

## Life Style Management of Pediatric Obesity based on Traditional Persian Medicine: A Narrative Review

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### Abstract

Obesity is a major risk factor for many diseases in children. Considering the widespread pandemic of pediatric obesity, developing more strategies for life style management of this disorder is essential. Therefore it was decided to conduct a more comprehensive study for prevention and treatment children obesity based on Traditional Persian Medicine (TPM). In this review we searched the most important TPM textbooks (such as Al-Havi, Al-qanun fit-tib, Kamel al Sanaeh), Classical Medicine (CM) text book (Krause's Food and the Nutrition Care Process), and scientific databases such as Data sources included (Medline, Scopus, Embase, Google Scholar) the period from 2000 to 2017 in terms of obesity management. The keywords Saman Mofrat, Setteh-e-Zarurieah, lifestyle, pediatric, children and obesity have been used in this search.

Based on TPM the six essential principles (Setteh-e-Zarurieah) must be observed in management of pediatric obesity that these essential factors are as follows: air, food and drink, sleep and wakefulness, evacuation and retention, body movement, mental movement and repose. Unhealthy lifestyle for example irregular sleep, constipation, overeating and wrong nutritional habits, insufficient physical activity, and emotional excitement, such as sadness and anxiety are plays an important role in obesity that confirmed by classical medicine. Moreover, TPM has a particular attention to the type of nutrients and their temperament and the children's digestion ability. So, further clinical trials should be performed to confirm the long-term efficacy of healthy lifestyle in pediatric obesity management.

**Key Words:** Life style, Persian Medicine, Pediatric, Obesity, Traditional.

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## 1- INTRODUCTION

Pediatric obesity is commonly identified by age- and gender-specific body mass index (BMI), waist circumference (WC) > 95th percentile, and BMI > +2 standard deviations from the average (1). BMI provides a guideline for weight in relation to height; it is equal to the body weight (in kilograms) divided by the height (in meters) squared. Other measures of childhood obesity, including weight-for-height (which is particularly useful for a child younger than two years), measures of regional fat distribution (e.g. waist circumference and waist-to-hip ratio), and growth standards, have been developed (2). According to the World Health Organization (WHO) (1988), Iran was one of the seven countries having the highest prevalence of childhood obesity; the obesity trend, in fact, doubled in Iranian children and adolescents between 1993 and 2001 (3). Recent studies show that the range of overweight and obesity in less than 18 years is 5.0 to 13.5, respectively (4). Obese children are at the risk of physical morbidity and premature mortality more than adults. Childhood obesity is a risk factor for many important health complications including hypertension, non-alcoholic fatty liver disease, insulin resistance, cardiovascular dysfunction, musculoskeletal complications, psychosocial disorders, and metabolic syndrome (5, 6). The feedback control system for regulating body weight and fat storing consists of the cellular processes for energy expenditure; this system is also needed for digestion, absorption, transport, and storage of nutrients and their subsequent mobilization and utilization as fuels. The central nervous system receives afferent signals from the periphery about food deficits or surpluses or alterations in the rate of fuel utilization; it also initiates signals that alter the metabolism of nutrients and the cognitive processes for food seeking (5).

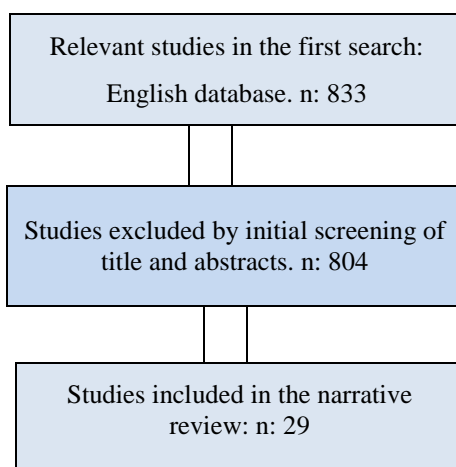
In the first two years of childhood Life, good nutrition promotes healthy growth and improves cognitive development. It also reduces the risk of overweight and obesity and ultimately infertility is growing. Children, however, require different amounts of nutrients of particular ages (7). A sedentary lifestyle is an important factor in the development of obesity. For children, this has been associated with many hours of watching television—an effect that may continue even during adulthood (2). In a cross-sectional study showed that most obese and overweight adolescents in Iran were in passive stages of weight control in and there are no specific plans (8). Traditional and complementary medicine in the treatment of chronic diseases is now being accepted in WHO strategies (9). TPM has a long history of being in use for the prevention and treatment of such diseases. In this school of medicine, obesity is considered is called "Saman Mofrat" (10). Owing to the importance of obesity in children, this review aimed to explore the healthy lifestyle (The six principles of maintaining health) in accordance with PTM and compare the outcome with the perspective of Classical Medicine.

