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## Obesity and Alternative Medicine Treatment Possibilities

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### **Abstract**

*Obesity is characterized with increased body fat compared to lean body mass and is a chronic disease caused by excess energy from the energy consumed by the body's nutrients. Obesity is a growing health problem of today's world. The prevalence of obesity has almost doubled between 1980 and 2008 in worldwide research, and according to this finding; almost more than half a billion adults were obese in the worldwide. The main factor that causes obesity is that the amount of energy entering the body is more than the amount of energy consumed. Much of this extra energy comes from increased carbohydrate and fat consumption. In recent years, the incidence of obesity has increased due to increased consumption of carbohydrates, fat-rich foods and carbonated beverages. The area and distribution of fat in the body is associated with the morbidity and mortality of the diseases. In the treatment It is aimed that to reduce energy intake below the energy consumption at obesity treatment. Because of this, one of the treatment method is taking additional nutrients that we can count under the Complementary Alternative Medicine (CAM). Especially in China, it is used extensively among alternative therapists. A lot of different studies were carried out related to obesity and treatment possibilities using with CAM methods in the world, and a lot of different results were obtained from these studies. Since CAM methods much cheaper than other methods, everyday prefers by the people increasingly. But the possible negative effect of these CAM methods should be explained to the public widely and the people to be warned.*

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**Key Words:** *Obesity, alternative medicine (CAM) and antiobesity treatment possibilities.*

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### **Introduction**

Obesity is characterized with increased body fat compared to lean body mass and is a chronic disease caused by excess energy from the energy consumed by the body's nutrients. Obesity is a growing health problem of today's world. Obesity and together, insulin resistance syndrome, Diabetes Mellitus (DM), hypertension, coronary heart disease, hyperlipidemia, non-alcoholic fatty liver disease, some cancers, sleep apnea, and diseases such as osteoarthritis has become a community problem. Obesity, which can be inherited especially in developed and developing countries, is spreading rapidly. It has been reported that there were 1.4 billion pre-obese and 400 million obese in the world in 2008 and 2.3 billion pre-obese and 700 million obese in 2015 (THSK, 2015).

Obesity is defined as an increase in the body fat mass to fat-free mass, resulting in an increase in body weight over the desired height, while WHO is defined as an abnormal or excessive fat build-up in the body to disrupt the health in its 1997 declaration (Tam and Çakır, 2012). 35% of adults aged 20+ were overweight (BMI  $\geq$  25 kg/m<sup>2</sup>) (34% men and 35% of women) in 2008. The prevalence of obesity has almost doubled between 1980 and 2008 in worldwide

research, and according to this finding; almost more than half a billion adults were obese in the worldwide.

The prevalence were highest in the WHO Regions of the Americas (62% for overweight in both sexes, and 26% for obesity) and lowest in the WHO Region for South East Asia (14% overweight in both sexes and 3% for obesity) for overweight and obesity. The reality that women had more tendency to be obese than men, obtained from all WHO regions in the World.

Body Mass Index (BMI) is widely used by WHO to determine obesity based on obesity classification (WHO, 2013). BMI is the value obtained by dividing the individual body weight (kg) by the length of the body in meters (BMI = kg / m<sup>2</sup>).

**Table 1: Weakness, overweight, and obesity in adults compared to BMI Classification (WHO, 2004).**

Classification	BMI(kg/m <sup>2</sup> )	
	Principal cut-off points	Additional cut-off points
Underweight	< 18.50	< 18.50
Severe thinness	< 16.00	< 16.00
Moderate thinness	16.00 - 16.99	16.00 - 16.99
Mild thinness	17.00 - 18.49	17.00 - 18.49
Normal range	18.50 - 24.99	18.50 - 22.99
		23.00 - 24.99
Overweight	≥ 25.00	≥ 25.00
Pre-obese	25.00 - 29.99	25.00 - 27.49
		27.50 - 29.99
Obese	≥ 30.00	≥ 30.00
		30.00 - 32.49
Obese class I	30.00 - 34.99	32.50 - 34.99
		35.00 - 37.49
Obese class II	35.00 - 39.99	37.50 - 39.99
		≥ 40.00
Obese class III	≥ 40.00	≥ 40.00

Source: Adapted from WHO, 1995, WHO, 2000 and WHO 2004.

