Women with a secondary education made up 62% of the research sample.

Results

Data analysis (Fig. 1) suggests that approximately 58% of the studied sample of women were satisfied with their marriage, health, housework, standard of living and themselves. This aspect of life was negatively assessed by 37% of respondents. Over 72% of respondents were definitely satisfied with their family life, friends, leisure activities, education, home and place of residence. 25% expressed their dissatisfaction with these aspects of life, and 3% did not express any opinion at all. Other aspects of life (occupational activities, living in Poland and earnings) were assessed negatively by 66% and positively by 30% of respondents.

The division of the examined women into two groups: with better and worse life quality perception, respectively, enabled to estimate the effect of body fat on the women's personal and social life. The lack of significant differences (Mann Whitney U test) in each given quality of life sphere, between groups of different age, time elapsed from diagnosis, education level and marital status permitted to treat this group as homogenous in terms of the above characteristics and enabled further analyses within the groups of post-mastectomy women characterised earlier (Tab. 1).

While age and body height of post-mastectomy women with better and worse quality of life perception were comparable, there was a significant difference in their body mass (determined by BMI) as well as significantly lower levels of fat mass and total body water in women who were more satisfied with different spheres of life. The lack of differences in fat free mass determined the lack of adequate muscle mass growth. There were no differences observed in the content of extracellular fluids. It meant that there was no water migration in the closed area of body cells to the area
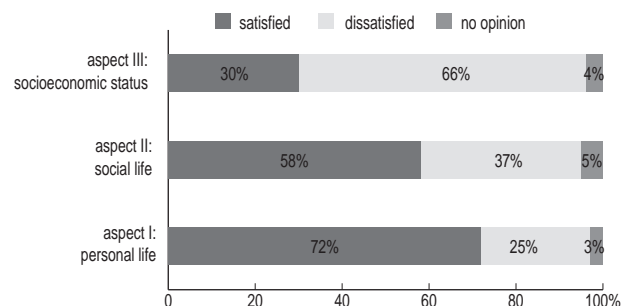

Figure 1. Comparison of evaluation of perceived quality of life in post--mastectomy women

Table I. Differences in quality of life perception with regard to social characteristics (Mann-Whitney U test)

Quality of life perception and age (Y – younger, below 50 years, O – older, 50 years and above)

QUALITY OF LIFE ASPECTS	Y/O
Personal life	1.92
Occupational life	0.64
Socio-economic status	1.22

Quality of life perception and time elapsed from the surgery (S – short < 5, L – long > 5 years)

QUALITY OF LIFE ASPECTS	S/L
Personal life	1.14
Occupational life	0.85
Socio-economic status	0.74

Quality of life perception, educational background and occupation (PV – primary-vocational, S – secondary, H – higher, P – blue-collar, M – white-collar)

QUALITY OF LIFE ASPECTS	PV/S	PV/H	S/H	P/M
Personal life	1.72	1.65	1.15	1.04
Occupational life	0.84	0.81	0.69	0.42
Socio-economic status	1.14	1.23	0.10	0.58

Quality of life perception and marital status (S – single, M – married, D – divorced, W – widow)

| QUALITY OF LIFE ASPECTS	S/M	S/D	S/W	M/W	M/W	D/W
Personal life	1.64	1.35	0.22	1.08	0.78	0.62
Occupational life	1.12	1.09	1.16	1.19	1.41	0.58
Socio-economic aspect	0.84	1.31	0.38	0.79	1.78	0.87

Table II. Body composition of women after mastectomy with better and worse perception of quality of life (in absolute values) – Mann-Whitney U test

	Age	Body height	Body mass	FM (kg)	FFM (kg)	TBW (L)	ECW (L)	BCM (kg)	BMI
Women with better quality of life perception									
M	52.17	161.55	65.96	19.97	45.99	33.77	17.36	21.92	25.36
Sd	7.19	5.06	6.89	5.30	2.88	2.17	1.78	2.44	2.70
Women with worse quality of life perception									
M	53.87	162.11	78.41	30.56	47.85	35.51	18.21	22.87	29.90
Sd	8.46	6.10	8.33	4.42	4.68	3.15	1.98	3.03	3.11
u	1.45	0.46	10.29*	12.67*	1.14	1.20	0.76	0.76	3.94*

significant differences at p ≤ 0.01 = 2.75
FM – fat mass, FFM – fat free mass, TBW – total body water, EWC – extracellular water, BCM – body cell mass, BMI – body mass index