## 2- MATERIALS AND METHODS

This review study is conducted by searching the most important Persian Medicine (PM) textbooks such as *Al-Hawi fi al-tibb* (The Liber Continents) by Rhazes (865–925 A.D.), *Al-Qanun fi'l-Tibb* (The Canon of Medicine) by Avicenna (980–1037 A.D.), *Kamel-al-Sanaat al-Tibbiah* by Majusi Ahwazi (Haly Abbas; 930–994 A.D.), and *Zakhireh Kharazmshahi* by Jorjani (1042–1136 A.D.). Classical Medicine (CM) text book (Krause's Food and the Nutrition Care Process), and scientific databases such as Data sources included (Medline, Scopus, EMBASE, Google Scholar) the period from January 2000 to December 2017 in terms of obesity management. Literature was

reviewed for key word underpinning conceptual boundaries and a broad overview of the subject matter. The keywords "Saman Mofrat", "Setteh-e-Zarurieah", "Traditionl Medicine", "Persian Medicine", "Lifestyle", "Pediatic", "Children" and "Obesity" have been used in this search (**Figure.1**). For example, in the Medline database, with keywords ("Lifestyle" and "Pediatic obesity") was searched and 416 articles

were analyzed and 26 related articles were obtained. According to TPM concept obesity is also known as Saman Mufrat (obesity). There are six factors, which are essential for the maintenance of good health, which is referred to as: Setteh-e-Zarurieah. These essential factors are as follows: air, food and drink, sleep and wakefulness, evacuation and retention, body movement, mental movement and repose (9).



**Fig1:** The process of searching and selecting studies.

### 3- RESULTS

Considering the widespread pandemic of pediatric obesity, developing more strategies for life style management is essential. Therefore it was decided to conduct a more comprehensive study for prevention and treatment children obesity based on TPM. In this section, the etiology of pediatric obesity and Setteh-e-Zarurieah role of obesity management based on TPM resources will be reviewed and then will be explained principle of obesity treatment in TPM.

#### 3-1. Principle of TPM in children diseases

TPM is a type of traditional medicine in the Middle East. This holistic medical system has a history of more than 1,000 years. According to TPM principles, humor is a fluid substance flowing through

blood vessels throughout the body. It originates from food sources and gets delivered from the stomach to the liver, where it undergoes a transformation and flows through the vessels. Normally, four humors—"Balgham" (cold and damp phlegm), "Dam" (warm and damp sanguine), "Safra" (warm and dry yellow bile), and "Sauda" (cold and dry black bile) are proportionately present in the human body. The balance of these humors maintains the health of the body. Excessive accumulation of any of these humors in the whole body or in any organ is called dystemperament or "Sui' a Mizaj" that can lead to disease (9). So, it is expected that there will be excess accumulation of Balgham humor in this case (11). In case of obesity, natural body heat is less than the normal heat due to environmental or nutritional reasons.

Natural body heat (Hararat-e Ghareezi) accompanies the body from birth to death. Over the years, it is affected by the nutrients that reach the body as well as by environmental factors (12). In TPM, high muscle mass indicates a warm temperament and high fat mass indicates a cold temperament (13). So, based on the body composition, children with higher fat mass have lower metabolism and a cold temperament; thus, they are more prone to obesity.

### **3-2. Classification of obesity in TPM**

According to TPM, globally obesity is divided into constitutional (congenital), and non-constitutional (acquired) categories. Based on the body composition, another classification is used to differentiate between increasing body fat, known as obesity due to increased fat (shahm), and increasing muscle mass, known as obesity due to increased muscle (9, 12).

### **3-3. The mechanism of increased appetite in TPM**

Excessive appetite can lead to obesity. In TPM, proper appetite is considered as a sign of health, and the main organs that regulate appetite include the stomach, brain, and liver. Every dystemperament in the whole body or one of these organs affect the appetite of children (9, 14). In case of hunger, Sauda secretion increases in the stomach and stimulates its origin, resulting in the individual's need for food. Excessive Sauda in the stomach is one of the causes of polyphagia that increases non-extreme cold dystemperament in the origin of the stomach. High appetite also occurs when other organs in the body have a hot temperament. Cold weather increases the appetite as well. Sleep and moodiness too affect the appetite ( 11, 15).

