Obesity: More than a Cosmetic Problem

Mona Nasrallah M.D
Associate Professor
Endocrinology & Metabolism - AUB

Maya Beydoun M.D
Fellow, Endocrinology
& Metabolism - AUB

Obesity is a chronic disorder characterised by an increase in percent body fat that may impair health. It is related to an increased consumption of food, without an equal increase in energy expenditure – eventually resulting in a mismatch between energy intake and output.

Moreover, the prevalence of obesity is increasing worldwide, reaching alarming levels. Obesity has become a *global epidemic*: As per the World Health Organization (WHO), in 2014 more than 1.9 billion adults were overweight of which 600 million were obese, representing a worldwide doubling in obesity since 1980.

Also this disorder does not spare the young and according to the WHO in 2013 approximately 42 million children under the age of 5 were overweight or obese.

Similar dramatic trends are observed in Lebanon. In a study published in 2012 by Nasreddine et al. comparing obesity trends in Lebanon between 1997 and 2008, obesity was noted to double in both boys and girls in the age-group 6 to19 years. Similar trends are also observed in adults aged above 20 years (Fig.1).

Figure1

Age (years)	Gender	1997 Obese %	2008/9 Obese %
6 – 19	Boys	9.7	18.2
	Girls	4.4	8.0
> 20	Boys	15.8	26.2
	Girls	19.2	23.4

What Causes Obesity?

Many factors may contribute to the development of obesity ranging from medications (antipsychotics, sulfonylureas, antihistamines, thiazolidinediones and corticosteroids), hormonal imbalances (hypothyroidism, polycystic ovary syndrome, hypogonadism, Cushing's Disease, Growth hormone deficiency and seasonal affective disorder), genetic factors and dietary factors (overeating, eating high fat/ high refined carbohydrate diets)[2].

In addition, there is growing evidence of an association between shortened sleep duration and obesity. This association may be related to an imbalance between the hormones signalling appetite and satiety[3].

Environmental pollutants and chemicals, such as the plastic monomer bisphenol A (BPA) may also play a role. These so-called "endocrine disrupters" can affect the endocrine system in health and predispose to the development of fat[3].

Moreover there is rising, but less well-documented evidence of an association antibiotic use and weight gain: the mechanism would be through alteration of the gut flora (the human microbiome, which is the normal bacteria which we resides in the gastrointestinal tract).

Lastly, animal models have shown that maternal over–nutrition during pregnancy results in increased fat composition and increased cardiovascular risk markers in the new-born. Similarly, a malnourished or underweight foetus is also more likely to develop obesity later on in life. This effect is most pronounced when receiving nutrient-rich food after delivery. The suggested mechanism is through "epigenetic changes" in the gene expression[4].

However, the majority of the cases of obesity are related to non-medical conditions such as sedentary lifestyle and increased caloric intake[2].

How is Obesity Assessed?

The Body Mass Index (BMI) serves as a simple calculation tool to assess obesity. It is calculated by dividing the weight in kg over the height in meters squared.

BMI = weight in kg/ (height in m)^2

According to the National Institute of Health (NIH) and the WHO, obesity is assessed as shown in Figure 2:

Figure2

Underweight	BMI <18.5 kg/m^2
Normal weight	BMI ≥18.5 to 24.9 kg/m^2
Overweight	BMI ≥25.0 to 29.9 kg/m^2
Obesity	**BMI ≥30 kg/m^2**
Obesity class I	BMI of 30.0 to 34.9 kg/m^2
Obesity class II	BMI of 35.0 to 39.9 kg/m^2
Obesity class III (Severe or Extreme obesity)	BMI ≥40 kg/m^2

Screening:

Starting the age of 2 years all individuals need to be screened yearly for obesity by assessing the BMI [2].

What are the Consequences of Obesity?

