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TEMPERAMENTAL ASSOCIATION OF COMORBIDITIES OF OBESTY (SIMAN-E-MUFRAT) AND ITS PREVENTION AND MANAGEMENT: AN OVERVIEW

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Abstract:

Background: *Siman-e-Mufrat (Obesity) is one of the most common problems worldwide; it is directly related with the changes of life style pattern of human being in this era. Therefore, there is a paradigm shift of killer disease from infectious to non-infectious diseases having almost equal mortality and morbidity.* ***Siman-e-Mufrat*** *(obesity) is a Balghami (Phlegmatic) disease and hence Khilt-e-Balgham predominates is a predisposing factor in causation of obesity. It causes sluggish of the metabolic function of the body and loss of movements of Aaza (organs) due to excessive accumulated Balgham (fat) and cold temperament, hence the person becomes lazy and dull. Deposition of Balgham (Atherosclerosis) obstructs Nufuz of Rooh (passage of oxygen) in the organs which finally cause death of the obese persons.W.H.O. projects that by 2015, approximately, 2.5 billion adults will be overweight and more than 700 million will be obese. The National Family Health Survey (N.F.H.S) shows that 12.1% men and 14.8% women in India are either overweight or obese. The obesity is not a single morbid condition but it invites several others to make a derangement at the level of vascular changes, visceral changes including derangement in carbohydrate, protein, fat even of mineral and water. Obesity is considered as an iceberg of many metabolic disorders including metabolic syndrome, as a result, Non-alcoholic Fatty Liver Disease (NAFLD), Diabetes Mellitus, Hypertension, CAD may emerge as a co-morbid factor.*

Objectives: *The aim of this review articles is to describe the comprehensive concept of obesity and its co-morbidities in Unani medicine with correlation of modern concept and its prevention and management.*

Keywords: *Siman-e-Mufrat (Obesity), Co morbidities and Unani Medicine.*

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INTRODUCTION:

Obesity and its associated disorders are leading cause of morbidity and premature mortality around the world, and it is a complex multifactorial chronic disease involving environmental, genetic, physiologic, metabolic, behavioral and psychological components. Obese persons are also vulnerable to low self-esteem and depression because of the psychological and social stigmata that can be associated with obesity.[1] "Obesity is a state of excess adipose tissue.[2, 1] or characterized by excessive accumulation of fat in the subcutaneous and deep tissue of the body usually 20% or more over an individual's ideal body weight[3, 4]. Currently clinical definition of obesity is defined in terms of the body mass index (BMI = weight in kilograms divided by height in meter square), Men or women with overweight are defined as a BMI of greater than 25 kg/m^2 and obesity as a BMI greater than 30 kg/m2.[2,4,5]. According to the percent of the body fat, Obesity is defined as more than 25% body fat for man and more than 30% body fat for women[6].These conditions result from an imbalance between energy intake and expenditure over a long period of time[7, 8].

Epidemiology: Prevalence of obesity has reached epidemic proportions in the United States and increasing through the world.[9] Studies in the USA have suggested that, unabated, the rise in obesity could well lead to future declines in life expectancy.Concern about the health risks associated with rising obesity has become nearly universal; Member States of the World Health Organization adopted a voluntary target of halting the rise in obesity by 2025[10],[11].Obesity rates in children and adolescents have continued to increase over the past 3+ decades. According to National Health and Nutrition Examination Survey (NHANES) 2007–2008, 17% of U.S. children and adolescents between the ages of 2 and 19 years were at or above the 95 percentiles for weight. Among children and adolescents, Mexican Americanmales and African American females are more likely to have a higher BMI**.** In Asia the highest rate of Obesity occurs in Thailand and Lowest in India followed by Philippines. India is just behind US and China in this global hazard list of top 10 countries with highest number of obese people, one in every five Indian men and women either obese or overweight. Almost 30-65% of adult urban Indians are reported to be either overweight or obese or have Central Obesity[11, 12].

Etiology: Unani Scholars mentioned following causes of obesity[13,] *Khilqi and Mauroosi* (Hereditary and Congenital), *Kasrate Farhat waMosarrat* (Excess of Joy), *Rahat wa Sokoon* (Excessive rest and lack of exercise), *Excessive use of Martoob wa Roghniyat (*excessive use of fatty diet and oils), *Kasrate ghiza* (excessive eating), *Sarwat wa Ghina* (richness), *Baroodat-e-Mizaj* (Cold Temperament), *Kasrate Sharab noshi* (excessive consumption of alcohol), Excessive sleeping[13,14,15.] Recently several environmental factors, as sedentary lifestyle, Socio-economic status, Psychological Factors low fibers foods. Eating a greater proportion of food away from home, particularly at fast food restaurants, where food is typically very calorically dense. In children the increased consumption of sugar added beverages and reduction of dairy intake have also been associated with greater weight gain in prospective studies[1, 2, 6].