### **3-4. The relationship between digestion and obesity**

There is a strong correlation between gastric digestion and weight balance in TPM. The dystemperament of the liver and the stomach toward the quality of being cold or wet causes digestive weakness (insufficient digestion)—it is an important reason for obesity (11).

### **3-5. The role of Setteh-e-Zarurieah (lifestyle) in the prevention and treatment of obesity in TPM**

There are six essential factors for a healthy life (Setteh-e-Zarurieah). These essential factors are as follows: 1) air; 2) food and drinks; 3) sleep and wakefulness; 4) evacuation and retention; 5) body movement; and 6. mental movement and repose. We now investigate the essential principles of a good lifestyle in the treatment of obesity:

*Air:* According to TPM, air cleanliness is important for public health. Inhaling contaminated air can play a role in changing the body temperament and there is a direct connection between air and one's temperament (9).

*Food and drinks:* A diet that is low in nutrients and high in quantity is likely to cause obesity. So, consumption of fruits, such as pomegranate and apple, vegetables, and legumes can be beneficial. Reducing the amount of food is needed here. TPM not only pays attention to the type of nutrients and their temperaments, but also considers the food calorie and the patient's digestion ability. The speed of the body's reaction after eating warm or cold food items differs and depends on each individual's temperament. It is important to note that PM scholars emphasized the consumption of plants and any food with hot and dry temperament for treating obesity. Moreover, food with cold and wet temperament should be limited to a child's diet, and, if necessary, such food items should be modulated with the addition of hot and dry spices or materials (for example, drinking milk with a little honey

or yogurt with mint) (9, 14). According to TPM, water should be used after food digestion (1.5 h after eating). Immediate drinking after eating causes indigestion, while drinking during eating has the worst effect. Drinking of cold water, especially during fasting, is forbidden and false eating habits should be gradually corrected (13).

**Sleep and wakefulness:** Only from TPM's view, early sleeping at night is recommended for the health of the body. Too much sleeping creates the quality of coolness and wetness in the body. So, sleeping too much or sleeping during the day has not been recommended for obese people because of increasing coldness in the body (9, 14). Zakariya Razi explains that eight hours of sleep is very important for health. He also says that sleep strengthens the vital faculty and helps digestion (13). Since there is a direct relationship between gastric digestion and weight balance in PM, inadequate sleep causes obesity.

**Evacuation and retention:** All the ways to increase sweating or decreasing body weight, such as taking a dry bath especially before meals, exercise, and vigorous body massage with hot and dry depleted oils like dill oil, and cupping, are useful in decreasing obesity. In TPM, "massage" is a process to transfer body faculties through movement and pressure to maintain the equilibrium for the normal physique; it helps to achieve the state of proper health (14). Diuretics and laxatives are also recommended for the treatment of obesity. Eating plenty of fruit may disturb the normal function of the stomach and worsen the symptoms of constipation in obese children and those with a cold

temperament. However, increasing the fiber intake in children having a hot temperament may relieve symptoms of constipation (9).

**Body movement and rest:** Lack of movement results in a wet and cold body. Every kind of exercise is useful, but it should be kept at a level that increases heat in the body (9, 12).

**Mental movement and repose:** Different emotions can affect the body's entire system. For example, sadness may decrease Hararat-e Ghareezi, resulting in coldness of the whole body (mental involvement can lead to pepticism with increased Sauda humor and affect one's appetite) (9, 16).

### 3-6. Principle of pediatric obesity treatment in TPM

TPM scholars mentioned four approaches in the treatment of obesity: 1) Modification of the six items mentioned above (Setteh-e-Zarurieah) in accordance with the disease condition; 2) Diet therapy; 3) Pharmacotherapy; and 4) Manipulation or physical therapy. If the diet fails to treat the condition, the treatment should be started with a single drug. When the single-drug therapy fails, it is better to start the treatment with an herbal compound along with regimental therapies (14). Historically, herbal medicine plays a significant role in the management of both minor and major medical illnesses. Since obesity is cold in temperament, herbal medicines having opposite temperaments—i.e. hot and dry—should be given. In TPM, the basic principle of treatment is *Ilaj bil zid* that treatment is in contrast to nature and *Mizaj* of the disease (9).