The median BMI should be in the range of 21 to 23 kg / m<sup>2</sup> for the adult population to reach optimal health by WHO. Nevertheless, the target for the person should be to maintain the BMI in the range of 18.5-24.9 kg / m<sup>2</sup>. The risk of disease increases in BMIs with a distribution of 25.0-29.9 kg / m<sup>2</sup>. In the case of 30 kg / m<sup>2</sup> of excess BMI, the risk of the related disease increases moderately to severe.

The main factor that causes obesity is that the amount of energy entering the body is more than the amount of energy consumed.

Regular physical activity has an important role in regulating energy balance, reducing health problems caused by obesity and deaths related to these problems. Age, chronic diseases and symptoms are assessed together by performing cardiopulmonary checks before obese individuals begin applying a new physical activity (Baltacı, 2012). With exercise, which constitutes a significant part of the weight loss program, a 5% loss in weight can be achieved. An average of at least 30 minutes of moderate-intensity exercise each day provides an energy consumption of 840 kJ (200 kcal) (Akbulut, 2010).

**Table 2 :Sugar contents of some products (Sarı and Babacan, 2014).**

Sugar	Fructose	Glukose	Saccharose (Fructose-Glukose)	Other sugar
Granulated sugar	(50)	(50)	100	0
Brown sugar	1	1	97	1
HFCS-42	42	53	0	5
HFCS-55	55	41	0	4
HFCS-90	90	5	0	5
Honey	50	44	1	5
Maple syrup	1	4	95	0
Molasses	23	21	53	3
Corn syrup	0	35	0	0

Much of this extra energy comes from increased carbohydrate and fat consumption. In recent years, the incidence of obesity has increased due to increased consumption of carbohydrates, fat-rich foods and carbonated beverages.

**Table 3: Fat content of some food. (Nutrition, 2010).**

Fat Content - Animal vs. Plant Foods			
Food Item	Fat (% of Calories)	Food Item	Fat (% of Calories)
Beef (sirloin), lean, raw	36	Beans (kidney), canned	4
Pork (leg, loin, shoulder), lean, raw	37	Lentils, raw	3
Chicken breast (meat & skin) raw	49	Brown Rice (medium-grain), uncooked	6
Turkey (dark meat), raw	32	Bread (rye)	11
Salmon (wild Atlantic), raw	40	Broccoli, raw	10
Tuna (Bluefin), raw	31	Strawberries, raw	8
Beef (ground, 90% lean), raw	51	Beans (pinto), canned	8
Egg (whole), raw	63	Cherry Tomatoes, raw	7
Milk (2% milkfat)	35	Soy Milk (light, plain)	26
Cheese (cheddar)	72	Apple, raw	3

\*Data obtained from Nutritiondata.com, accessed 12/22/10

The area and distribution of fat in the body is associated with the morbidity and mortality of the diseases (WHO, 2013). Regional distribution of fat in men and women is genetically different. In male type obesity, fat is collected in the upper part of the body, in waist, upper abdomen and breast regions (apple type). When the female type obesity is, the fat is collected in the lower part of the body such as; in the hips, thighs and legs (pear type).

