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# Siman mufrat (Obesity) a lifestyle disease and its impact on women's health–prevention and herbal management

## Abstract

Siman mufrat (Obesity) has detrimental influences on all systems, including reproductive health and therefore likely to suffer with many gynecological and obstetrics problems. These problems may arise at any time in their lives i.e. since childhood to menopause. According to Asian WHO guidelines, a person is known as overweight if the BMI is 23 and obese if BMI is ≥23. The epidemic of obesity is now being recognized as the major health issue facing the world today. It reduces life expectancy by 7.1years in men and 5.8years in women. In women obesity is the major risk factor to develop various diseases like menstrual irregularities, infertility, abortion, premature births, contraceptive failure, endometrial polyp, endometrial carcinoma, stress urinary incontinence etc. and other systemic illness includes Type 2 diabetes Mellitus, Cardiovascular diseases, degenerative joint diseases, etc. Qualitative and quantitative derangement of normal balances of akhlat with excessive phlegm causing zo'afe jigar and results various diseases. Unani system of medicine, principle of treatment is elimination of cause of obesity. The modern medicine has developed many drugs but side effects have limited their role in treating obesity. In Unani system of medicine there is treasure of plant origin drugs having highest diversity in their properties both in diet and herbal therapy, which can reduce body weight and prevent diet induced obesity. Thus, in this paper an attempt has been made to highlight the strength of Unani medicine in the management of obesity.

**Keywords:** siman mufrat, obesity, lifestyle disease, women's health, Unani drugs, liver correction, Phlegmatic, cardiovascular diseases, thyroid dysfunction, diabetes, Atherosclerosis, hereditary, metabolism, lipoproteins, hypertension

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**Abbreviations:** BMI, body mass index; PCOS, polycystic ovary syndrome; IVF, *in vitro* fertilization;

GDM, gestational diabetes mellitus; PIH, pregnancy-induced hypertension; OCPs, oral contraceptive pills; LNG-IUS, levonorgestrel-releasing intrauterine system; SUI, stress urinary incontinence; RCT, root canal treatment; WHI, women's health initiative; HDL, high-density lipoproteins; LDL, low-density lipoproteins

## Introduction

Modernization has changed life style of human being. Due to this changes chances of development of certain metabolic disorders like thyroid dysfunction, diabetes, cardiovascular diseases etc. Among these obesity is one. In comparison to rural population urban population are more sufferer because of their routine sedentary life. Obesity affects more females than males.[1] Obesity is a major public health problem across the world. Obesity is an excess of body fat frequently resulting in a significant impairment of health and longevity. Obesity results from excessive caloric intake, decreased energy expenditure or combination of the two.[2]

## Unani concept of obesity

According to Unani concept obesity is also known as Samane Mufrat (obesity) and is related to food of Hazme Kabidi. Unani physicians described that excessive intake of diet and sedentary lifestyles are the major contributory factors of Siman Mufrat. It is a Balghami (Phlegmatic) disease and Sue mizaj kabid (ill cold temperament of liver) may cause formation of excess of balgham. Hence, Khilte Balgham predominates in the body of person and is a predisposing factor in causation of obesity. In this condition loss of movements of Aaza (organs) is due to excessive accumulated Balgham (fat) and cold temperament, hence the person becomes lazy and dull. This situation is just like Qaidul Badan (arrest of body). Balgham after mixing with blood produces lubrication in its Qiwam (viscosity).[3] Increases in the Balgham causes increase in viscosity of the blood and also constrict blood vessels. Deposition of Balgham (Atherosclerosis) obstructs Nufuz of Rooh (passage of oxygen) in the organs which finally cause death of the obese persons.[4,5] Hararate Ghareezia diminishes slowly in obese persons and that is why, obese persons die early than others.