**Table-1:** The principle of pediatric obesity treatment in TPM

Modify Seethe-e-Zarurieah (lifestyle)		Pharmacotherapy
Regimental Therapies	Dietotherapy	
<p><b>1) Air:</b> Air cleanliness is important for public health. Inhaling contaminated air can play a role in changing the body temperament and there is a direct connection between air and one's temperament.</p> <p><b>2) Sleep and wakefulness:</b> Sleeping too much or sleeping during the day is prohibited. Eight hours of sleep is very important for health.</p> <p><b>3) Evacuation and retention:</b> All the ways decreasing body weight: -Exertion -Exercise -Diuresis -Diaphoresis -Venesection -Stay in hot and dry places.</p> <p><b>4) Manipulation or physical therapy:</b> -Vigorous body massage with hot and dry depleted oils like dill oil, and cupping, are useful in decreasing obesity.</p> <p><b>5) Body movement and rest:</b> - Lack of movement results in a wet and cold body and Causes obesity.</p> <p><b>5) Mental movement and repose (psychological treatment):</b> -For example: sadness may decrease Hararat-e Ghareezi, resulting in coldness of the whole body and causes obesity.</p>	<p>1) Diets of less nutritive but high in quantity. 2) Eating foods that are easier to digest: vegetables with hot and dry temperment for example (celery and mint) in excess. 3) Diets having Har Yabis Mizaj (hot and dry temperament) should be given. 4) Hot spices such as onion, alium, mint, carum carvi, and piper longum should be added in diets.</p> <p>Examples of permitted diets based on the recommendations of Persian medicine: - Cereals: Sangak bread made from wheat. -Oat and chickpea bread. Low amount of rice with saffron and cumin. - Meat and eggs: Soft-boiled eggs. Lamb and quail, partridge and chicken, preferably grilled with spicy spices. - Milk and dairy: Fresh milk with a little honey and cinnamon. Yogurt or dough with a little peppermint and thyme. Cheese with walnuts and vegetables with warm and dry nature. - Fat: Butter prepared from cows, Olive oil, Sesame Oil. - Sweets and snacks: Different kinds of honey. Dried berries. Raisins. Sesame pudding. Apple jam. - Vegetables: Types of peppers, garlic, onion, celery, dill, mint, parsley, chives - Fruits: Apples, melon, grapes, mango, fig, coconut. - Nuts: Pistachios, almond, hazelnut. - Drinks: Green tea, Honey Vinegar Syrup, celery juice.</p>	<p>The disease is cold in temperament, so herbal medicines having opposite temperament i.e. Hot and dry should be given. Examples of permitted herbal based on the recommendations of TPM:</p> <ul style="list-style-type: none"> <li>• Mentha arvensis</li> <li>• Asarum europium</li> <li>• Piper nigrum</li> <li>• Apium graveolens</li> <li>• Althaea officinalis,</li> <li>• Coccus lacca</li> <li>• Origanum vulgare</li> <li>• Commiphora myrrha,</li> <li>• Carum carvi</li> <li>• Seeds of Ruta graveolens</li> <li>• Nigella sativa.</li> </ul>

TPM: Traditional Persian Medicine.

#### 4- DISCUSSION

TPM scholars believed that paying more attention to the prevention of obesity is better than its cure. Maintaining health is so important that the main duty of physicians should be to keep people healthy and treat them only if they become sick. According to TPM manuscripts, regulating body weight within the normal

range plays an important role in keeping the health of body organs and their proper functioning (12). In CM, obesity is a major risk factor for diabetes, cardiovascular diseases, cancer, non-alcoholic fatty liver, osteoarthritis, and other diseases (17). Therefore, the prevention and treatment of pediatric obesity is a top priority for healthcare in both TPM and CM. In this

section explores some similarities in terms of TPM and CM in the management of obesity:

#### **Relationship between digestive system and obesity:**

In TPM, any disturbance in the digestive organs, such as dystemperament in the liver, stomach, and gut, can play a role in obesity (13). Also, poor digestion is one of the main causes of obesity in TPM (12). In CM, The gastrointestinal system plays a key role in the pathogenesis of obesity and facilitates caloric imbalance. Some studies have shown that by digestion and absorption of nutrients, digestive organs play an important role in the physiology of energy (18). It has been shown in various studies that lifestyle improvement including counseling about stress management and dietary changes, exercise habits and sleep in patients with gastrointestinal disorders play an important role in improving digestive symptoms (19). Also, researchers have identified a strong and complex relationship between the micro-flora population of the gut and food absorption (20).