Pathophysiology: A central or upper body fat distribution is more predictive of the metabolic complication of obesity than total fat mass. Through lipolysis of Adipose tissue release of free fatty acids (FFAs) and glycerol occurs into the circulation and it provides 50 to 100 of daily energy needs. Adipose tissue lipolysis is regulated primarily by insulin (inhibition) and catecholamines (stimulation) although growth hormone, cortisol and atrial natriuretic peptide also stimulate lipolysis. Upper body obesity is associated with several abnormalities of adipose tissue lypolysis, most remarkably with higher postprandial FFA release and concentration; this abnormality is particularly evident in type 2 diabetes mellitus. High abnormal FFA concentration can contribute to a number of the metabolic complications of obesity[1, 2 , 19].

Obesity and its associated Cormobidities:

Unani concept of disease: Siman-e- Mufrat (Obesity) has been categorized under *Amraze Balghamiya*[14] because in obese individuals, *Balgham* (phlegm) is more than blood proportionally, hence they have *Barid Mizaj*[13, 14, 15, 33].The first reference of Siman-e-Mufrat was given by Hippocrates (460). He said that when a person becomes extreme obese, imtila-e-dam (congestion or accumulation of blood) may lead to sudden death because of hemorrhage (due to rupture of vessels) or due to loss of hararat (heat). Unani physicians have also mentioned that excessive *Rutoobat and Buroodat* (wet and cold), increase the Sameen and *Shaham* in the body. Presence of *Maayeat* and *Dasumat* in the blood, which is more *Ratab* than blood, described *Maddi* causes of *sameen and shaham*. This *Dasumat* (fatty particles) is solidified by excessive *Buroodat* (coldness) in body, therefore *Barid Ratab*(Cold and Wet) person has more *shaham* and *sameen*[15].

Generally fat deposits on abdomen[16].Obesity causes narrowing of vessels, and due to this, vessels transport less amount of *Nasim* (oxygen) to the tissues[15,17] leading to decrease *Hararate Ghariziya* of the body which may result in *Fasade Mizaj* and infection[17]. If *Hararate Ghariziya* is completely lost it may cause death[18].

CLASSIFICATION:

Al-Razi has been classified Siman-e-Mufrat (Obesity) into following two groups[20]:

1.Maqami Siman-e Mufrat (Local) obesity: When Shaham (Fat) deposits in a particular organ or region then it is called local obesity, for example protrusion of abdomen or breast due to the deposition of fat[20].

2.Umoomi Siman-e Mufrat (General Obesity): When generalized deposition of fat occurs in the body then it is called general obesity[20].

Recently the obesity is categorized on the basis of etiology, mode of onset, distribution of fat cells, number of adipocytes, the common classifications are as follows:

CLASSIFICATION ON THE BASIS OF AETIOLOGY:

1. **Exogenous or primary or essential obesity:** It occursdue to excessive food intake and low physical activity.
2. **Endogenous or secondary obesity:** It is caused by endocrine and metabolic disorders, like Hypothyroidism, Cushing's syndrome, Insulinoma, Hypothalamic disorder[7, 19,] Carpenter Syndrome, Cohen's syndrome, Polycystic Ovarian Disease, Laurence-moon biedl syndrome, Prader willi syndrome.

OBESITY CLASSIFICATION ON THE BASIS OF ONSET:

1. **Juvenile onset obesity:** Obesity since childhood is categorized as juvenile onset of obesity it has high mortality rate than adult onset of obesity.
2. **Adult onset obesity:** Obesity acquired in adult age is called adult onset of obesity[1,3,5,] .

CLASSIFICATION ON THE BASIS OF FAT CELL DISTRIBUTION:

1. **Android type or abdominal obesity**: Deposition of fat on upper half of body predominantly in the abdominal region. Usually seen in men. It is also called apple shaped obesity, and it is closely associated with metabolic complications including cardiovascular risk in obese person[4,34].
2. **Gynoid type obesity:** Deposition of fat to the lower half of the body predominantly around hips, gluteal and femoral region, It is seen in the females. It is also called pear shaped obesity and it has less metabolic importance[4, 34].
3. **Generalized obesity:** In this type fat is distributed all over the body both trunks and arms tend to be present through life[21].

