

# Obesity and women's health

## Obezite ve kadın sađlığı

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### ABSTRACT

Obesity is a significant public health issue that has been rapidly increasing in recent years and leads to various health problems. Obesity, which is more common among women, adversely affects both general and reproductive health of women. In this review, the effects of obesity on women's health are summarized in context to the literature.

**Keywords:** Body mass index, obesity, women's reproductive health, women's health.

### ÖZ

Obezite, son yıllarda hızla artan ve çeşitli sađlık sorunlarını beraberinde getiren önemli bir halk sađlığı sorunudur. Kadınlarda daha fazla görülen obezite kadının hem genel sađlığını hem de üreme sađlığını olumsuz yönde etkilemektedir. Bu derlemede obezitenin kadın sađlığına etkileri literatür eşliğinde özetlenmiştir.

**Anahtar sözcükler:** Beden kütle indeksi, obezite, kadın üreme sađlığı, kadın sađlığı.

Nowadays, obesity is a very common nutritional disorder and has become a significant health problem that leads to various diseases, reduced quality of life, shortened lifespan, and expensive treatment costs. The World Health Organization (WHO) defines obesity as abnormal or excessive fat accumulation. The Turkish Ministry of Health, on the other hand, defines obesity as body weight exceeding the desired level relative to height as a result of excessive increase in the ratio of the body's fat mass to lean mass.<sup>[1]</sup>

Obesity is a chronic disease that can occur in all age groups from infants to the elderly and has become a worldwide epidemic.<sup>[2]</sup> The most important cause of obesity is the imbalance between the energy taken into the body and

the energy consumed.<sup>[3]</sup> Many other factors such as inadequate physical activity, excessive and incorrect eating habits, age, education level, sociocultural factors, hormonal and metabolic factors, psychological problems, smoking-alcohol use, certain drugs, and genetic risk factors can cause obesity.<sup>[1,3]</sup> The basis of obesity is founded in childhood; late diagnosis and treatment lay groundwork for adult obesity.<sup>[4]</sup> Obesity is more common among women than men, caused by the effects of biological factors.<sup>[5]</sup> The life cycles of women, including adolescence, pregnancy, number of births, length of breastfeeding, and menopause are all risky periods that increase the woman's susceptibility to obesity.<sup>[5]</sup> Fluctuations in sex hormones during different stages of

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the reproductive cycle, including menarche, pregnancy, and menopause, may cause increase in adipose tissue.<sup>[5]</sup>

## EPIDEMIOLOGY OF OBESITY

Obesity is a nutritional health problem that threatens human health with steadily rising prevalence in the 21<sup>st</sup> century. Prevalence of obesity is especially high in developed countries and increases due to changing lifestyle, decreased physical activity, diet changes, and increased number of calories in the body. Worldwide obesity has increased nearly three times since 1975, according to WHO data.<sup>[1]</sup> In 2016, more than 1.9 billion adults aged 18 and older who were overweight.<sup>[1]</sup> The International Obesity Task Force (IOTF) reported that 1.1 billion adults were overweight and 312 million were obese, while 26% of non-pregnant women between ages 20-39 were overweight and 29% were obese.<sup>[5]</sup> World Health Organization reported 60% of women in the United States were overweight ( $\geq 25$  kg/m<sup>2</sup>) and that 30% of women in many European countries were obese ( $\geq 30$  kg/m<sup>2</sup>) and 6% were morbid obese ( $\geq 35$  kg/m<sup>2</sup>).<sup>[5]</sup>

According to results of a significant study in our country, The Turkish Epidemiology Survey of Diabetes, Hypertension, Obesity and Endocrine Disease (TURDEP-II), in Turkey, increase in obesity was 34% in women and 107% in men over the last 12 years.<sup>[1]</sup> The Turkish Ministry of Health reported that 23.9% of women had an obesity problem, and 30.1% fell into the pre-obese category in the year 2016.<sup>[1]</sup> According to 2008 WHO statistics, among men over 20 years of age, obesity prevalence was 20.4% worldwide, and 22.8% in Turkey.<sup>[5]</sup>

Regarding women, obesity prevalence is 23.1% worldwide, and 35.6% in Turkey.<sup>[5]</sup> Studies have shown that obesity is more predominant among women and this negatively affects their lifespan and quality of life. It also brings with it many systemic, hormonal, metabolic, aesthetic, mental, and social problem.<sup>[1]</sup>

## METHODS OF MEASURING OBESITY

There are many methods to correctly diagnose obesity including measurement of body water percentage, X-ray measurement of fat

thickness in soft tissue, ultrasound measurement of subcutaneous fat thickness, and impractical methods such as body density measurement. Indexes such as Rohrer, Ponderal, Benn, and Broca indexes are also used to determine obesity. It is possible to increase the methods used to determine obesity. However, among these methods, methods such as skinfold thickness, body mass index (BMI), waist-hip ratio are recommended for epidemiological studies.<sup>[6]</sup>