#### **Relationship between constipation and obesity:**

Based on TPM, constipation can cause obesity with accumulation of wastes in the body (13). In CM the prevalence of obesity in children with constipation is more common in comparison with the control group of the same age and sex. Obesity may be attributed to dietary factors, activity levels, or hormonal effects and should be evaluated precisely (37). Other studies show that the prevalence of obesity in children with constipation is more common in comparison with the control group of the same age and sex. Obesity may be attributed to dietary factors, activity levels, or hormonal effects and should be evaluated precisely (21).

#### **Relationship between diet Type and obesity**

TPM has a more comprehensive view of the treatment of obesity and also assumed a singular look at a person's diet in the treatment of obesity: In addition to calorie diet and type of food, it also considers the temperaments of disease, food. Therefore, recurrence of weight gain after modification of the patient's temperament through treatment is less common. Based on TPM, food can have a warm or cold effect on the temperament and cause the related signs and symptoms. TPM emphasizes the consumption of plants and foods items with a hot and dry temperament in obesity treatment (13, 16). It is important to note that TPM scientists emphasized the consumption of plants with a hot and dry temperament in obesity treatment (9, 14). Hot and dry plants cause weight loss through different mechanisms such as enhanced thermogenesis and activation of protein kinase, reduced expression of multiple genes involved in adiposeness (22), increasing energy consumption and oxidation of lipids, and reduced appetite (23).

There is a close relationship between major chemical compounds of medicinal plants and their temperaments. Dr. Shams Ardekani et al. have shown that plants whose chief components are phenolic compounds have a hot and dry temperament (24). Another study found that polyphenols in fruit, vegetables, and dietary supplements at appropriate concentrations, which are easily absorbed in the intestine, can be a potential candidate for the prevention and treatment of obesity (25). Based on CM, the thermic effect of food (TEF), which consumes about 10% of the total energy, includes the energy for the digestion, absorption, and metabolism of nutrients. Compared with spice-free food, food items with spices have higher and longer TEF—i.e. meals with chili or mustard can increase the metabolism up to 33% more than the food without them—and their effects can

continue for up to three hours (26). Children differ from adults in their absorption, distribution, metabolism, and defecation of some ingredients. On the other hand, children are more efficient in terms of detoxification because of having livers larger than adults. However, children are more sensitive to the adverse effects of herbs as their central nervous and immunity systems undergo development (27). Children are physiologically more vulnerable to the adverse effects of some plants than adults. For example, some herbs, such as senna and aloe, are known cathartics, while herbal tea contains powerful diuretic combinations (27, 28). These plants may cause a lack of water and electrolyte disturbance in children, while adults can easily compensate for this type of dehydration (27). Therefore, it is very important to consider doses, side effects, and drug interactions when administering herbal medicine to children.

#### **Relationship between Air quality and obesity:**

In TPM, there is a direct connection between air and one's temperament and Polluted air can cause sickness in a person (13). In based on CM, air pollution can harm ones health slowly or suddenly; it depends on the severity of airborne contamination (29). Obesogens are chemical compounds foreign to the body that disrupt the normal metabolism of lipids, eventually resulting in fatness and obesity (20). Animal studies have also shown that early life contact to urban particulate substance causes mitochondria injury and increased accumulation of white adipose tissue relative to metabolically active brown adipose tissue and more energy is stored in the body (30).

#### **Relationship between sleep and obesity**

In TPM, too much sleeping creates coolness and wetness in the body and causes obesity or exacerbation, on the

other hand lack of sleep leads to poor digestion and accumulation of waste products in the body and causes obesity (16). Some study show that short sleep duration, high sleep duration variability, and sleep-related problems are associated with an obesity-promoting diet for children. Short-term (6%) and long-term sleep (3%) was significantly related to obesity, and an average of seven to eight hours of sleep every day is necessary to maintain a good health (31). However, another cross-sectional study of children aged 7–9 years old shows that there is an inverse relationship between long sleep and the prevalence of overweight/obesity and body fat (32).

#### **Relationship between exercise and obesity:**

TPM emphasizes physical therapy in the treatment of obesity; too much rest results in a wet and cold body, thereby increasing the development of obesity (9, 14). Most research suggests that exercise is more effective for preventing someone from being of overweight and obese. Moreover, high-intensity interval walking programs can improve peak aerobic capacity and cardiovascular risk factors in middle-aged sedentary individual (33).