The factors, causing to obesity are:

- Excessive and incorrect eating habits
- Insufficient physical activity
- Age
- Sex
- Education level
- Socio-cultural factors
- Income status
- Hormonal and metabolic factors
- Genetic factors
- Psychological problems
- Apply very low-energy diets at frequent intervals
- Non-alcohol use
- Some drugs used (antidepressants, etc.)
- Number of births and time between births

### **The types of obesity are ;**

according to fat distribution;

- **Central (Man type) Obesity:** This type of obesity known as Apple type, abdominal, upper part of waist and central fatness. In this model, the quantity of fat cell to per unit is much higher. The fats are collected mostly in body and stomach compare to arms and legs. This type of obesity are more subject to metabolic disease. The fat deposition in waist part can give a damage to internal organs. Especially; cancer, chronic disease and fat deposition in liver can be seen much higher rate. The period and the quality of lifetime is much down.
- **Subcutane (Women type) Obesity:** This obesity type known as also; gluteofemoral, under the belt, subcutaneous, women type (gynaecoid) and pear type. The fat are collected under the skin and in hip parts in this type. The risks and threats are less compare to the man type of obesity. (Evsen, 2016).

### **According to the age of onset of obesity**

- **Hypersellic Obesity:** Obesity type is seen in childhood. The reason for this is the increase in the number of cells that store fat in the body.
- **Hyperplastic obesity:** Obesity type occurs in adults. The reason for this is the increase in the volume of cells that store fat in the body. Though there is no change in the cell number, it leads to an increase in the volume of the cells.

### **The treatment methods, used in obesity are:**

It is aimed that to reduce energy intake below the energy consumption at obesity treatment. Because of this, most diets consist of cellulosic substances. These nutrients create a feeling of toughness by swelling (Grenway and Smith, 2000). Therefore, it has to be more carefull to the intake of these substances in diet treatment. Behavioral therapy and exercise are used as alternative treatment methods in cases where the diet treatment is not sufficient in obesity.

Behavior therapy; it is aimed that that the lifestyle and the environmental factors that cause the patient to overeat is recognized and changed with the behaviour therapy. (Dunitz, 2001).

Diet treatment: It is aimed to achieve ideal weight and to maintain ideal weight by ensuring energy deficit in healthy nutrition treatment of obesity and reducing body fat deposits without loss of muscle mass in muscular and vital organs (Grenway and Smith, 2000).

Medication; can be used in dietary, exercise and lifestyle changes, in addition to the treatment of overweight and obese patients. However, problems such as the efficacy of drugs, safety, slowing of weight gain during treatment, and weight gain after withdrawal are limitations of

drug treatment in obesity. Medication; may be useful in patients with BMI > 30 kg / m<sup>2</sup>, BMI 27-29.9 kg / m<sup>2</sup> and those with additional morbidity and gastrointestinal bypass surgery (Yanovski, 2014).

Exercise is recommended. Inactivity, defined as physical immobility or sedentary life, has been shown to cause increased epidemic obesity in adults and children worldwide. 1.9 million deaths are linked to physical activity inadequacy in the World (WHO, 2009).

### Literature Summary

One of the treatment methods is taking additional nutrients that we can count under the Complementary Alternative Medicine (CAM). The CAM methods are getting more interest in the world every day and transferring into main treatment method instead of alternative. Because of taking more interest, the US government established NCCAM (The National Center for Complementary and Alternative Medicine) in 1998 to give advices and support researches about the CAM methods. NCCAM has categorized the CAM methods in five groups: (1) Alternative medicine systems: They are east medical methods such as; traditional Chinese medicine, traditional Tibet medicine, ayurvedic medicine, and also some western methods like homeopathy and naturopathy. (2) Mind-body medicine: aiming to healthy body with mental applications such as; art therapy, meditation, yoga and NLP (neuro linguistic programming). (3) Biologically based therapy: includes vitamins, diets, plants, vegetal drugs such as echinacea, ginseng, ginkgo, thyme, nettle grass, brocoli, brussel sprout, senna, green tea and aloe vera and other natural products. (4) Manipulative and body based methods: lean on the motion of body such as; Shiropactic, osteopathy, Cranio sacral therapy, massage and Alexander Technic. (5) Energy Therapies: Either applied with magnets and similar product called bio-electromagnetic therapies or acupunctur, acupresur, gi gung, reflexology, bioenergy, reiki, shiatsu, ta and chi generally called bio-area therapies. (Akgül and Dosay-Akbulut, 2014).