### Skinfold thickness

Skin fold thickness can be measured using a "skinfold caliper" from 10 different sites on the body including the triceps, subscapular, biceps, suprailiac, etc. Generally, the left subscapular or left triceps are recommended for studies. Average values for each skinfold thickness and percentile values according to age have been determined.<sup>[6]</sup>

### Body mass index

The BMI is the most commonly used method to measure obesity. The formula is as follows:<sup>[6]</sup>

$$\text{BMI} = \text{body weight (kg)} / \text{height}^2 \text{ (m)}^2$$

For adults, BMI <20 indicates underweight, 20-24.9 normal, 25-29.9 overweight, 30-39.9 obese, and  $\geq 40$  morbid obese. While some studies accept the BMI limit as 27 instead of 25, the most common limits used are those indicated above.<sup>[6]</sup>

### Waist-hip ratio

Recently, the waist-to-hip ratio (WHR) has been accepted as the best method to indicate fat distribution and is considered more important than other measurements in determining the risk of cardiovascular disease. The value, calculated as waist circumference divided by hip circumference, should not exceed 1 in men and 0.8 in women. People with high WHR and fat upper body are more prone to Type 2 diabetes, hypertension, and coronary heart disease.<sup>[6]</sup>

## CAUSES OF OBESITY

With modernization of society, humans have become more mechanized and the number of tasks requiring energy consumption decrease.<sup>[6]</sup> Higher amount of energy taken into the body than it is consumed leads to obesity. Developing obesity depends on many risk factors and the main risk factors include:

- Genetic factors, family eating habits
- Excessive and incorrect eating habits
- Inadequate physical activity
- Age
- Gender
- Certain medications (antidepressants etc.)
- Smoking and alcohol addiction
- Frequent low-energy diets
- Number of births and time between births
- Hormonal factors
- Increased calorie intake with dietary changes
- Sociocultural factors
- Financial income
- Psychological problems<sup>[1,3,5,6]</sup>

### **OBESITY CONTROL**

Controlling obesity, as in all health problems, consists primarily of determining the problem and its prevention. Therefore, preventive measures gain importance.<sup>[6]</sup> In order to ensure adequate and balanced nutrition, the food consumption habits of the society should be evaluated and informative health policies should be implemented. The key point in treatment is to decrease the energy intake and increase energy expenditure.<sup>[6]</sup> At this point, obese patients must change their lifestyles and dietary habits. Obesity treatment is a long-term and continuous process that requires the individual's determination and effective participation.<sup>[4]</sup>

Since various factors play a role in the etiology of obesity, a team consisting of a physician, dietician, psychologist, and physiotherapist is needed.<sup>[4,6]</sup> The methods used in obesity treatment are grouped under five categories as diet therapy, exercise, behavior change, drug therapy, and surgical treatment.

### **THE EFFECTS OF OBESITY ON WOMEN'S HEALTH**

Obesity is accompanied by various health issues. Obese individuals are at increased risk of diabetes, hyperlipidemia, hypertensive diseases, cardiovascular diseases, sleep and respiratory diseases, stroke, infarction, and colon cancer.<sup>[1,5]</sup> About 3.4 million adults die due to

health problems caused by obesity and being overweight.<sup>[5]</sup>

Obesity may especially cause female-specific health problems which may negatively affect the lives of women. It can negatively impact fertility and pregnancy. Obese women are at increased risk of breast cancer, ovarian cancer, and increased estrogen levels induced by obesity which increases the risk of endometrial cancer.<sup>[1]</sup> At the same time, obese women are susceptible to preterm delivery, stillbirth, congenital anomalies, macrosomia, and birth injuries as well as 1.2 times increased risk of spontaneous abortion and 3-5 times increased risk of recurrent miscarriage.<sup>[1]</sup>

### **OBESITY AND OVARIAN CANCER**

Ovarian tumors, which are generally late to appear and are detected in late stages, have the highest mortality rates among all cancers of the female reproductive system.<sup>[2]</sup> Although there is no clear consensus on the relationship between obesity and ovarian cancer, there are several publications of varying opinions.<sup>[2,5]</sup> Obesity also affects the diagnostic phase of ovarian cancer. Difficulty in diagnosis and treatment, and unapparent symptoms overshadowed by obesity may place patients at risk of late diagnosis at advanced stages or with widespread tumor distribution.<sup>[2]</sup>

