Türk Kadın Sağlığı ve Neonatoloji Dergisi

To cite this article: Akın Işık R, Terzioğlu F. The most important health problem of the 21st century: Investigation of obesity in women according to their life periods. Turk J Womens Health Neanotol 2022; 4(4): 183-190.

Review

The Most Important Health Problem of the 21st Century: Investigation of Obesity in Women According to Their Life Periods

21. yüzyılın en önemli sağlık problemi: Yaşam dönemlerine göre obezitenin incelenmesi

Rabiye Akın Işık*[1], Füsun Terzioğlu[2]

[1] Faculty of Nursing, Hacettepe University, Ankara, Turkey
[2] Department of Nursing, Atılım University, Faculty of Health Sciences, Ankara, Turkey

Abstract

Obesity is a complex disease involving an excessive amount of body fat and an important public health problem affecting all ages in both men and women. It has been shown that obesity is responsible for many genetic, environmental, neurological, physiological, biochemical, cultural and spiritual factors. World Health Organization (WHO) recommends Body Mass Index (BMI) for obesity classification due to its simplicity, cost-effectivity, and high accuracy. Apart from BMI, waist circumference measurement, weight-to-height, skinfold thickness, and circumference measurements are also used. According to the WHO, 2.8 million people die every year due to obesity. Although obesity affects all ages and social groups, women have been more overweight compared to men since and has been linked to many biological factors. However, even with the medical problems, obese women live longer than men, but not without higher healthcare costs. In this review, the effects of obesity on women's health and life will be discussed.

Keywords: Obesity; Women's Health; Nursing

Öz

Obezite, vücutta aşırı yağ birikimini içeren kompleks bir hastalıktır ve her yaştan kadın ve erkeği etkileyen önemli bir halk sağlığı sorunudur. Obeziteden genetik, çevresel, nörolojik, fizyolojik, biyokimyasal, kültürel ve ruhsal birçok faktörün sorumlu olduğu gösterilmiştir. Dünya Sağlık Örgütü (WHO) basitliği, maliyet etkinliği ve yüksek doğruluğu nedeniyle obezite sınıflandırması için Vücut Kitle İndeksi'nin (VKI) kullanılmasını önermektedir. Ancak VKI'nin dışında, bel çevresi ölçümü, kilo-boy, deri kıvrım kalınlığı ve çevre ölçümleri de kullanılmaktadır. Dünya Sağlık Örgütü'ne göre her yıl 2,8 milyon insan obezite nedeniyle ölmektedir. Obezite her yaş ve sosyal grubu etkilemekle birlikte, kadınlar birçok biyolojik faktörle ilişkili olarak erkeklerden daha kiloludurlar. Ancak, medikal problemi olan kadınlar bile erkeklerden daha uzun yaşar ancak daha yüksek sağlık bakım harcamalarına sahiptir. Bu derlemede obezitenin kadın sağlığı ve yaşamı üzerindeki etkileri tartışılacaktır.

Anahtar Kelimeler: Obezite; Kadın Sağlığı; Hemşirelik

Corresponding author *: Faculty of Nursing, Hacettepe University, Ankara, Turkey.
Email: akinrabia35@gmail.com
ORCID: 0000-0002-0358-5425
DOI: 10.46969/EZH.1010936
Received: 17.10.2021 Accepted: 19.08.2022

Volume 4 Number 4 p: 183-190

1. Introduction

Obesity is an important public health problem affecting all ages in both men and women (1). Obesity, once considered an indicator of power, prosperity, wealth and health, is now considered a disease and the most important contributor to premature deaths in many developed countries (2, 3). According to the World Health Organization (4), 2.8 million people die every year due to obesity.

Obesity is responsible for many genetic, environmental, neurological, physiological, biochemical, cultural and spiritual factors (5, 6). Due to the multifactorial etiology, it is difficult and complex to prevent and treat. According to WHO (4), obesity is defined as "abnormal or excessive fat accumulation in the body to the extent that it impairs health". Obesity is a chronic disease that increases the risks of other complications including cardiovascular and metabolic disease and cancer (7).

According to WHO (4), the rate of mild obesity (BMI≥25 kg/m2) in individuals 20 years and older was 34% in men, 35% in women. Severe obesity (BMI≥30 kg/m2) was 10% in men and 14% in women. The obesity rate in the world has doubled over ten years (1998-2008) (8). According to Turkey Statistical Institute (9) data, while obesity rate was 15.2% in Turkey in 2008, it increased to 31.1% by 2016 with a higher association in women (23.9%) than men (15.2%).