between cells, which affected the oedema in women after mastectomy. A high percentage of obese women was found in both analysed groups (Tab. 2, Fig. 2).
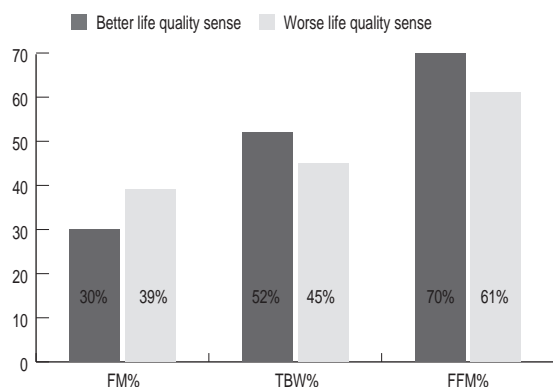
Figure 2. Body composition in post-mastectomy women (%). FM – fat mass, TBW – total body water, FFM – fat free mass

Discussion

Studies of groups of patients have attempted to determine relations between morphological traits and a given disease as well as the effect of treatment on perceived quality of life [6, 19, 20, 21]. It was noted that the evaluation of one aspect of quality of life, i.e. body image, was higher in women who had undergone a breast-sparing surgery or mastectomy with reconstruction [6, 22].

With respect to the BMI researchers noted a significantly high correlation between the incidence of breast cancer and the BMI level highly exceeding the norm [23]. The results of present research confirm earlier reports and revealed a significant percentage of women with overweight and obesity in the sample of women after mastectomy in both analysed groups. Increased body mass, significant fat tissue contents and higher BMI values had been noted in groups of women after mastectomy, irrespective of their age, genetic predisposition, nationality, education, social background and eco-

nomic status [3, 8, 10, 11, 24]. There were reports showing that after menopause overweight and obesity caused an increase in estrogen concentration and a risk of breast cancer [4]. Preventive behaviour of women, in particular, after the age of 50, should include, first of all, maintaining appropriate proportions of body composition. Body mass components then should be determined with the use of accurate methods, e.g. bioelectrical impedance analysis (BIA) [10, 25].

Some authors [26] indicated relationships between quality of life and physical activity of patients with various malignant cancers. Physical exercises performed by women after mastectomy during treatment and after its completion had a positive effect on the quality of their life, which was also confirmed by the results of studies of other authors as well as in our earlier reports [27, 28, 29]. The use of physical activity as an obesity reducing tool was, according to some authors, particularly significant women at the mature age when the increase in weight at this time was generally transformed into a greater increase in the fat component than fat free tissue [7, 8, 9, 30].

Conclusions

In terms of perceived quality of life the studied women did not differ in their age and body height. Most post-mastectomy women with a better perception of their quality of life after the treatment completion were likely to have lower fat tissue contents than women with a worse perception of quality of life. Body fat might be one of the factors influencing perceived quality of life, while the levels of muscle mass and extracellular water do not cause a lowering of the level of perceived quality of life.