### Types and causes of obesity

When Shahem deposits in a particular organ it is called local or central obesity for example protrusion of abdomen due to the deposition of fat. When there is generalized deposition of fat in the body, is called general or peripheral obesity. The causes of Samane Mufrat are Virasati and Khilqi Samane Mufrat (hereditary and congenitally), Martoob Ghiza (fatty diet like meat, sweet dishes), Martoob Roghinyat (fatty oils), Baroodat Mizaj (coldness of temperament), Rahatwa warzish ki kami (excessive rest and lack of exercise), Kasrate Ghiza (excessive eating), Farhat (excess of joy), Soft cloths and soft bedding for sleeping, Intake of excessive alcohol especially after meal.[6] All these are responsible for excess production

of Balgham as well as disturb metabolism. Different physicians had different opinions related to obesity, includes description of obesity including its classification, etiology, pathophysiology, risk factors, different mechanisms, complications, prevention, diet, management and scientific methods to describe morbid obesity in their classical texts.[7–9] In spite of tremendous development in the medical science several diseases are still challenging to human being and efforts are continue to conquer them. Obesity is one of them. Certain level of weight gain is a good sign of health. If it exceeds normal limit then it becomes dangerous.

## Facts about obesity

According to global estimation the worldwide obesity is doubled since 1980. In 2010, more than 1.4billion adults, above 20years were overweight. 200million men and nearly 300million women were obese. Around more than 40million children under the age of 5years were overweight. The obesity rate increased from the late 1970's to 2017 from 15–40%. Approximately 2/3rd of Indian adults are overweight or obese. Around 65% of the world's population lives in countries where overweight and obesity kills more people than underweight. Obesity is a major health problem it cause death. Obesity is preventable and treatable.[10] In women leads to menstrual irregularities, infertility, abortion, premature births[7,11,12] contraceptive failure, endometrial polyp, endometrial carcinoma, stress urinary incontinence etc. and other systemic illness includes Type 2 diabetes Mellitus, Cardiovascular diseases, degenerative joint diseases, etc.[13]

## Studies on impact of obesity on women's health

### Obesity and puberty

A study has been carried out on impact of childhood obesity at the time of onset of puberty. The study reported in obesity lepton level is increased. Excess of adrenal and ovarian androgen convert into oestrogen. Hence there is bioavailability of sex steroids causes early onset of menarche, puberty, adrenarche and thelarche.[14,15] According to Unani system of medicine childhood obesity leads to delayed menses. It is due to excess of *barudat* (coldness) makes the reproductive function delay whereas if obesity is occur in teenage may lead to early menarche. Because of excess of barudat the Hararate Ghareezia enter into the core surface of the body. This Hararate Ghareezia act on internal organs especially reproductive organs hence early menarche is occurring.[4–7]

### Obesity and irregular cycles

Women with PCOS, many of them obese have menstrual irregularities. In the absence of PCOS, obesity has been associated with irregular cycles. Women with a BMI of 35 have a fivefold higher risk of long cycles compared with those with a BMI between 22 and 23.[16,17]

### Obesity and infertility, pregnancy

Obese women have been shown to require a longer time to conceive and are at increased risk of ovulatory disorders. Obesity and insulin resistance are predictors of treatment failure following ovulation induction. Obesity reduces the success rate of IVF. Other risks in pregnant obese women include premature delivery, GDM, PIH, difficult labor, increase incidence of operative deliveries.[18] According to Unani system the obese women difficult to conceive because of less production of Mani (Semen) due to excess barudat or coldness. If obese women conceive the uterus fail to retain the Mani inside because of excess ratubat (Fluidity) interfere with quwat hafiza of the uterus hence leads to abortion.[4–7]

### Obesity and contraceptive failure

The highest risk of contraception failure was observed among low-dose oral contraceptive users. Obesity impairs hormonal contraceptive efficacy and increases the risk of thrombo embolic while taking combined OCPs. Significant weight gain with either combined oral contraception, levonorgestrel releasing intrauterine system (LNG-IUS) or the progesterone-only pill. Weight gain is occurs if the women is on OCPs. Approximately 9kg weight is increase in 5years of duration. Excess of weight decrease the plasma concentration of active agent. Hence contraceptive failure is common in obese women.[19]

### Obesity and menopause

During menopausal transition around 2.1kg weight is increase. Excess deposition of fat causes conversion into oestrogen. Hence excess oestrogen causes endometrial hyperplasia and heavy menstrual bleeding.[20]

### Obesity and endometrial polyps

Hormonal factors related to estrogen excess, such as obesity, have been implicated in the pathogenesis of endometrial polyps. Onalan et al.[21] demonstrated that women with a BMI greater than 30 were more likely to have endometrial polyps than women with a BMI less than 30. Obesity was an independent predictor for the development of endometrial polyps. Most endometrial polyps are benign, with malignancy reported in only 1.5% of cases.[22, 23]