Especially in China, it is used extensively among alternative therapists. Herbal supplements; such as ginger, *Garcinia cambogia*, *Camellia sinensis*, chromium picolinate, conjugated linoleic acid (CLA), *Hoodia gordonii*, *Cynanchum auriculatum*, chitosan; and other some CAM methods such as; acupuncture, non-invasive body contouring, including high intensity focused ultrasound (HIFU), laser therapy, cryolipolysis and radiofrequency (RF) were used intensively in the treatment of obesity.

One of the ingredients in diet treatment is the use of ginger. The greatest and most important feature of ginger is its safety. It is accelerating the metabolism with its appetite suppressant properties (Esteghamati et al., 2015 )

Herbal medicine interventions for obesity are being studied mostly in China more than several countries. The outcome of each study varied and summarized in five categories: (1) change in body weight: a significant decrease in body weight using xin-ju-xiao-gao-fang (XJXGF, compound of rhubarb, Coptis, semen cassiae, and Citrus aurantium), yellow pea fiber, bofu-tsusho-san (compound of Radix Platycodi, Gypsum Fibrosum, talcum, Paeoniae, Scutellariae, and Glycyrrhizae), RCM-104 (compound of Camellia sinensis, flos sophorae, and semen cassiae), pistachio, Satiereal®, Monoselect Camellia (containing green tea extract: GreenSelect® Phytosome®), or Nigella sativa; (2) BMI: a significant decrease in body fat with using xin-ju-xiao-gao-fang, bofu-tsusho-san, RCM-104, Linggui Zhugan Decoction (compound of poria, Macrocephalae, Radix Glycyrrhizae, Ramulus Cinnamomi, and Radix Atractylodis), Pu'er tea, pistachio, or Monoselect Camellia; (3) a significant decrease in waist or hip circumferences with herbal medicine packets of xin-ju-xiao-gao-fang, Pu'er tea, Satiereal, Catechin enriched green tea, West African Plant (*Irvingia gabonensis*), and Cissus



quadrangularis(*Irvingia gabonensis*); (4) decreasing of food intake with RCM-104 and yellow pea fiber (5) other positive effects into quality of life. This study provide huge information related to using of herbal medicine against to the treatment of obesity all over the World (Yanfei et al., 2017).

According another research; they found that adults with obesity have prefer using of yoga therapy, and other different CAM methods, such as relaxation techniques, natural herbs, massage, chiropractic medicine, tai chi, and acupuncture, less than normal-weight individuals. Within these CAM methods; the most preferable one is the relaxation techniques, while the use of herbs, massage therapy, and yoga was much less in adults with obesity were determined (Bertisch, et al., 2008).

In another research the fifty-five patients with obesity were included. Age, sex, weight, body mass index (BMI), waist, fasting plasma glucose (FPG), fasting insulin (FI), lipid, thyroid stimulating hormone (TSH), free thyroxine (fT<sub>4</sub>), and HOMA were determined. A survey based on the 30 questions related to occupation, marital status, educational level, accompanying diseases, treatment modalities and any type of CAM that they preferred. As a result; they found that 69.1% of these patients used at least one CAM technique. Within these technique; the herbal therapy has highest prevalence with 94.7 % of CAM users had tried at least one herbal therapy. Cabbage (*Brassica oleracea*), linseed (*Linum usitatissimum*) and cinnamon (*Cinnamomum verum*) were the most common herbs that patients used. Acupuncture was also preferred frequently by the patients with obesity (36.4%) (Aksoy, et al., 2010) .

Other study based on the using of ginger as herbal medicine within the CAM method. To investigate the antiobesity effect of ginger on rats, rats were fed with high fat and ginger nutrition for 8 weeks. As a result, the weight of the ginger group was less than compare to the control group. As the proportion of ginger increases in the content of the feed; the adipose tissue weight decreased. From these findings it has been suggested that the antiobesity effect of ginger was occurred with inhibiting fat absorption, and this influence came up from mainly the active components of ginger (Han et al., 2005).