Although obesity affects all ages and social groups, women have been more overweight compared to men since and has been linked to many biological factors. Weight gain and obesity in women have been linked to increased pregnancies (10) and excess weight gain (11), oral contraceptive use, and lack of physical activity (12). Beginning adolescence, body fat increases faster than muscle mass in women physiologically and is associated with estrogen hormones. Menopause also contributes to increased adipose tissue. Although the effect menopause transition on body fat distribution is not clear, the formation of intra-abdominal fat tissue is known to increase (6). As stated above, obesity is a risk factor for disease. Even with these medical problems, obese women live longer than men, but no without higher healthcare costs (13, 14). In this review, the effects of obesity on women's health and life will be discussed.

2. Obesity

WHO recommends Body Mass Index (BMI) for obesity classification due to its simplicity, cost-effectivity, and high accuracy. BMI is calculated by dividing body weight by the square of the height [kg/height (m2)]. However, BMI is not recommended for pregnant women, athletes, and diseases with edema (15). Obesity classification according to BMI is shown in Table 1 (16).

Tablo 1. Obesity Classification According to BMI

CLASSIFICATION	BMI
Underweight	<18.5
Normal	18.5-24.9
Overweight	25.0-29.9
Obese I	30.0-34.9
Obese II	35.0-39.9
Obese III (Morbid Obesity)	≥40
Reference: WHO [22]	

Apart from BMI, waist circumference measurement, weight-to-height, skinfold thickness, and circumference measurements are also used (17). The BMI normal values in adults are 18.5-24.9 kg/m2, and waist circumference poses a high risk for obesity in men above 102 cm and in women above 88 cm (9, 18). The increase in waist circumference increases obesity risk and disease (9).

3. Obesity and Young Adolescents

Adolescence is an important process for growth and development and encompasses cognitive and psychosocial development (19, 20). Interestingly, 15% of adult height and 50% of body weight are gained in this period (21, 22). During the growth process, changes in the amount of fat, water, and hormones occur in the body. Height and weight in adolescent girls changes in the year before menarche and continue two years following menarche (21, 22). At the beginning of adolescence, fat tissue increases in the body compared to muscle mass due to estrogen (6). The need for energy and nutrients also increases due to physiological changes and rapid body growth (21, 22). In the adolescent period, adequate and balanced nutrition is important to achieve growth and proper bone density. In addition, nutrition helps to initiate and continue menstruation in adolescent girls (23).

According to WHO (24), adolescents are considered a high-risk group for nutrition. This is due to the high prevalence of obesogenic risk factors including excessivecalorie intake (25). Behaviors such as eating out the home/fast-food, skipping main meals, snacking, and eating disorders may develop (26). Today it is common for adolescents to have a more sedentary lifestyle and increased calorie consumption and consequently obesity (21). These bad habits can be permanent and negatively affect health throughout life (21).

Adolescent girls have higher obesity rates than males in primary school and puberty (20). A previous report showed that obesity prevalence increases with increasing age in girls (20). Psychological factors may be an underlying cause (20) including eating disorders (anorexia and bulimia), depression, poor body image, and/or stigma-triggered obesity (27). Young obese girls enter puberty earlier than their normal-weight peers. According to the study conducted by Kaltila-Heino et al. (28), early puberty is a risk factor for depression in young girls. Problems experienced by obese adolescent women include sexual maturation and reproductive system disorders, changes in menstruation, dysmenorrhea, risky sexual behavior and contraception, polycystic ovarian syndrome, bone density abnormalities, macromasti and increased risk of breast and endometrial cancer. In addition, many other factors may occur during the pregnancy of adolescents with obesity (29).

4. Obesity and Pregnancy

In the literature, BMI is not recommended in the evaluation of pregnant women (15). However, it is recommended to measure the BMI because it provides a useful and practical assessment and is the first screening step for pregnant women in terms of obesity. The prevalence of obesity during pregnancy is observed at rates ranging from 7.56% (30) to 20% (31). One of every five women of childbearing age (2) becomes obese during pregnancy. This affects the health of pregnant women and future generations significantly (32), and causes serious health problems (33).

During pregnancy, many physiological/psychological changes occur including The excess weight gain (5). Factors such as the presence of obesity before, excess weight after (34), and late gestational age cause obesity during pregnancy (35). Obesity during pregnancy is accepted as high risk (36) and complications can develop during the antenatal, intrapartum, postpartum and neonatal periods (37).

Antenatal complications observed in pregnancy with obesity include miscarriage, congenital anomalies (32), fetal death (38), gestational hypertension (33), chronic hypertension (32), preeclampsia, gestational/chronic diabetes (33), increased hospitalization, limitations in ultrasound imaging (32), Urinary Tract Infection (UTIs) and early membrane rupture (31), and increased risk of developing metabolic syndrome (33).

