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Review Article

### CLASSICAL UNDERSTANDING OF OBESITY AS A RISK FACTOR FOR CARDIOVASCULAR DISEASES

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**Abstract:**

*Obesity is a growing health problem worldwide, It is associated with an increased cardiovascular risk on the one hand of obesity itself and on the other hand of associated medical conditions (hypertension, diabetes, insulin resistance, and sleep apnoea syndrome). Obesity has an important role in atherosclerosis and coronary artery disease. Obesity leads to structural and functional changes of the heart, which causes heart failure. The altered myocardial structure increases the risk of atrial fibrillation and sudden cardiac arrest. In Unani System of Medicine, obesity is termed as siman mufraṭ and farbahi. Siman mufraṭ means excess of shaḥm (fat). Excess of shaḥm is due to burudat (coldness) and rutubat (wetness). The factors which increase the burūdāt and ruṭūbat in the body are cold foods and drinks, cold medicines, rest, sleep, excess of food, moderate degree of pleasure, ḥammām especially after meals etc. The complications produced due to obesity are diabetes, hypertension, cardiovascular diseases etc. Obesity is a chronic diseases and results from an interaction between an individual's genetic predisposition to weight gain and environmental influences. They have given detailed description and discussion of siman mufraṭ and its pathological conditions, prevention along with its management*

**Keywords:** *obesity, coronary artery diseases, shaḥm, burudat, rutubat, hammam.*

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**INTRODUCTION:**

Obesity is a medical condition in which excess body fat accumulates to an extent that it may have a negative effect on health. People are generally considered obese when their BMI over 30/kg/m<sup>2</sup>. Obesity increases the risk of diseases particularly cardiovascular diseases, Type-2-DM, hypertension, obstructive sleep apnoea, certain type of cancer, osteoarthritis, depression etc. Unwanted weight gain became the leading cause of overweight and obesity and it is considered as a non-communicable disease. Overweight and obesity affect the social and psychological factors of obese persons, it affects their personal life and they become vulnerable to it, person feels low self-esteem and goes into the depression [1]. Obesity is a chronic disease results from an interaction between an individual's genetic predisposition to weight gain and environmental influences [2]. Hippocrates was the first to realize the complications of Siman Mufrat and its association with disease processes. Hippocrates noted that obesity may lead to infertility and even the unexpected death. Galen distinguished between morbid and non-morbid obesity and gave a conceptual approach to pathogenesis of obesity [3]. Rabban Tabri given a general description of weight reducing diets and regimens. Zakariya Razi gave a systemic management of obesity and its type where he has detailed various modes of its management including drugs, dieto-therapy, exercises, massage, hydrotherapy, and lifestyle changes. [4].

**According to the Contemporary concept:**

According to the WHO, obesity is defined as an abnormal or excessive accumulation of fat and presents a risk to health [5]. Cardiovascular disease (CVD) mortality and morbidity have been revealed to be higher in individuals who are overweight, particularly with central deposition of adipose tissues [6], while abdominal obesity has been revealed to be a risk factor for CVD worldwide [7]. Obesity may be associated with hypertension, dyslipidemia, diabetes, or insulin resistance, and elevated levels of fibrinogen and C-reactive protein, all of which increase the risk of CVD events [8]. Prevalence of obesity is increasing in both developed and developing countries [9]. According to WHO data, 39% of the global population above 18 years of age are overweight and of these, 13% are obese. The association between obesity and hypertension, diabetes mellitus, dyslipidaemias, and sleep apnoea syndrome has also been shown to increase the incidence of cardiovascular disorders [10].

Body mass index (BMI) is used for measuring the extent of obesity; however, it gives no information on

fat distribution, which is of high significance in cardiovascular risk [11]. The innovative clinical measurements (e.g., abdominal circumference and waist/hip ratio) have aimed to characterizing central or abdominal obesity. In case of man, abdominal circumference above 102 cm and in case of female above 88 cm considered as central obesity and increased cardiovascular risk [12]. A waist/hip ratio above 0.9 in the case of men and above 0.85 in the case of women indicates central obesity [13].