Complication of *Siman-e- Mufrat* (Obesity): Unani Aspect

Unani Physicians gave detailed description about Complications of Obesity in Unani Text as they were well aware about the disease and its complications according to systemic involvement Such as cardiac, Respiratory, Reproductive and Neurological related sequelae.

These are categorized into following seven headings by Akbar Arzani[17]

- Dyspnoea (tangiya tanaffus) : It Occurs due to vasoconstriction resulting in insufficient rooh transportation to the organs.
- Coma and Syncope: occurs due to imtilaUrooq wa Badan.
- Hemorrhage: excessive body fat cause narrowing and rupture of the vessels resulting jryan, facial paralysis, hemiplegia, coma and death.
- Palpitation, fever and vomiting
- Diarrhea and dysentery
- Paralysis.
- Infertility: Sexual power of obese person becomes weak both in men and women as mani is not formed completely, abortion may occur in women if conceived, the child will be physically unfit.
- Due to excessive ratoobat (Moisture), obese persons are prone to Zarb (injury).

Besides this other Unani physicians also gave their views about its Complications.

Hippocrates Quoted that Occurrence of Sudden death is more common in those who are naturally fat than in the lean[23].

Jalinoos (Galen) has written when a person becomes obese, it is a dangerous condition and increases chance of sudden death in that people. He also described reason behind it that vessels get compressed due to obesity leading to *Imtela* (congestion) and *adme tarveeh* (tissue anoxia) [23].

Rufash as described Obese people get involved inco-morbid conditions and intolerant to hunger, hard work and indigestion they become susceptible to severe diseases, like epilepsy, paralysis, dyspnoea,

cholera, syncope and hyperpyrexia. If the obese female becomes pregnant, then abortion or difficulty in labor may occur. Sometimes, purgatives kill these people and if they are not killed they become very weak as they have less blood and more phlegm[24].

If a person is obese since childhood, then the death of such person occurs earlier as compared to lean person[25, 26.] Whenever obese persons suffer from any disease then they are not easily cured and not able to tolerate hunger and thirst.[25, 26, 27.]

MEDICAL COMPLICATIONS OF OBESITY

Obesity has major adverse effects on health. It is associated with an increase in mortality, with a 50-100% increased risk of death from all causes compared to normal weight individuals, mostly due to cardiovascular disease, life expectancy of moderately obese person could be shortened by 2-5 year, and 20-30-year-old male with a BMI > 45 may lose 13 year of life[3, 9, 10].

Cardiovascular: Cerebrovascular disease, Congestive heart Failure, Coronary Artery disease, Cor pulmonale Hypertension

Dermatologic: Acanthosis nigricans**,** Chronic skin infections

Endocrinologic / Metabolic: Decrease growth hormones, decreased sympathoadrenal activity, Hyperuricemia, Gout, Impaired fasting glucose, impaired glucose tolerance, type 2 diabetes, Increased cortisol production, Increased total or free androgens, Insulin resistance, hyperinsulinemia, Lipid abnormalities: Increased total cholesterol, LDL, VLDL, and triglycerides, decreased HDL cholesterol.

Gastroenterologic: Nonalcoholic fatty liver disease, Cholelithiasis

Genitourinary and Reproductive: Urinary incontinence, loss of Libido and Infertility, Early menarche, Erectile or other sexual dysfunction, impotence, Gestational diabetes, Oligomenorrhea/amenorrhea, Polycystic ovary syndrome

Musculoskeletal: Osteoarthritis of weight-bearing joints

Oncologic: Breast cancer (post-menopausal women), Colon Cancer (men), Endometrial cancer, Esophageal cancer, Gallbladder cancer (women), Hepatocellular carcinoma, Kidney cancer, Prostate cancer

Pulmonary: Asthma, Obstructive sleep apnea, Pickwickian syndrome (hypoventilation), Restrictive lung disease

Surgical: Increased preoperative morbidity and mortality, Incisional hernias

Vascular / Hematologic: Venous stasis, Venous thromboembolism, Thrombophlebitis[2,9]**.**