In general, a higher BMI is associated with a higher mortality from all causes and from cardiovascular disease (CVD). This is a direct proportionate relationship. In the BMI range from 25 to 50 kg/m^2, each 5 kg/m^2 increase in BMI is associated with an increased mortality from the following by:

- 1.39 from CVD
- 2.16 from Diabetes
- 1.1 from the development of cancer
- 1.2 from diseases of the lung

As a matter of fact, the Framingham study, which included more than 3400 subjects, showed that those who are obese (BMI >30) at age 40 years lived 6 to 7 years less than those who are not. The impact of obesity on longevity is greater for men than for women and greater for whites than blacks[5].

Obesity not only affects the life expectancy, but also increases the risk of suffering from other diseases:

1. Type 2 Diabetes:
A strong relationship between diabetes and obesity has been shown across all populations. In a prospective study including more than 114200 patients conducted between 1976 and 1990, patients who gained 5 - 7.9 kg after the age of 18 years had a doubled risk of developing type 2 diabetes as compared to those who maintained a stable weight[6].

2. Hypertension
For each 1 kg of weight gain, both the systolic and diastolic blood pressures are raised by approximately 1mmHg[5].

3. Dyslipidemia
With obesity, a change in cholesterol level is commonly observed, favouring the "atherogenic" profile[5].

4. Heart disease
Obesity is well known to be associated with the development of coronary artery disease, which includes myocardial infarction, heart failure and conduction abnormalities in the heart[5].

5. Stroke
According to the "Global Burden of Metabolic Risk Factors for Chronic Diseases Collaboration" which included 1.8 million patients, for every 5 kg/m^2 increase in BMI, there was a 1.18-fold increased risk for the development of stroke[5].

6. Venous Thrombosis
The Atherosclerosis Risk in Communities (ARIC) and the Cardiovascular Health Study (CHS) found a 2.7-fold

increased risk for the development of venous thrombosis when the BMI is above 407.

7. Cancer

Obesity increases the likelihood of dying from cancer. It also increases the likelihood of the development of certain cancers. An increased BMI is associated with an increased risk of the following cancers: endometrial, gallbladder, kidney, liver, colon, cervical, thyroid, ovarian, postmenopausal breast cancer and leukemia[5].

8. Others: Obesity essentially affects every body system. There is higher likelihood of sleep apnea, infections, gout, osteoarthritis, gastroesophageal reflux, gallstones, fatty liver, urinary incontinence, depression and lastly dementia[8].

Take Home Recommendations:

Aiming at preventing obesity, the WHO recommends the following:

1) at least 30 minutes of regular, moderate - intensity exercise on most days
2) limit total fat intake
3) shift fat consumption away from saturated fats to unsaturated fats
4) increase consumption of fruit, vegetables, pulses, whole grains and nuts
5) limit the intake of sugar and salt.

Additionally, adherence to a healthy lifestyle, with decreased exposure to chemicals, limit of stressful factors and proper sleeping habits are favoured, even if less well documented.

References

1. Nasreddine et al (2012), Trends in overweight and obesity in Lebanon: evidence from two national cross-sectional surveys (1997 and 2009), BMC

2. Bray et al (2016), Obesity in adults: Prevalence, screening, and evaluation. Uptodate.com

3. Klish et al (2016), Definition; epidemiology; and etiology of obesity in children and adolescents, uptodate.com

4. Smith et al (2015), Epigenetic and developmental influences on the risk of obesity, diabetes and metabolic syndrome, Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy

5. Bray et al (2016), Obesity in adults: Health hazards, Uptodate.com

6. Colditz et al (1995), Weight gain as a risk factor for clinical diabetes mellitus in women, Ann Intern Med; 122:481.

7. Tsai et al (2002), Cardiovascular risk factors and venous thromboembolism incidence: the longitudinal investigation of thromboembolism etiology. Arch Intern Med; 162:1182.

8. Larson et al (2016) Risk factors for cognitive decline and dementia. Uptodate.com