In another study; the frequency and the connection of complementary and alternative medicine use for weight control were searched. Analyses focused on 372 people who had used CAM within the previous 12 months. Within the total, 3.3% (n = 372) had used a CAM therapy in the previous 12 months. The most popular therapy were yoga (57.4%), meditation (8.2%), acupuncture (7.7%), massage (7.5%), and Eastern martial arts (5.9%), and the majority of CAM users used CAM therapies on their own. Most of them also indicated that their CAM use was supported with other weight-loss strategies such as; using a lower carbohydrate and higher protein diet as well (Sharpe et al., 2007).

In another research; the effect of polyherbal formulation (containing *Fomitopsis pinicola*, *Acanthopanax senticosus*, *Viscum album*, and *Allium tuberosum*), against to high-fat diet-(HFD-) induced obesity were examined. Using of this polyherbal formulation in HFD fed mice for 12 weeks as a treatment resulted with reducing in body and white adipose tissue (WAT) weights and occurrence of fatty liver. In addition to this, the polyherbal formulation decreased serum lipids, leptin, and insulin levels together with hepatic lipids. It was summarized that these polyherbal formulation have an inhibitory effects against to obesity and can be use in treatment of obesity and fatty liver caused by a high-fat diet as an effective therapeutic product (Jung et al., 2016).

In another study; included overweight (body mass index [BMI], 25–30 kg/m<sup>2</sup>) or obese (BMI, >30 kg/m<sup>2</sup>) male and female patients between 20 to 50 years old in Colombia in 2002. This study based on 94 patients (70 women, 24 men; mean [SD] age, 36.5 [9.7] years; mean [SD] BMI, 28.4 [4.2] kg/m<sup>2</sup>). Forty-nine (52.1%) patients declared self-treatment with weight-loss CTPs (complementary therapies and products); 40 (42.6%) patients used complementary products, and 21 (22.3%) used complementary therapies. Among the products, herbal medicines, folkloric or home remedies, and commercial diets were mostly used (40.0%, 40.0%, and 27.5%, respectively). The use of CTPs was more prevalent in women especially with higher education compared with men ( $P < 0.001$ ; odds ratio [OR] = 6.43). (Amariles et. al., 2006).

Another different study was designed to search the role of changes in leptin and beta endorphin (BE) levels in decreasing of the weight following electroacupuncture (EA) application against to obesity. EA was applied to 20 females as a 41.45 +/- 4.71 years old and had a body mass index of 36.00 +/- 2.66; and a diet program was applied to 20 females as 42.30 +/- 4.35 years old and had a body mass index of 34.90 +/- 3.21. They came a cross with 4.5% weight reduction in the patients with EA application, whereas 3.1% weight reduction in patients with diet programme. A decrease in body weight was seen in the EA group ( $p < 0.000$ ) compare to the diet restricted group. Also a decrease in serum leptin levels ( $p < 0.000$ ) and in contrast to this an increase in the serum BE ( $p < 0.05$ ) levels were obtained in the EA group compare to the diet restricted group. According to these findings; it was indicated that the reduced serum leptin levels followed same route with body weight lost which were seen in the EA group. Also, it is thought that the increasing serum BE level in the EA group, most probably stimulated the lipolytic activity which may have promoted the weight loss with activating of energy stores in obese people (Cabioglu and Ergene, 2006).

A WHO expert consultation; mentioned the explanation of recommended body-mass index (BMI) for specifically Asian populations. He indicated that Asian populations have different associations between BMI, percentage of body fat, and health risks such as high risk of type 2 diabetes and cardiovascular disease than European populations (Nishida, 2004).