Metabolic Complications of Obesity

Insulin Resistance: The term insulin resistance is used to the ability of insulin to promote glucose uptake and to inhibit the release of glucose into the circulation. The primary site of insulin –stimulated glucose uptake, oxidation and storage is skeletal muscle, and the principle site of glucose production is the liver. Insulin resistance initially leads to hyperinsulinemia and it may eventually lead to obesity NAFLD and type 2 Diabetes mellitus. The ability of insulin to promote glucose uptake, oxidation, and storage in muscle and to suppress plasma FFA concentration is reduce in upper body obesity. Abnormal regulation of Adipose tissue and excess FFAs induce muscles resistance by promoting increased synthesis of diacylglycerols and ceramides, both of which can interfere with the normal insulin singling pathway. Adiponectin an adepocyte derived hormone that improve insulin action is secreted as reduced rates in obesity and diabetes. Increased production of interleukin-6, tumor necrosis factor and retinol binding protein-4 by adipose tissue also has been linked with insulin resistance, although dysregulated production of adipose derived hormone also known adipokines contribute to insulin resistance and the metabolic complication of Obesity[28].

"Metabolic syndrome" also known as X syndrome is a complex set of traits that cluster together and enhance the risk of CVD.The individual criteria for diagnosis are not uniform but most include threshold values are lipid, Blood Pressure, glucose as well as measurement of insulin resistance such as waist circumference. According to these guidelines, individuals with three or more of the criteria carry the diagnosis of metabolic syndrome[2, 22].

CRITERIA FOR METABOLIC SYNDROME

Increased waist circumference	Men: >102 cm (40 inch) Women: >88 cm (35 inch)
Fasting plasma glucose	≥ 100 mg/dl
Elevated blood pressure	Systolic ≥ 130 mm Hg Diastolic ≥ 85 mm Hg
Serum triglyceride level	≥ 150 mg / dl
Decreased high density lipo protein (HDL) cholesterol level	Men < 49 mg /dl Women < 50 mg / dl

Islet cell failure and Type 2 Diabetes Mellitus: A strong relation has been found between obesity and type 2 diabetes mellitus. Obese individuals are mostly insulin resistant and type 2 diabetes usually results from defect in both insulin secretion and insulin action. In Nurse Health study, BMI value above 22 kg / m^2 were associated with an increased risk of diabetes. Animal studies have suggested that a process referred to as lipotoxicity is involved in pancreatic β cell failure. There is some evidence that elevated FFAs have adverse effect on islets β cell function in human. Another potential contributor to β cell failure in Obesity is the overproduction of islet amyloid polypeptide; it can form toxic amyloid deposit in β cell[28].

Dyslipidemia: Upper body Obesity is associated with increased triglycerides, decreased-high density lipoprotein (HDL) Cholesterol, and a high proportion of small, dense low-densitylipoprotein (LDL) particles. This dyslipidemia contributes to the increased cardiovascular risk observed in the metabolic syndrome. Fasting hyper triglyceridemia is caused by increased hepatic VLDL secretion, which may be driven by increased delivery of FFAs to the liver coming from both visceral fat and upper body subcutaneous fat. The reduce HDL cholesterol concentration and the increased small, dense LDL particle concentration associated with upper body obesity are likely an indirect consequence of elevated triglycerides-rich VLDL[28].

Nonalcoholic fatty liver disease: Obesity is frequently associated with the spectrum of liver disease known as nonalcoholic fatty liver disease (NAFLD). This hepatic fatty infiltration of NAFLD can progress in a subset of inflammatory nonalcoholic steatohepatitis (NASH). Manifestations of this disorder include hepatomegaly, abnormal liver function tests, and abnormal liver histology including macro vesicular steatosis, steatohepatitis, fibrosis and more rarely to cirrhosis and hepatocellular carcinoma[2, 28].

Coronary artery disease (CAD): Obese persons, particularly those with abdominal fat distribution, are at increased risk for CAD. The American Heart Association added obesity to its list of major risk factors for CAD in 1998[28].

Sleep apnoea: Obese men and women are also at high risk for sleep apnoea, in which partial or complete upper airway obstruction during sleep leads to episodes of apnoea or hypopnoea. The interruption in night time sleep and repeated episodes of hypoxemia lead to daytime somnolence, morning headache, systemic hypertension, and can eventually result in pulmonary hypertension and right heart failure[2, 28].