#### **Relationship between Psychiatric disorders and obesity:**

In TPM, sadness and depression may decrease vital energy (Hararat-e Ghareezi), resulting in coldness of the whole body and obesity (9, 12). In CM, childhood depression is positively correlated with BMI during adolescence (34). In a study, there was a direct relationship between the symptoms of depression and BMI in preschool girls. Additionally, overweight girls with symptoms of depression have a greater need for weight control because, in addition to the risk of developing depression, they are at the risk of eating disorders (35).



## 5- CONCLUSION

The role of Setteh-e-Zarurieah (Lifestyle) in the prevention and treatment of obesity in accordance with Traditional Persian Medicine (TPM) matches some findings in Classical Medicine. Unhealthy lifestyle for example irregular sleep, overeating and wrong nutritional habits, insufficient physical activity, and emotional excitement, such as sadness and anxiety, can cause obesity. TPM also adopted a special look at the individual's diet in the management of pediatric obesity. It is important to note that in the formulation of diet and medicine based on TPM, much emphasis has been placed on the consumption of plants and foods with hot and dry temperament in obesity treatment. This can help researchers to find more effective and safer approaches and promote a healthy lifestyle for pediatric obesity management. Further investigation with clinical trials should be performed to confirm the long-term efficacy of these modalities as a complementary therapy in pediatric obesity management.

**6- CONFLICT OF INTEREST:** None.

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## 8- REFERENCES

1. Martin A, Saunders DH, Shenkin SD, Sproule J. Lifestyle intervention for improving school achievement in overweight or obese children and adolescents. *Cochrane Database Syst Rev*. 2014 ;(3):CD009728.
2. Klish WJ. Definition; epidemiology; and etiology of obesity in children and adolescents. *Up-To-Date*, Rose, BD (Ed), *Up-To-Date*, Waltham, MA. 2007.
3. Khazaei S, Mohammadian-Hafshejani A, Nooraliey P, Keshvari-Delavar M, Ghafari M, Pourmoghaddas A, et al. The prevalence of obesity among school-aged children and youth aged 6-18 years in Iran: A systematic review and meta-analysis study. *ARYA atherosclerosis*. 2017;13(1):35.
4. Jafari-Adli S, Jouyandeh Z, Qorbani M, Soroush A, Larijani B, Hasani-Ranjbar S. Prevalence of obesity and overweight in adults and children in Iran; a systematic review. *Journal of Diabetes & Metabolic Disorders*. 2014;13(1):121.
5. Bachman ES, Dhillon H, Zhang C-Y, Cinti S, Bianco AC, Kobilka BK, et al.  $\beta$ AR signaling required for diet-induced thermogenesis and obesity resistance. *Science*. 2002;297(5582):843-5.
6. Qi Z, Kelley E. The WHO traditional medicine strategy 2014–2023: a perspective. *Science*. 2014;346(6216):S5-S6.
7. Khodae GH, Emami Moghadam Z, Khademi G, Saeidi M. Healthy Diet in Children: Facts and Keys. *International Journal of Pediatrics*. 2015; 3(6.2):1183-94.
8. Haghi M, Mazloomi Mahmoodabad SS, Mozaffari-Khosravi H, Eslami Shahrbabaki H, Fallahzadeh H. Analysis of Weight Control among Overweight and Obese Iranian Adolescents: Application of the Trans-theoretical Model. *International Journal of Pediatrics*. 2018; 6(2):7013-22.
9. Qi Z, Kelley E. The WHO traditional medicine strategy 2014–2023: a perspective. *Science*. 2014;346(6216):S5-S6.
10. Ibn-Sina H. *Al-Qanun fi'l-Tibb*. Canon of Medicine. New Delhi: I.H.M.M.R. Printing Press; 1987.
11. Arzani M. *Tebbe akbari*. Iran, Qom: Jalaleddin; 2008.
12. Ahwazi M. *Kamel-al-Sanaat al-Tibbiah*(The Perfect Art of Medicine). Bulaq: Al-Matbaah al-Misryyah; 1877.
13. Razi MZ. *Al-Hawi fi'l-Tibb*. Comprehensive Book of Medicine. Hyderabad: Osmania Oriental Publications Bureau; 1986.
14. Pasalar M, Nimrouzi M, Choopani R, Mosaddegh M, Kamalinejad M, Mohagheghzadeh A, et al. Functional dyspepsia: A new approach from traditional Persian medicine. *Avicenna J Phytomed*, 2016; 6 (2): 165-74.