### **Conclusion:**

Obesity is getting one of main problem in these days in the world. Especially on the basis of consumption of unhealthy diet in well developed countries affect negatively weight problem towards obesity. To find effective treatment method against to obesity taking more importance every day. In this summary giving information on obesity and some CAM method as an alternative treatment were given. The studies including herbal medicine against to obesity are carried out mostly in China more than several countries. Within these CAM methods; the most preferable one is the relaxation techniques, while the use of herbs, massage therapy, and yoga was much less preferred according to studies. But some other studies indicated that the herbal therapy has highest prevalence with 94.7 % and Cabbage (*Brassica oleracea*), linseed (*Linum usitatissimum*) and cinnamon (*Cinnamomum verum*) were the most common herbs that patients used. Acupuncture was also preferred frequently by the patients with obesity (36.4%) as well. However some different studies resulted with the finding of the most popular therapy were yoga (57.4%), meditation (8.2%), acupuncture (7.7%), massage (7.5%), and Eastern martial arts (5.9%), and the majority of CAM users used CAM therapies on their own. Most questioner also indicated that their CAM use was supported with other weight-loss strategies such as; using a lower carbohydrate and higher protein diet as well. Some of these studies related to leptin levels and obesity relation. These researchers found that the reduced serum leptin levels followed same route with body weight

lost which were seen in the EA (electroacupuncture) group. Also, it is thought that the increasing serum BE level in the EA group, most probably stimulated the lipolytic activity which may have promoted the weight loss with activating of energy stores in obese people. This finding also supported by the polyherbal formulation (containing Fomitopsis pinicola, Acanthopanax senticosus, Viscum album, and Allium tuberosum) research as well. In this study; the polyherbal formulation decreased serum lipids, leptin, and insulin levels together with hepatic lipids. They gave an explanation as; this polyherbal formulation have an inhibitory effects against to obesity and can be use in treatment of obesity and fatty liver caused by a high-fat diet as an effective therapeutic product. A lot of different studies were carried out related to obesity and treatment possibilities using with CAM methods in the world, and a lot of different results were obtained from these studies. Since CAM methods much cheaper than other methods, everyday prefers by the people increasingly. However, despite increased use of CAM methods in the World, it is still seen as an alternative treatment, and the public should be more informed by the medical staff and media about the CAM methods' advantages and their potential negative interactions with drugs and possible hazardous effects.

### Referances:

- Akbulut, G. (2010). Erişkinlerde şişmanlığın diyet tedavisindeki güncel yaklaşımlar ve fiziksel aktivitenin önemi. *Meslek içi sürekli eğitim dergisi*. 23-24:86-90.
- Akgül E, Dosay-Akbulut M. 2014. Use of Complementary or Alternative Medicine In Patients With Cancer In Turkey. *Journal of US-China Medical Science*. Jul.-Sep. Volume 11, No. 3 (Serial No. 95) pp. 159-167.
- Aksoy Duygu Yazgan, Cinar Nese, Levendoglu Fuat, Canikli Yasemin, Yildiz Bulent Okan, Bayraktar Miyase, Usman Aydan & Ilbars Zafer. (2010). Complementary and alternative medicine use in patients with obesity: an anthropological approach. *Endocrine Abstracts.*, 22: P707.
- Amariles Pedro, González Laura I., Giraldo Nubia A. (2006). Prevalence of self-treatment with complementary products and therapies for weight loss: A randomized, cross-sectional Study in Overweight and Obese Patients in Colombia. *Current Therapeutic Research*. Vol. 67(1): 66-78.
- Baltacı, G.(2012). Obezite ve egzersiz. T.C Sağlık Bakanlığı, Türkiye Halk Sağlığı Kurumu, obezite ve metabolik hastalıklar dairesi başkanlığı yayın no:730 2.baskı Ankara.
- Bertisch Suzanne M., Wee Christina C., and McCarthy Ellen P. (2008). Use of Complementary and Alternative Therapies by Overweight and Obese Adults. *Obesity* (Silver Spring). 16(7): 1610–1615.
- Cabioğlu MT and Ergene N. (2006). Changes in serum leptin and beta endorphin levels with weight loss by electroacupuncture and diet restriction in obesity treatment. *Am J Chin Med*. 34(1):1-11.
- Dunitz, M. (2001). Obezite ve İlişkili Hastalıkların Tedavisi.1.Baskı, İstanbul, AND Danışmanlık Eğitim Yayıncılık ve Organizasyon Ltd. Şti.
- Esteghamati Alireza, Mazaheri Tina, Rad Mona Vahidi, and Noshad Sina. (2015). Complementary and Alternative Medicine for the Treatment of Obesity: A Critical Review. *Int. J. Endocrinol. Metab.*, 13(2): e19678.
- Evsen, H. 2016. Ratlarda Obezite Oluşumunda Balık Yağı ve Mısır Şurubunun Etkisi ile Zencefil ve Nikotin Obezite olan Ratlardaki Antiobezite Etkisinin Belirlenmesi. AKÜ bilimsel araştırma projeleri komisyonu, 14.SAĞ.BİL.05.Thesis. Afyon. 78 p.
- Grenway, FL., Smith, SR. (2000). The future of obesity research. *Nutrition*,16: 976-982.
- Han, LK., Gong, XJ., Kawano, S, Saito., M, Kimura., Y., Okuda, H. (2005). Antiobesity actions of Zingiber officinale Roscoe. *Yakugak Zasshi.*, 125(2):213-7