### **OBESITY AND ENDOMETRIAL CANCER**

Endometrial cancer is the most common gynecologic malignancy, in which symptoms of uterine bleeding, generally in the early term, allows relatively early diagnosis.<sup>[2]</sup> Epidemiological data has shown obesity caused 2-5 times increased risk of endometrial cancer in pre- and post-menopausal women.<sup>[5]</sup> The effect of adipose tissue on hormonal balance increases proliferation index in the endometrium, leading to increased mutations in proto-oncogenes and posing a great risk for cancer with endometrial hyperplasia.<sup>[2]</sup> Many studies have indicated obesity as an important risk factor for endometrial cancer.<sup>[2,5]</sup> Obese and morbid obese patients also have longer operation times in surgical interventions compared to patients with normal BMI and blood loss is more common.<sup>[2]</sup>

## OBESITY AND CERVICAL CANCER

The third most common gynecologic malignancy in the United States, cervical cancer, has increasing prevalence in developing countries and high mortality rate.<sup>[2]</sup> The relationship between obesity and cervical cancer is controversial. Studies have indicated that the adenocarcinoma subtype of cervical cancer is especially associated with obesity.<sup>[2]</sup>

Ursin et al.<sup>[7]</sup> demonstrated hormonal status as a risk factor for cervical adenocarcinoma and that obesity plays a role through hormones released by adipose tissue. The fact that pelvic examination is performed less in obese women due to body image, less importance given to health of some women, and difficulty of Pap test due to anatomical reasons in obese patients are some of the reasons for less participation in screening tests, preventing early diagnosis.<sup>[2,5]</sup>

## OBESITY AND BREAST CANCER

Diet is a prominent risk factor for breast cancer.<sup>[2]</sup> Increase in dietary animal products and fat content increases breast cancer risk. It is possible to say that there is a distinct association between obesity and breast cancer.<sup>[2]</sup> Women with BMI >25 are at increased risk.<sup>[2]</sup> Postmenopausal breast cancer is associated with obesity due to increased estradiol concentration in blood serum.<sup>[5]</sup> Increased insulin and estrogen levels in obese postmenopausal women also increase breast cancer risk.<sup>[2]</sup> Although several observational studies have indicated obesity is strongly associated with hormone-receptor-positive breast cancer in postmenopausal women, recent publications have shown obesity has similar degree of association with both estrogen receptor positive and triple receptor (estrogen, progesterone, and Her-2/neu receptor) negative diseases.<sup>[2]</sup> Obesity not only plays a role in tumor, which affects the nature of the disease, but obesity-related morbidity also leads to negative outcomes in both survival and prognosis in breast cancer patients. Mammography screening is also more difficult to perform in obese patients, making it difficult to obtain accurate results.<sup>[2]</sup>

## OBESITY AND PREGNANCY

Pregnancy, has an important place in a woman's life, also poses a risk for obesity due

to metabolic and physiologic changes. Obesity during pregnancy leads to many fetal and maternal risks.<sup>[8]</sup> As scope of obesity increases, so do the risks. The risks caused by obesity in pregnancy include:

- Prenatal risks: miscarriage, gestational DM, pregnancy-induced HT, preterm delivery, post-term pregnancy, multiple pregnancy, urinary tract infection, sleep apnea
- Intrapartum risks: dysfunctional labor, cesarean birth, failed labor analgesia, shoulder dystocia
- Postpartum risks: infection, postpartum hemorrhage, breastfeeding failure, thromboembolism
- Perinatal risks: congenital anomaly, death, macrosomia, autism, asthma.<sup>[8,9]</sup>

Each 1 kg/m<sup>2</sup> increase in BMI increases the likelihood of cesarean delivery by 7%.<sup>[8]</sup> Obesity before pregnancy is the most common cause of stillbirth.<sup>[9]</sup> Morbid obese women (BMI ≥35 kg/m<sup>2</sup>) have 2.79 increased risk of stillbirth compared to women with normal body weight. Due to these and other risks, pregnant obese women must be informed about weight gain, nutrition, and dietary choices.

## OBESITY AND BREASTFEEDING

Metabolic changes due to excessive fat accumulation may also cause disorders in breast glands.<sup>[1]</sup> The literature states that obese mothers are reluctant to start and continue breastfeeding during the lactation period.<sup>[1,5]</sup> One study found that obese women had relatively low milk production and response to prolactin hormone in the first week compared to women with normal body weight.<sup>[1]</sup> Not only is lactation delayed in obese mothers, the lactation period is also shorter.<sup>[8]</sup> Due to problems breastfeeding, the baby is resorted to supplementary baby formula, which also increases the baby's risk of developing obesity.<sup>[1]</sup>

## OBESITY AND INFERTILITY

Obesity has the effect of reducing fertility in women.<sup>[1]</sup> Overweight women have lower likelihood of ovulation and conception.<sup>[1]</sup> It has been reported that obese women with irregular ovulation are more likely to apply to health

institutions for conception and to benefit from assisted reproductive technology compared to women with normal weight.<sup>[5]</sup> Obese women using Assisted Reproductive Technology were found to have low pregnancy rates, difficulties in endometrial tissue development and implantation, and miscarriages after conception.<sup>[1,5]</sup>