Complications associated with obesity may be seen intrapartum including difficulties in monitoring fetal and uterine contractions, birth abnormalities, and anesthesia complications (32), operative vaginal delivery, prolongation of action, increase in induction use (39), bladder/perineum traumas, cesarean delivery (31, 32), difficulty in intubation, maternal death, venous thromboembolism, birth trauma, stillbirth (40), shoulder dystocia, difficulties with epidural, and increase in postterm delivery frequency (41).

Postpartum complications include inability to lose weight (32), increased risk of infection (32, 42), breastfeeding complications (32, 43), postpartum depression (44), postpartum hemorrhage, thromboembolism (32), stress incontinence and maternal death (45). Breastfeeding complications are caused by increased prematurity and intervened birth rates as well as excessive weight in the postpartum period (13).

Neonatal complications include birth defects (46), apgar score below 4 (47), stillbirth, macrosomia (48), acidosis/respiration complications (49), hospitalization (49) and increased need for intensive care (50). In infants of obese mothers, childhood obesity, adolescent and adult metabolic diseases are more common (33, 51). This shows that children born from obese women carry risk of disease in all periods of their lives.

5. Obesity and Infertility

Infertility affecting one in seven married couples (3, 52), negatively affects women's health especially by depression, anxiety, sexual dysfunction in women, and emotional well-being/quality-of-life (53). Many factors such as postponement of gestational age (53), obesity (3, 54, 55), stress (56), smoking (57) and alcohol use are considered among the causes of infertility (58). Obesity is responsible for 25-50% of infertility in women (58).

The cause of decreased obesity-related fertility/infertility is changes in the secretion and metabolism of sex hormones, estrogens and androgens, and disruption of the balance between the hypothalamus, pituitary and ovarian axes (3, 59). The relationship between adipose tissue and gonads is bidirectional. Adipose tissue affects gonadol functions via adipokine secretions such as resistin, ghrelin, adiponectin and leptin (60). The effect of leptin on reproductive functions regulates early embryo cleavage and development (61). While it has a stimulating effect on the hypothalamic-pituitary axis, it is inhibitory on newly developing follicles (62). Obesity is associated with an increase in serum leptin and follicular fluid. Leptin acts on specific follicular cell receptors, and causes a decrease in insulin-induced steroidogenesis in both granulosa and teka cells (63). Leptin stimulates estrogen in granulosa cells and inhibits LH (62). Insulin changes in obese women is also important for infertility and anovulation (64). Insulin is important for ovarian function and causes increased androgen production in obese women. Increased aromatization of androgens to estrogens causes reduced sex hormone-binding globulin (SHBG) levels resulting in increased estradiol and free

testosterone (3, 52). This condition worsens hyperinsulinemia, resulting in increased androgen/estradiol ratio and LH hypersecretion, which affects the ovarian microenvironment and folliculogenesis (65, 66). As a result, obesity affects assisted reproductive technology and fertility at every stage (67, 68), fertilization, embryo development and implantation (69). It has been shown that there are important differences in various hormones and metabolites of the patients with obesity in the IVF cycle compared to non-the patients with non-obesity (70). Increased insulin resistance (IR) (71), lower oocyte utilization rates, higher need for gonadotropin use, and low number of cryopreserved embryos has been identified in IVF treatment in obese women (68, 72). Since female obesity and infertility are interrelated, healthcare professionals are recommended to educate women in ways to control obesity. When increased BMI and advanced age align, a significant effect on fertility success occurs (3).

6. Obesity and PCOS

PCOS is a hormonal disorder that generally affects women during the peripubertal period. Genetic and environmental factors are thought to play a role in its etiology (73). Although PCOS is not common among women with normal weight, clinical features are associated with IR in obese women (74). Basal metabolic rate decreases with hyperandrogenism and IR in women with PCOS (75). This causes weight gain in women with PCOS (13). Obesity is more common in women with PCOS (76) and emerging obesity worsens PCOS symptoms (13).

With the addition of obesity to PCOS, production of estrogen increases as a result of the peripheral concentration of androgens. One of the most important endocrine changes in obesity is the increase in basal blood insulin. The increase in body fat mass causes increased insulin secretion and IR (77). Following IR and hyperinsulinemia, changes occur in the secretion of gonadotropins secreted from the hypothalamus. Especially LH increases and FSH decreases (78). Hepatic production of SHBG is prevented in obese women following hyperandrogenism. The decrease in SHBG and the increase of peripheral aromatization of androgens to estrogens result in increased circulating free estrogen in obese women (78). This results in increased negative feedback of the hypothalamic-pituitary axis. This negatively affects gonadotropin secretion and ovulation and adequate ovarial follicle development (79). As a result, fertilization ability decreases and abortion rates are quite high in obsese women (78, 80). Interestingly, the follicular phase lasts longer and the luteal phase is shorter in women with BMI≥25. In obese women and PCOS, losing weight increases fertility chance (81, 82). Obesity as well as undernutrition have been considered indicators of reproductive system dysfunction and menstrual irregularity.