### Obesity and fibroid uterus

In a retrospective study, those presenting with uterine fibroids were more likely to be obese or severely obese than a general population of women. In a prospective cohort study, BMI and weight gain exhibited a complex relationship with the risk of developing fibroids. The risk of developing fibroids is tripled in women with a bodyweight of 70kg or more in comparison with those who weigh less than 50kg. It is possible that obesity causes a relative hyper estrogenic state, which encourages fibroid growth, although not all studies are in accordance with this hypothesis.[24] According to Unani medicine excess of balgham (phlegm) causes obesity. In obese women excess balgham condense in localized area then it forms auram sulb i.e. fibroid uterus.[7,8]

### Obesity and urinary incontinence

A large cohort study demonstrated a link between BMI and urinary incontinence. Increased waist circumference, in particular, was associated with SUI, possibly as a result of raised intra-abdominal pressure caused by central obesity. The severity of incontinence appears to be influenced by the duration of obesity. Women who had been overweight or obese since the age of 20years were more likely to report severe incontinence than those who gained weight later in life. RCT on association between obesity and incontinence is supported by the results of 6month behavioral intervention reduction in the frequency of urinary incontinence.[25] According to conventional medicine stress urinary incontinence in obese women is due to increase abdominal pressure. In Unani system of medicine it is mentioned that in obese women the urinary incontinence is occur. It is due to excess of ratubat (Fluidity) interfere nervous and muscular function. Hence hypo function of nervous and muscles leads to incontinence.[6,8]

### Obesity and pelvic organ prolapsed

The prevalence of pelvic floor dysfunction is highest (57%) in morbidly obese women (BMI>40), and considerably higher (53%) in severely obese women (BMI>35) compared with that (44%) in obese women (BMI>30) . WHI study demonstrate that exacerbation of cystocele, rectocele and uterine prolapsed was noted among women who were overweight (BMI between 25 and 29.9) or obese (BMI ≥30) at baseline.[26] In over weight and obese women, worsening of symptoms of cystocele occurred in 32 and 48%; rectocele in 37 and 58%; and uterine prolapsed in 43 and 69%, respectively. Furthermore, a small degree of weight loss (10%) was associated with borderline worsening of uterine prolapsed, minimal regression of cystocele and rectocele. This suggests that the damage to the pelvic floor caused by obesity is probably irreversible.[26] According to Unani concept excess of ratubat lax and loosens the ligaments of the uterus. Hence the ligaments not able to hold the uterus in its position lead to various degree of prolapsed.[5–8]

**Obesity and surgical issues**: Pelvic surgery in obese women is technically challenging. Both anesthesia and surgery have significant morbidity.[27]

**Co morbidities**: Diabetes, Hypertension, Cardiovascular Diseases, Musculo Skeletal Disorders, Stoke, Asthma etc.[28]

## Principles of treatment

Balance diet, physical activity and regular exercise, Tadeele mizaj, taqkhil ghiza, istefrag and correction of the Sue Mizaj Barid, Elimination of the existing causes. Treatment is Ilaj Bil Zid (use of anti obesity drugs). Accumulation of Madda or Khilt Balgham in the body use of Munafis Balgham (expectorant), Mushil Balgham (purgatives), Mudir (diuretics), Muarriq (diaphoretics) and Mujaffif (desiccant) will be beneficial. Excessive khilte Dam in the body then the use of Fasad (venesection) is beneficial; otherwise it is better to use Mushil Balgham.[8,9]

## Management in conventional medicine[29,30]

Lifestyle modification, diet and exercise are the cornerstones of any weight loss program and Pharmacotherapy may aid weight loss.

Pharmacological therapy categories into 2 types:

1. Centrally acting drugs which suppress appetite e.g. Phentermine
2. Peripherally acting drugs which reduce fat absorption e.g. Orlistat

### Adverse effects[31]

a. Despite of having beneficial effects of these drugs several side effects are also reported. The cessation of these drugs causes rebound weight gain.

b. Orlistat have been reported to results in loose stools, oily spotting, fiscal urgency, flatus and the potential for malabsorption of fat soluble vitamins.

c. Sibutramine includes dry mouth, constipation and insomnia, the nor adrenergic effect of the drug can also increase heart rate and blood pressure.