- Hoe-Yune, Ji Yosep, Ki Na-Ri m, Kim Do-Young, Kim Kyong-Tai, and Choi Bo-Hwa. (2016). A Fomitopsis pinicola Jeseng Formulation Has an Antiobesity Effect and Protects against Hepatic Steatosis in Mice with High-Fat Diet-Induced Obesity. *Evidence-Based Complementary and Alternative Medicine* Vol. (2016): Article ID 7312472, 10 pages.
- Nishida Chizuru. (2004). Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet* 363: 157–63. Department of Nutrition for Health and Development, WHO, 20, Avenue Appia, 1211 Geneva 27, Switzerland. WHO expert consultation.
- Sarı, E., Babacan, O. (2014). Fruktoz; Bir Halk Sağlığı Sorunu mu? *TAF Prev. Med. Bull.*, 13(5):401-404.
- Sharpe PA1, Blanck HM, Williams JE, Ainsworth BE, Conway JM. (2007). Use of complementary and alternative medicine for weight control in the United States. *J Altern Complement Med.* 2007 Mar;13(2):217-22.
- Tam A., Çakır B. (2012). Birinci basamakta obeziteye yaklaşım. *Ankara Medical Journal.*, 12(1):37-41.
- Türkiye Halk Sağlığı Kurumu (THSK). (2015). Obezite. <http://beslenme.gov.tr/index.php?lang=tr&page=40>
- World Health Organization (2004). Obesity and Overweight Fact Sheet. Obesity: preventing and managing the global epidemic Report of a WHO Consultation (WHO Technical Report Series 894). Number of pages: 252. Publication date: 2000 (reprinted 2004). <http://www.who.int./media-centre/factsheets/fs311/en/>
- World Health Organization (2009). Unhealthy Diets And Physical Inactivity, Fact Sheet. [http://www.who.int./nmh/publications/fact\\_sheet\\_diet\\_en.pdf](http://www.who.int./nmh/publications/fact_sheet_diet_en.pdf)
- World Health Organization (2013). Obesity and Overweight Fact Sheet. <http://www.who.int./media-centre/factsheets/fs311/en/>
- Yanfei Liu, Mingyue Sun, Hezhi Yao, Yue Liu, and Rui Gao. (2017). Herbal Medicine for the Treatment of Obesity: An Overview of Scientific Evidence from 2007 to 2017. *Evidence-Based Complementary and Alternative Medicine*. Volume 2017 (2017), Article ID 8943059, 17 pages.
- Yanovski, SZ., Yanovski, AJ. (2014). Long-term drug treatment for obesity: A systematic and clinical review. *JAMA.*, 311:74-86.
- www.Nutrition.com. accessed. 12/22/10.