### **OBESITY AND MENOPAUSE**

Both aging and menopause lead to changes in adipose tissue.<sup>[6]</sup> Women during menopause were found to have increased obesity rates due to decreased ovarian hormones. Vasomotor symptoms have been found to be more prevalent among women with high BMI. Menopause also increases the risk of abdominal obesity and metabolic syndrome by 18%.<sup>[1]</sup> Women with abdominal obesity comprise a large majority of postmenopausal women experiencing sexual problems.<sup>[5]</sup>

### **OBESITY AND URINARY STRESS INCONTINENCE**

Obesity increases the severity of urinary stress incontinence (USI). Analysis of the data from the National Health and Nutrition Examination Survey conducted by Markland et al.<sup>[10]</sup> from 2001 to 2008 showed that USI rates increased parallel to obesity and diabetes. Studies have also proposed that obesity was linked to USI, in which weakness in pelvic floor innervation and muscles caused by obesity led to increased intraabdominal pressure and USI.<sup>[4]</sup>

Lifestyle changes and weight loss are foremost in treatment.<sup>[4]</sup> Pelvic floor or Kegel exercises are helpful in increasing pelvic floor muscle strength and coordination. A prospective study of 110 women who practiced regular pelvic floor muscle exercises for 12 weeks reported significant improvement in severe symptoms of incontinence.<sup>[4,11]</sup> Another study recommended that all patients diagnosed with USI regularly continue practicing pelvic floor exercises. Bladder neck suspension operation is currently a treatment option for these patients. Another current treatment modality is mini-sling operation<sup>[4]</sup> which can be applied in this patient group because it provides effective treatment success in a very short time.

### **OBESITY AND PSYCHOLOGICAL PROBLEMS**

Obesity often leads to social stigma and the person's embarrassment of their weight.<sup>[5]</sup> Studies conducted in developed countries have indicated that obese individuals faced many social difficulties in their daily lives, had depressive mood, and carried risk for depressive disorders.<sup>[5]</sup> Obese individuals may face stigma and prejudice in society due to their physical appearance. Depressive symptoms and depression rates are higher among obese patients.<sup>[5]</sup> The National Health and Nutrition Examination Survey (1988-1994) reported that obesity was associated with depression in women but not in men. While people experience low self-confidence due to obesity in some societies, they experience fewer psychological effects in societies that tolerate excess weight.<sup>[5]</sup> Studies have reported that obese people are more likely to experience psychosocial problems such as depression, bulimic behavior, mental disorders associated with body image perception, stigma, night eating syndrome or trying to achieve psychological satisfaction by overeating, and sleep disorders.<sup>[5]</sup>

### **OBESITY AND OTHER HEALTH ISSUES**

Other health problems caused by obesity may also occur in women. Risk of diabetes mellitus increases with duration and degree of obesity.<sup>[1,5]</sup> Increased visceral fat increases insulin resistance.<sup>[5]</sup> Increased visceral fat and insulin resistance are the most important signs of metabolic syndrome and are risk factors for diabetes mellitus and cardiovascular diseases. Diabetes risk increases when BMI is higher than 24 and WHR is over 0.76.<sup>[5]</sup>

It is known that obesity plays a role in development and progression of back pain and knee osteoarthritis in women.<sup>[1,5]</sup> Although the connection between obesity and back pain is not fully clear, mechanical and systemic factors are thought to play a role. Obesity can cause back pain through direct mechanical stress on intervertebral disks or the indirect effects of atherosclerosis on lumbar blood circulation.<sup>[1]</sup>

Recent studies have stated that periodontitis may also be associated with obesity. While the

biological mechanisms behind this association have not been fully explained, cytokines and hormones originating from adipose tissue is thought to contribute to the pathogenesis of periodontitis and other chronic inflammatory diseases by causing excessive inflammatory response.<sup>[5]</sup>

Obesity increases the risk of hypertension and heart disease in women.<sup>[1,12]</sup> As a result of increased blood circulating in the body, vasoconstriction and increased heart rate cause obesity and hypertension. The increase in kidney sodium absorption due to hyperinsulinemia as a result of obesity also leads to increased blood pressure in obese people. Obesity is a risk factor for the development of coronary artery disease in women.<sup>[1,12]</sup>

In conclusion, examination of the literature and studies show that many aspects are affected by obesity in women. Especially today, many factors such as negative life conditions, stress, consumption of fast food and high-calorie processed food, and sedentary lifestyle pave the way for obesity. Therefore, people should be informed about obesity while women should be educated about obesity and counseling should be provided by health professionals.

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