### Surgical treatment

Bariatric surgery is effective in morbidly obese women, and can regularize menstrual cycles and resolve polycystic ovary syndrome

### Unani management

When the conventional medicine fails to treat the condition then the people seek complimentary, safe and effective alternative medicine, which include Unani system of medicine. According to Unani system of Medicine the treatment is classified into two groups:[7,8]

**A.** Non pharmacological

**B.** Pharmacological

A. Non pharmacological again two types:

i. Ilaj Bil Ghiza (Dieto therapy)

ii. Ilaj Bil Tadbeer ( Regiminal therapy)

B. Pharmacological therapy:

i. Ilaj Bil Dawa (Pharmacological therapy)

**A(i) Ilaj bil ghiza:** Avoid oily food; avoid that food which increases the blood and phlegm. Intake of food is decrease in terms of quality not in quantity. That makes the food should be less energetic, but should give feeling of fullness of stomach. Mizaj of the obese persons becomes barid, so, in such condition, the diet, drugs and exercises which produce Haar Yabis Mizaj should be prescribed.[7,8,31]

### Ghiza (Diet) which is scientifically proved as anti obesity

**Papita (Carica papaya Linn):** It contain enzyme called Papain "which helps to breakdown protein in the body. It is rich in antioxidants, Vitamin A and C and also Good source of fiber which acts as laxative. It also decreases the BMI, LDL and increase HDL.[32]

**Ananas (Ananas Comosus):** The stem and core of pineapple contain an enzyme called Bromolein. Bromolein helps in breakdown of proteins, improve digestion, immunity and It has anti-inflammatory, anti-thrombolytic, diuretic properties. It is a rich source of Vitamin B1 and C, it contains minerals like manganese.[33]

**Patta gobi (Brassica oleracea capitates-Cabbage):** Brassica oleracea capitata also known as cabbage. It lowers cholesterol level so it is a natural and effective cholesterol reducer. Cabbage prevents bile to absorb fat after a meal and lowers the overall amount of cholesterol. It is a good source of Beta carotene, Vitamin C and fiber with very low calories.[34]

**Amrud (Psidium guajava):** It is a rich source of Vitamin C, roughage with no cholesterol and less digestible carbohydrates, It reduces appetite very easily thus helps in weight loss. Pink guava had anti-obesity properties and high enzyme activities.[35]

**Pyaz dashti (Allium cepa Linn.-Onion):** Allium cepa Linn. Onions or Pyaz dashti (Allium cepa L.) are widely used in the food industry for its nutritional and aromatic properties. According to a study, the ethyl acetate extract of onion (EEO) showed potent inhibitory effects on animal fatty acid synthesis (FAS).[36]

**Filfil siya (Pepper Nigrum):** It belongs to the family *Piperaceae*, commonly known as Black pepper. In Unani it is named as Filfil siyah. It is hot and dry in temperament and digestive and carminative. It stimulates fat metabolism while serving as a mild laxative. Together these actions help reduce and regulate weight without causing fatigue. Piperine is the active principle found in this plant. It reduced the body weight, reduces levels of plasma TC, LDL and VLDL, significantly ($P < 0.05$) elevated the levels of HDL.[37]

**Zardchob (Curcuma Longa- haldi)**: It is hot and dry in temperament. It has Munafis Balgham (Expectorant) and Mujaffif (Desiccant) action. Natural antiseptics, it is a good digestive tonic and blood and liver purifier helps in the clearing and improved function of the entire digestion system particularly the intestines. Turmeric also helps to reduce cholesterol levels and regulate blood sugar level. Antioxidant property: It prevents free radical damage and decrease oxidative stress and thus prevents cardiovascular complications associated with obesity.[38]

**Lemon juice:** It is cold in temperament. It is digestive and having the property of Jali (Detergent). Lemon juice is quite effective for obese patients. 5-10ml of lemon juice is mixed with one glass of water and should be taken on empty stomach in the morning.