Possible Unani Theraputic intervention:

Although incidence of obesity and its cormobidities is steadily increasing, but still there is no satisfactory treatment available in modern medicine. Despite of beneficial effect of the drug, it has number of side effects including weight gain after cessation of the drug. Unani Medicines plays an important role in the management of Obesity. Unani Physicians Suggested the diet and exercise were an integral part of the therapeutic regimen for obese patients from the time of Hippocrates and Galen in the prescientific era, Hippocrates, suggested that: Obese and those persons who want to lose weight should perform hard work before meal.

Principles of treatment (Usool-e-Ilaj)

Unani physicians recommended the following principles of treatment for obesity:

- Weight reduction
- Maintenance of healthy state
- Remove the waste product (Khilt fasid/ Excessive khilt balgam) by usool ilaj-bil-zid
- Modify the Asbab e sittazaroorya according to disease condition.
- If the diet fails to treat the condition then start with single drug therapy.
- When single drug therapy too fails then start with compound formulations and with regimental therapies.

Illaj Bil-Ghiza (Dietotherapy):-

According to Buqrat (Hippocrates, 420 BC), the quality (kaifyat) and quantity (Kammiyat) of diet and importance of balanced diet in relation to occurrence of disease is important factor in the treatment of obesity. He said one who wants to reduce fat should take satu like diet (that is of low calorie value and fiber rich). With this, it is quite evident that concept of low calorie diet was present in the minds of ancient Unani physicians.

Illaj Bil-Tadbeer (Regimental Therapies):-

For removal of execive baroodat those tadabeers should be adopted, which produce Hararat and yaboosat in the body like

- Taqlil-ghiza (Low diet)
- Kasrat-e- Riyazat (Exercise)
- Takankiziyadati (Exertion)
- Ishal (Diarrhoea)
- Idrar-baul (Diuresis)
- Tareeq (Diaphoresis)
- Fasd (Venesection)
- Dalak-e-Khashin (Rough Massage)
- Hammam-e-Yabis (Dry bath)
- Massage with Mohallil roganiyat (anti

inflammatory oils)

- Appetite suppressors, e.g. rice of chirchita
- Nafsiyati Ilaj (psychological treatment) 1, 3, 5-6,8-14

Illaj Bil-Dawa (pharmacological treatment)

Unani physicians has been recommended large number of drug either single or compound formulations in Unani classical literature, for the management of obesity. Most important single drugs being prescribed and clinically proved are given as under:

Darchini (Cinnamomum zeylanicum), Lahsun (*Allium sativum*), Luk Maghsool (*Coccus lacca*) Kalonji (*Nigella sativa*), Khardal (*Brasicanigra*), Badiyan (*Foeniculum vulgare*), Bura Armani (Armenian bole), Marzanjosh (*Oliganum vulgare*), Nankhuwah (*Ptychotisajowan*), Ajwayin Khurasani (*Hyoscyamusniger*),

Filfilsiyah (*Piper nigram*), Fitrasaliyun (*Petroselinum crispum*), Gandana (*Allium ascalonicum*), Halelakabuli (*Terminalia chebula*), Haleelasiyah (*Terminalachebula*), Haloon (*Lepidium sativum*), Jawakhar (Potasium carbonate), Juntiana (*Jentiana lutea*), , Namaklahori (sodium chloride), Paudina (*Mentha arvensis*), , Unsul (*Allium cepa*), Sandarus (*Trachylobiumhornemannianum*), Sheetraj hindi (*Plumbago zeylanicum*), Sirka (Vinegar), Sudab (*Rutagarveolans*), Tukhmekarafs (*Apiumgraveolans*), ZarawandTaweel (*Aristolochia longa*), Zeera kirmani (*Carumcarvi*). 1, 8, 10-13, 15-21

The compound formulations (Murakkkabat) for the treatment of Obesity are as under:

Safoof Mohazzil, Arq Zeera, Arq Badiyan, Habb-Sandarus, IyarajFaiqra, Amroosiya, Asnasiya, Itrifal Sagheer, Jawarish Kamoni, Jawarish Falafili, and Anqarooya. 1, 3, 8, 10-11, 13, 16, 21-22

CONCLUSION:

Our literature survey of Unani herbal drug indicated that these single and compound herbal products fall under an acceptable level of evidence or with no scientific background at all, or they have a scientific rational but not to an acceptance level. Attempts were made in the review to define the features of possible herbal weight loss product by improvement of bio markers like blood pressure and serum lipids without any side effects. So that, we have tried to highlight the strength of Unani medicine in the prevention and management of obesity and its comorbidities in this paper.

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