Obesity and Female Cancers

Obesity is expected to cause at least 12 types of cancer and recently replaced smoking as the highest risk factor for cancer (83). Obesity is directly related to cancer development, recurrence, and death in women (84). In this respect, the WCRF recommends a BMI between 21 and 23 (85). Obesity is a risk factor for cervix (86), ovarian (87), endometrium (88), and breast cance (89) and is responsible for 88% of cancer-related deaths (90, 91).

Endometrium Cancer: The risk of endometrial cancer has been determined to be 1.52 times higher in obese women (92). Similarly, endometrial cancer-related mortality rates have increased due to obesity (93, 94). Adipose tissue contributes to stimulation of hormone production, inflammatory response, and cellular proliferation pathways (95) and causes endometrial cancer (96). Dysfunctional adipose tissue has been shown to release of pro-inflammatory cytokines, and cause changes in crucial signalling pathways (97). These inflammatory processes cause IR, abnormal responses in natural/adaptive immunity, and lead to a tumogenic environment (98). One of the important adipokines in these pathological processes is leptin (99). Recently, pathological and molecular differences between type-I and type-II endometrial cancer have been revealed. For example, type I tumors are caused by endometrial hyperplasia, while type II tumors are typically associated with pathognomic features. Both types of tumors are frequently seen in obesity (100).

Cervical Cancer: The relationship between cervical cancer and obesity (101) is controversial (102). Conflicting reports have debated obesity as a risk factor for cervical cancer (103, 104). In cervical cancer, IGF-1 has been found to play a role in disease development/progression (105, 106). Insulin and IGF-1 concentrations are associated with obesity. A relationship between obesity, cervical cancer (107), and cancer-related death is higher in obese women (108).

Ovarian Cancer: In ovarian cancer, high BMI before cancer diagnosis increases the risk (109). Community-based studies have shown that every five-kg increase in women's weight is associated with the risk of ovarian cancer (110, 111).

Breast Cancer: Understanding the relationship between obesity and breast cancer is important due to its prevalence in women (112). This relationship has been revealed in many studies (113,

114). Adipose tissue of obese individuals produce inflammatory cytokines/mediators, creating a favorable environment for cancer (115-117). In obesity, high levels of leptin cause more preadipocytes that reduce adipocyte maturation (117). In obesity, as the adipose tissue expands causing an imbalance in oxygen levels, which induces gene expression changes. Hypoxia-inducing Factor-1 (HIF-1), a molecular oxygen sensor, can directly regulate the expression of leptin VEGF, and adinopectin (118). In obese adipose tissue, adinopectin/leptin ratio decreases (119). High serum and intratumor leptin levels may cause worsening of breast cancer prognosis (120).

7. Conclusion

Obesity negatively affects the physical, psychological and sociological health of women and is associated with higher mortality and morbidity rates. It is among the primary roles and responsibilities of caregivers to determine the risk factors related to age, to identify the early phase risks, to provide advice for regular and balanced nutrition and to regularly control weight. It is believed that with proper education will help women understand the complications associated with development of obesity. It is important to integrate obesity practices into care protocols and clinical practice. Healthcare workers should ensure multidisciplinary cooperation in order to prevent obesity in women and offer joint programs with other institutions/organizations to prevent obesity.

Acknowledgements

We would like to acknowledge the www.makaletercume.com for their outstanding scientific proofreading and editing services that was provided for this manuscript.

Yazar katkısı

Araştırma fikri ve tasarımı: RAI ve FT; veri toplama: RAI ve FT; sonuçların analizi ve yorumlanması: RAI ve FT; araştırma metnini hazırlama: RAI ve FT. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

Finansal destek

Yazarlar araştırma için finansal bir destek almadıklarını beyan etmiştir.

Çıkar çatışması

Yazarlar herhangi bir çıkar çatışması olmadığını beyan etmiştir.

Author contribution

Study conception and design: RAI, and FT; data collection: RAI, and FT; analysis and interpretation of results:RAI, and FT; draft manuscript preparation: RAI, and FT. All authors reviewed the results and approved the final version of the manuscript.

Funding

The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

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