**A(ii) Ilaj Bil Tadbeer (Regimental Therapy):** Takan ki ziyadati (exertion) , Kasrate Riyazat (exercise), Ishal (diarrhea), Idrar-baul (diuresis) and Tareeq (diaphoresis), Fasd (venesection), Reduce sleeping hours, Hammam-e-Yabis (dry bath) , Appetite suppressors, Dalak-e-Khashin (rough massage) Massage with haar and mohallil (resolvent) oils like Roghan qust, Roghan soya etc and Nafsiyati Ilaj (psychological treatment).[4,7,8]

**B. Ilaj Bil Dawa (pharmacotherapy):** According to Unani physician obesity is control by diet, if it fails then go for single drug therapy, it is fails then advice compound formulation along with regiminal therapy i.e. exercise, massage etc.[7,8,38]

Mechanism of anti-obesity herbal medicine:

There are 3 mechanisms:

1. Increase Hiddat (Production of heat)
2. Tarqeeq Khilt (Liquefaction of the humor)
3. Idarar (Mudir, Mushil, Moariq)

**Luc-Lak-e-Maghsool (Coccus lacca):** It is a main constitute of Safoof-e-Mohazzil. It is a slick serum and secretion from a scale insect species laccifie lacca, Hot and dry temperament. Its anti obesity property is because of its Mujaffif (Desiccant) and Munafis Balgham (Expectorant) properties. It makes the excess body fluid to dry Mujaffif effect or it absorbs the excess body fluid. One gram of Luk-e-Maghsool may be taken with water in the morning for getting positive impacts for obesity.[39,40]

**Kharkhask (Tribulus Terrestris):** It has hot and dry temperament; its main function is Mudir (Diuretic). It serves as a liver tonic by elevating the hormones. The subsequent stimulating effect on the liver improves protein synthesis and develops stamina; increase BMR necessary for burning excess calories and fat.[41]

**Muqil (Commiphora Mukul):** It is also called as Guggul and Balsam odendrom and in Unani it is called as Muqil, Muqil belongs to family *Burseracea*. Muqil having the temperature of hot and dry, the properties of Muqil include Munafis Balgham (Expectorant) and Kasir Riyah (Carminative). This natural herb has also clinically demonstrated a cholesterol lowering ability. Muqil is also a Thyroid tonic. It stimulates thyroid gland and helps to absorb the iodine. Iodine is essential for metabolism. It increases Basal Metabolic Rate thus enhance the utilization of food. It increased burning of calories and fat and thus control obesity. Muqil also contains Guggulosterone. It inhabits adipogenesis by apoptosis of adiposities and reduces weight. Muqil in combination of these two component i.e. Guggulosterone, Sessanin reduces cholesterol-level and favorably modified LDL and HDL. Studies reported that Muqil helps to reduce the risk of heart attack 2%.[42]

**Lehsan (Allium sativum):** A clinical trial on Lehsan shows there is significant decrease in body weight by decreased size of abdominal adipose cells and it also lowers cholesterol level. It contains Alliin, Allinase and Ajoenal. Garlic has anti-platelet activity, anti coagulant activity. Its effect on platelet function hence uncontrolled use of garlic is not recommended in person undergoing major surgeries.[43]

**Aslussoos (Glycerrhiza glabra Linn)**: An experimental study was conducted with dried powder of methanolic extract of Liquorices (Glycerrhiza glabra) on male Wistar rats for 8 weeks. The result found that there was significant decrease in body weight, visceral adipose, serum TC and TG and glucose levels. Hence Licorice has anti-obesity activity, partly was mediated by decreasing dietary fat absorption from the intestine.[44]

**Zeera siya (Nigella sativa Linn):** Pre clinical study on obese rats reported that black cumin extract administration posses anti obesity activity.

**Tukhme karafs (Apium graveolans Linn**): In Unani system of medicine it known as Tukhme karafs, an experimental study was conducted on ethanolic extract of Apium graveolans in adult male albino rats. The result showed, a significant decrease in body weight, serum total cholesterol, Triglycerides, LDL-C and significant increase in HDL-C in ethanolic extract treated groups.[45]

**Methi (Trigonella foenum Graecum):** Trigonella foenum Graecum (Fenugreek) belongs to family *Fabaceae*. In Unani medicine it is named as Hulba. Fenugreek seeds have Hypoglycemic and Anti-cholesterol actions. A clinical study was conducted on FG seeds powder was given twice a day for 20days. Blood samples were collected to estimate the lipid profile. Results showed significant changes in between the groups. Serum cholesterol, triglycerides and VLDL levels were significantly decreased when compared to normal control group.[46]

**Zangabeel (Gingiber officinalis Linn)**: It contains shagoal and gingerol. It suppresses the absorption of dietary fat from the intestines and help in dissolution of excess fat deposited in the body. It increases basal metabolic rate thus reduce weight.[47,48]