**PATHOGENESIS:**

In obesity Burudat increases and Hararat-e-ghariziyah decreases and causes vasoconstriction and contributes to obstructed propagation of Ruh in the body, and thus may predispose to the death in advanced stage of disease [3]. Besides this, in *siman mufrat* the level of Shaham increases and abnormal *Balgham* accumulates and produces *imilai Kaifiyat* in blood vessels and causes rupture of blood vessels anywhere in body. Although vessels of heart and brain are more vulnerable to it. As a result of above conditions patient present symptoms of severe breathlessness, and palpitation [14]. Ibn-e Nafis states that morbid substances hamper the absorption of *Akhlat* and due to hampered absorption of *Akhlat* blood vessels became narrow and hard. These matters produce disturbance in flow and penetration of Ruh reached into the organs. When Ruh fails to accomplish the body requirement, tissues turn hard and blood flow is not adequately maintained to heart and brain, and thus, patient suffers from syncope, stroke, and even sudden death in some cases [15].

Several studies had established a relationship between obesity and cardiovascular diseases. These are as follows

**The Relationship between Obesity and Atherosclerosis**

Several details of the Patho-physiological processes of obesity and atherosclerosis have been exposed in the past three decades. Previously, both diseases are considered as lipid storage disorders with triglyceride accumulation in the fat tissue and cholesterol esters in atherosclerotic plaques. Currently, both obesity and atherosclerosis are considered chronic inflammatory conditions which initiate the both nonspecific and adaptive immune processes [16, 17]. The pathogenesis of obesity and atherosclerosis has numerous mutual factors. In both cases lipids oxidize the Low-density lipoproteins particle, and free fatty acids activate the inflammatory process and trigger the disease. Inflammation is responsible for atherosclerosis, early endothelial dysfunction and atherosclerotic plaques causing complications, and is related to obesity, insulin resistance, and type-2-diabetes. The fatty

tissue proclamations adipocytokines, which persuade insulin resistance, endothelial dysfunction, hypercoagulability, and systemic inflammation, thereby easing the atherosclerotic process. In visceral obesity, inflammatory Adipo-cytokines rise to higher levels. The level of C-reactive protein is increased and it is associated with an increased risk of myocardial infarction, peripheral vascular disease, and diabetes mellitus [18, 19,20].

### 3. Obesity and Coronary Artery Disease

Obesity is closely related to coronary atherosclerosis. A study performed on young patients presented that atherosclerosis begins numerous decades before manifested coronary artery disease. In those patients with higher BMI values, the Atherosclerotic vascular lesions are more frequent and advanced compared to subjects with normal body weight [21]. According to a longitudinal studies, at least two decades of obesity is an independent risk factor of coronary artery disease [22]. when the body weight increased by 10kg it increases the risk of coronary artery disease by 12% and at the same time systolic blood pressure rises by 3 mmHg and diastolic by 2.3 mmHg as a consequence [23]. Excess weight can be considered the most important risk factor in the development of myocardial infarction ahead of smoking. The higher the BMI, the sooner NSTEMI develops [24]. In young age, obesity is a self-governing risk factor of emerging STEMI [25], but at the same time surplus weight can also be related to other vascular events. An increase in BMI by one unit causes a 4% rise in the risk of ischemic and a 6% rise in haemorrhagic strokes [26].

### 4. Obesity and Heart Failure:

Heart failure is one of the major causes of death globally with a prevalence of approximately 3% in developed countries [27]. A close relationship may be observed between heart failure and obesity. According to data from the Framingham Heart Study, the rise of BMI by 1 kg/m<sup>2</sup> increases the risk of heart failure by 5% in the case of men and 7% in the case of women [28]. Studies show that patients suffering from heart failure, 32%-49% are obese and 31%–40% are overweight. Heart failure develops 10 years earlier than in the case of obese and overweight subjects as compared to the subject with a normal BMI. The Framingham Heart Study emphasized the pathogenic role of obesity for the development of heart failure in 11% males and 14% of females [29]. The structural and functional changes of the heart observed in obesity alone contribute to a worsening in myocardial function, which is often referred to as “Obesity cardiomyopathy” [30]. Through several direct and indirect mechanisms Obesity leads to heart