References

1. Kowalik S. The utility of the concept of quality of life for the rehabilitation of persons with disabilities. In: Wołowicka LW, eds., Quality of life at medical science, Poznań: Academy of Medicine. 2001. pp. 54-77.
2. Thome B, Dykes A-K, Hallberg IR. Quality of life in old people with and without cancer. Qual. Life Res. 2004; 13: 1067-1080.
3. McPherson K, Steel CM, Dixin JM. ABC of breast diseases. Breast cancer--epidemiology, risk factors, and genetics. BMJ. 2000; 321: 624-628.
4. Bernstein L. Epidemiology of endocrine- related risk factors for breast cancer. J. Mammary Gland. Biol Neoplasia. 2002; 7 (1): 3-15.
5. Henningson M, Johansson U, Borg A, et al. CYP17 genotype is associated with short menstrual cycles, early oral contraceptive use and BRCA mutation status in young healthy women. Mol Hum Reprod. 2007; 13 (4): 231-236.
6. Engel J, Kerr J, Schlesinger-Raab A, et al. Quality of life following breast-conserving therapy or mastectomy: results of a 5-year prospective study. Breast J. 2004; 10: 223-231.
7. Sonnenschein E, Toniolo P, Terry MB, et al. Body fat distribution and obesity in pre- and postmenopausal breast cancer. Int J Epidemiol. 1999; 28: 1026-1031.
8. Mellemkćr L, Bigaard J, Tjonneland A, et al. Body composition and breast cancer in postmenopausal women: a Danish prospective cohort study. Obesity. 2006; 14: 1854-1862.
9. Ahn J, Schatzkin A, Lacey JVJR, et al. Adiposity, adult weight change, and postmenopausal breast cancer risk. Arch Intern Med. 2007; 167 (19): 2091-2102.
10. MacInnis RJ, English DR, Gertig DM, et al. Body size and composition and risk of postmenopausal breast cancer. Cancer Epidemiol Biomarkers Prev. 2004; 13: 2117-2125.
11. Harive M, Howell A, Vierkant RA, et al. Association of gain and loss of weight before and after menopause with risk of postmenopause breast cancer in the Iowa women's health study. Cancer Epidemiol Biomarcers Prev. 2005; 14 (3): 656-661.
12. Eliassen AH, Colditz GA, Rosner B, et al. Adult weight change and risk of postmenopausal breast cancer. JAMA. 2006; 296 (2): 193-201.
13. Tao MH, Shu XO, Ruan ZX, et al. Association of overweight with breast cancer survival. Am J Epidem. 2006; 163: 101-107.
14. Lukaski HC, Johnson PE, Bolonchuk WW, Lykken GI. Assessment of fat – free mass using bioelectrical impedance measurements of the human body. Am J Clin Nutr. 1985; 41 (4): 810-817.
15. Kowalik S. Psychological dimensions of quality of life. In: Bańka A, Derbis R, eds., Psychological Thought in Poland Reborn, ed. Germini, Poznań; 1993. pp. 41-52.
16. Lukasky HC. A new approach to estimate changes in total body water by bioelectrical impedance analysis. Nutrition. 1997; 13 (5): 474-475.
17. Sun SS, Chumlea WC, Heymsfield SB, et al. Development of bioelectrical impedance analysis prediction equations for body composition with the use of a multi-component model for use in epidemiologic surveys. Am J Clin Nutr. 2003; 77: 331-340.
18. Bolanowski M, Zadrożna-Śliwka B, Zatońska K. Body composition studies – methods and possible application in hormonal disorders. Endocrinology, Obesity and Metabolic Disorders. 2005; 1 (1): 20-25.
19. Cella D, Fallowfield L, Barker P, Cuzick J. Quality of life of postmenopausal women in the ATAC (arimidex, tamoxifen, alone or in combination) trial after completion of 5 years' adjuvant treatment for early breast cancer. Breast Cancer Res & Treat. 2006; 100: 273-284.
20. Pandey M, Thomas BC, Ramdas K, Ratheesan K. Early effect of surgery on quality of life in women with operable breast cancer. Jap J Clin Oncol. 2006; 36: 468-472.
21. Parker PA, Youssef A, Walker S, et al. Short-term and long-term psychosocial adjustment and quality of life in women undergoing different surgical procedures for breast cancer. Ann Surg Oncol. 2007; 14: 3078-3089.
22. Nissen MJ, Swenson KK, Ritz LJ, et al. Quality of life after breast carcinoma surgery: a comparison of three surgical procedures. Cancer. 2001; 91: 1238-1246.
23. International Agency for Research on Cancer. Weight Control and Physical Activity IARC Press: Lyon, France, 2002.
24. Adebamowo CA, Ogundiran TO, Adenipekun AA, et al. Waist-hip ratio and breast cancer risk in urbanized Nigerian women. Breast Cancer Res. 2003; 5 (2): 18-24.
25. Hansen S, Cold S, Petersen PH, Rose C. Estimates of the sources of variation (variance components) of bioelectrical impedance and anthropometric measurements in an epidemiological case-controls study of breast cancer. Eur J Clin Nutr. 1997; 51: 764-770.
26. Kiebert GM. Quality of life as a result of clinical trials in oncology – selected issues. In: Meyza J, eds., Quality of life with cancer, Warszawa: Institute of Oncology them M. Sklodowska-Curie. 1997. pp. 43-57.
27. Courney KS, Friedenreich CM. Physical exercise and quality of life following cancer diagnosis: a literature review. Annals of Behavioral Medicine. 1999; 21: 171-179.
28. Courney KS, McKey JR, Jones LW. Coping with cancer: can exercise help? Physical and Sportsmedicine. 2003; 28: 49-73.
29. Czerniak U, Demuth A. Relationship between life quality perception and physical activity of females after mastectomy. Polish Journal of Sports Medicine. 2010; 26 (2-3): 98-105.
30. Ignasiak Z, Dąbrowska G, Żurek G. The level of fat in older women – physically active and inactive students of the University of the Third Age active and inactive physically. Antropomotoryka. 2007; 37: 67-73.

Correspondence should be addressed to: Urszula Czerniak, Department of Anthropology and Biometry, University School of Physical Education, Królowej Jadwigi St. 27/39, 61-871 Poznań, Poland, tel: (61) 835 52 30, e-mail: czerniak@awf.poznan.pl