**Combination of Curcuma, Piper nigrummm and Allium cepa:** A study, the anti-obesity and anti-diabetic effect of Curcuminoid from Curcuma longa Linn, Piperine from pepper nigrum and Quercetin from Allium cepa (CPQ) was evaluated. Results revealed in marked decrease in plasma glucose, triglycerides, total cholesterol and LDL with a concomitant increase in plasma HDL.[49]

**Murakkabat (Compound drugs):**[6-8, 50,51] Dawa ul Luk, Jawarish Kamooni Kabeer 4-6g twice a day, Majoon Muhazzil 10g at bed time, Majoon Muqil 10g at the bed time, Jawarish Falafali 5-7g twice a day, Arq Zeera 40ml, Arq Badiyan 40ml, Iyaraj Faiqra 7g twice daily, Majoon Baladuri 6g twice, Majoon Kamooni 6g twice, Anqarooya 6g twice, Itrifal Saghir 6g at bed time, Dawa-ul Kurkum 7g twice, Habb-Sandarus two tablets twice, Safoof e Mohazzil 6g along with Arq Zeera 40ml,[52,53] are found useful for obesity patients.

**Table 1** List of single drugs useful in Simane mufrat (Obesity).[52]

| S No | Unani name | Scientific name | Mizaj | Dose | Action |
|---|---|---|---|---|---|
| 1 | Asaroon | Asarum europium | Har-yabis | 3-5gm | Musakhkhin |
| 2 | Zeera | Carum carvi | Har-yabis | 3-5gm | Mufatteh |
| 3 | Zaravand | Aristolochia rotunda | Har-yabis | 3-5gm | Mushile balgham |
| 4 | Tukhme Sudab | Seeds of Ruta graveolens | Har-yabis | 3-5gm | Musakhkhin mulattif |
| 5 | Shibb-e-yamani | Aluminium hydroxide | Har-yabis | 250- 500mg | Mujaffif |
| 6 | Soya | Anethum sowa | Har-yabis | 2-3gm | Mohallil |
| 7 | Anisoon | Pimpinella anisum | Har-yabis | 2-5gm | Mulattif and mufatteh |
| 8 | Fitrasaliyoon | Petrosalinum crispum | Har-yabis | 3-5gm | Mufatteh |
| 9 | Filfil siyah | Piper nigrum | Har-yabis | 3 ratti-1gm | Musakhkhin |
| 10 | Bura armani | Armenian bole | Har-yabis | 3-5gm | Mulattif |
| 11 | Karafs | Apium graveolens | Har-yabis | 3-5gm | Moarriq, Mufatteh |

Table Continues...

| S No | Unani name | Scientific name | Mizaj | Dose | Action |
|---|---|---|---|---|---|
| 12 | Marzanjosh | Oliganum vul | Har-yabis | 6-9gm | Mohallil |
| 13 | Luk Magsul | Coccus lacca | Har-yabis | 0.5-2gm | Mujaffif ratoobat (Anti hyperlipidemic activity) |
| 14 | Lehsun | Allium sativum | Har-yabis | 3gm | Moarriq, Mulattif (Hypolipedemic activity) |
| 15 | Khatmi | Althaea officinalis | Har-yabis | 5-7gm | Mohallil,munzij-e- balgham |
| 16 | Murmaki | Commiphora myrrha | Har-yabis | 1-2gm | Mufatteh |
| 17 | Naana | Mentha arvensis | Har-yabis | 3-5gm | Musakhkhin, mulattif |

## Conclusion

There are several plants described in Unani system for weight management. But so far, no systematic and well designed screening is attempted to come up with an effective herbal weight loss product. A better understanding in the existing evidence based science on herbs will further guide a qualitative research in obesity management that will attract the end users by the effective benefits. The combination of multiple herbal preparations having different mechanism of action may be more beneficial in the management of obesity and its complications. Thus RCT using herbal products will be of potential benefits.

## Future perspective

Epidemiological studies have predicted a substantial increase in obesity rates in women aged 30-50years by the year 2050. With obesity affecting 47–52% of all women, a significant impact on gynecology is inevitable. More research is needed on how this dramatic increase can be halted, as are large multicenter trials on interventions for the prevention and treatment of obesity.

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## Conflicts of interest

The author declares that there are no conflicts of interest.

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