failure. Excess weight leads to haemodynamic changes. Cardiac output and blood pressure increase with increment in BMI of 5 kg/m<sup>2</sup> and 5 mmHg rise in systolic blood pressure [31]. On one hand, it is related to the activation of the Renin-angiotensin-aldosterone system and on the other hand, to the increased activity of the sympathetic nervous system [32,33]. Obesity increases both the Aldosterone level and the Mineralo-corticoid receptor expression, which promote interstitial cardiac fibrosis, platelet aggregation, and endothelial dysfunction. Abdominal obesity is associated with subclinical left ventricular dysfunction [34]. In obesity the production of Inflammatory cytokines (TNF- $\alpha$ , IL-1, IL-6, IL-8, etc.) is increased it play an important role in the development of heart failure [35,36]. Triglyceride accumulation in the cardiac muscle can regularly be observed in obese patients and facilitates the generation of toxic metabolites (e.g., Ceramide and Diacylglycerol) and they enhance the apoptosis of cardiomyocytes [37,38]. Obesity increases the chances of heart failure not only by itself but also through the associated medical comorbidities. Alterations in lipid metabolism enhances atherosclerosis and thereby the risk of ischemic cardiomyopathy [39]. Accumulation of Myocardial lipid and fibrosis can play a pathogenic role in the genesis of various cardiac arrhythmias, which may contribute to the expansion of heart failure [40,41,42].

### 5. Obesity and Sudden Cardiac Death:

Several studies indicate a relationship between sudden cardiac death and obesity [43]. Obesity is considered an independent risk factor in the expansion of ventricular tachyarrhythmias. In obese patient remodelling in the structure of ventricular myocardium results in left ventricular hypertrophy, and Systolic and diastolic ventricular dysfunctions [44]. Obesity may also be associated with prolonged and inhomogeneous ventricular repolarization, which can lead to the prolongation of the QT interval. These ECG parameters are known as independent markers of cardiovascular mortality, and their pathological prolongation may draw attention to an increased risk of ventricular arrhythmias [45]. In the development of the pathologically prolonged and inhomogeneous repolarization observed in obesity and the electrical instability involved as a consequence, the main roles are assigned to obesity cardiomyopathy, the altered function of voltage-dependent potassium channels, and autonomic dysregulation [46].

### PREVENTION OF OBESITY:

#### 1. Physical Activity and Exercise

- Encourage adults and children to engage in regular physical activity and decrease sedentary activity.
2. Counselling and Approaches
- Provide healthy lifestyle promotion messages to all patients.
  - Discuss weight control interventions for overweight patients to prevent the progression to obesity.
  - Use patient-centered counselling techniques to evaluate what the patient is interested in learning and what they would like to focus on regarding change.
  - Encourage a self-management approach, including setting goals for healthy lifestyle habits <sup>[47]</sup>.
3. Dietary intervention:
- Promote consumption of a variety of nutritious foods. Endorse escaping of high calorie foods and sugar-sweetened beverages
  - Address environmental and family factors associated with eating. — Reassure and support breastfeeding during infancy
  - Encourage families to create a healthy eating environment that is responsive to hunger and fullness cues. – Deliberate ways to access inexpensive healthy foods. – Promote family meals; limit eating out and fast food. — Perimeter children's screen time and acquaintance to food and beverage marketing. <sup>[47]</sup>.
4. Lifestyle Assessment Related to Obesity Risk
- Assess BMI at least annually, and monitor for increasing BMI (or BMI percentile in children).
  - Review dietary and physical activity habits in addition to sleep duration.
  - Review other obesity risk factors such as medical co morbidities, familial obesity, medication profile, food insecurity, lack of nutrition knowledge, or lack of food preparation skills <sup>[47]</sup>.
5. Sleep
- Promote age-appropriate and according to the temperament sleep durations <sup>[47]</sup>.