15. Javan R, Kooshki A, Afzalaghaee M, Aldaghi M, Shokri S, Naghedi Baghdar H, et al. Herbal Appetizer for Children with Failure to Thrive (FTT) in View of Traditional Persian Medicine: A Review. *International Journal of Pediatrics*. 2017;6203-20.
16. Jorjani SE. *Zakhireh Kharazmshahi (Treasure of Kharazmshahi)*. Tehran: The Iranian Culture Foundation; 1976.
17. D. S. Complications of obesity in adults: a short review of the literature. *Malawi MI Journal*. 2014;26(1):20-4.
18. Badman MK, Flier JS. The gut and energy balance: visceral allies in the obesity wars. *Science*. 2005;307(5717):1909-14.
19. Miwa H. Life style in persons with functional gastrointestinal disorders—large scale internet survey of lifestyle in Japan. *Neurogastroenterology and Motility*. 2012;24(5):464-71.
20. Gallagher M, Mahan L, Escott-Stump S, Raymond J. *Krause's Food and the Nutrition Care Process*. 2012. ISBN: 9780323340755 (hardcover)
21. Pashankar DS, Loening-Baucke V. Increased prevalence of obesity in children with functional constipation evaluated in an academic medical center. *Pediatrics*. 2005;116(3):e377-e80.
22. Lee MS, Kim IH, Kim CT, Kim Y. Reduction of body weight by dietary garlic is associated with an increase in uncoupling protein mRNA expression and activation of AMP-activated protein kinase in diet-induced obese mice. *J Nutr*. 2011;141.11:1947-53.
23. Whiting S DE, Tiwari B; appet.2012.05.015. Capsaicinoids and capsinoids. A potential role for weight management? A systematic review of the evidence. *J Appetite* 2012; 59:341–48.
24. Ardekani MRS, Rahimi R, Javadi B, Abdi L, Khanavi M. Relationship between temperaments of medicinal plants and their major chemical compounds. *Journal of Traditional Chinese Medicine*. 2011;31(1):27-
25. Sergeant T, Vanderstraeten J, Winand J, Beguin P, Schneider Y-J. Phenolic compounds and plant extracts as potential natural anti-obesity substances. *Food chemistry*. 2012;135(1):68-73.
26. Farsani GM, Movahhed M, Motlagh AD, Hosseini S, Yunesian M, Farsani TM, et al. Is the Iranian Traditional Medicine warm and cold temperament related to Basal Metabolic Rate and activity of the sympathetic-parasympathetic system? Study protocol. *Journal of Diabetes and Metabolic Disorders*. 2014;13(1):74.
27. Tomassoni AJ, Simone K. Herbal medicines for children: an illusion of safety? *Current opinion in pediatrics*. 2001 Apr 1; 13(2):162-9.
28. Saxe T. Toxicity of medicinal herbal preparations. *American family physician*. 1987;35(5):135-42.
29. Park K. Edn18th BB, Jabalpur Park's *Textbook of Preventive and Social Medicine*. 2005; 542:7.
30. McConnell R, Gilliland F, Goran M, Allayee H, Hricko A, Mittelman S. Does near-roadway air pollution contribute to childhood obesity? *Paediatric obesity*. 2016; 11(1):1.
31. Buxton OM, Marcelli E. Short and long sleep are positively associated with obesity, diabetes, hypertension, and cardiovascular disease among adults in the United States. *Social science and medicine*. 2010;71(5):1027-36.
32. Padez C, Mourao I, Moreira P, Rosado V. Long sleep duration and childhood overweight/obesity and body fat. *American Journal of Human Biology*. 2009;21(3):371-6.
33. DiPietro L, Stachenfeld NS. Exercise treatment of obesity. 2013. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK278961/>
34. Pine DS, Goldstein RB, Wolk S, Weissman MM. The association between childhood depression and adulthood body mass index. *Pediatrics*. 2001;107(5):1049-56.
35. Erickson SJ, Robinson TN, Haydel KF, Killen JD. Are overweight children unhappy?: Body mass index, depressive symptoms, and overweight concerns in elementary school children. *Archives of pediatrics and adolescent medicine*. 2000;154(9):931-5.