### Management of Obesity:

According to the Unani System of medicine the intervention for prevention from obesity related disorders, and management of obesity is taken into account in following manner:

#### 1) Ilaj bi'l Ghiza

#### 2) Ilaj bi'l Tadbeer

#### 3) Ilaj bi'l Dawa

#### 1. Ilaj- bi'l- Ghiza (Dieto Therapy)

- Qaleel-al-Taghzia and Kaseerul Kaimoos diets should be advised
- As decreased consumption casts less burden on Quwwat-hazima (power of digestion)
- Avoidance of fatty, roasted and fried edibles foods.
- Advised hot water, and judicious use of vinegar and fasting
- diets having Har Yabis Mizaj (hot and dry temperament) should be given.
- Hot spices which have mulattif property such as onion, *Aleum*, mint, *Carum carvi*, and *piper longum* should be added in diets. It helps in metabolization of accumulated body fat. <sup>[49]</sup>.

#### 2. Ilaj bi'l Tadbeer (Regimenal therapy)

- vigorous exercise such as fast running.
- vigorous massage of the body with Haar and Muhallil Roghan such as Roghan Qust (*Sassurea Lappa*)
- increased Tahleel (dissolution) of accumulated fat are effective in reduction of body fat.
- Hard work Tareeq (increased sweating).
- excess purgation.
- use of Mushilat (purgatives) and Mudirrat (diuretics) for inducing Yuboosat (dryness).
- Hard work
- Hijamah (Cupping) <sup>[48]</sup>.

#### 3. Ilaj bid Dawa (pharmacotherapy)

Single drugs exerting actions of Mufattit, Musakhkhin, Mudir, Mulattif, Muhallil, Muqawwi-e-Qalb-wa-Kabid, Dafe Shahmeen drugs such as, Zanjabeel, Kalonji, Rewand Chini, Asaroon, Qust, Sumbul-ut-Teeb, Mastagi, Tukhm-e-Karafs Luk, Anisoon, Nankhwah, Izkhir etc are effective in treatment of Siman Muftrat <sup>[50]</sup>. These drugs are hepatoprotective, hypolipidemic, anti-inflammatory, diuretic and antioxidant in nature. According to the principle of Unani System of Medicine, the drugs used to treat the obesity should have Har Yabis temperament as the obese person usually have barid Ratab Mizaj; exert Musakhkhin, and Mulattif actions on fat which result in increased Hararat and Yaboosat in the body. It plays a key role in metabolism of Shaham, and thus reduction in weight is resulted <sup>[48,49]</sup>.

### CONCLUSION:

Obesity is among the leading causes of elevated cardiovascular disease (CVD) mortality and morbidity. In the present study, the associations between the increase in body mass index (BMI) and the increase rates of CVD and high blood pressure. The altered myocardial structure increases the risk of Atrial fibrillation and sudden cardiac death. However,

obesity also has a protective effect on the clinical outcome of underlying cardiovascular disease, the phenomenon called obesity paradox. The improved cardiac imaging techniques allow the early detection of altered structure and function of the heart in obese patients. Obesity is a medical condition in which excess body fat has accumulated to an extent that it may have a negative effect on health. Obesity increases the risk of diseases particularly cardiovascular diseases, type-2-DM, hypertension, obstructive sleep apnoea, certain type of cancer, osteoarthritis, depression etc. Hippocrates was the first to realized the complications of Siman Mufirat and its association with disease processes. He stated that it may lead to infertility, and even the sudden death. Galen distinguished between morbid and non-morbid obesity and gave a conceptual approach to pathogenesis of obesity. In siman mufirat the level of Shaham increases and abnormal Balgham accumulates and produces imtilai Kaifiyat in blood vessels and causes rupture of blood vessels anywhere in body. Although vessels of heart and brain are more vulnerable to it. obesity can be prevented through physical activity, exercise, counselling approaches and diet. obesity can be managed through, ilaj bil ghiza, ilaj bit tadbeer and ilaj bil dawa.

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