Sumerianz Journal of Medical and Healthcare, 2023, Vol. 3, No. 2, pp. 8-12
ISSN(e): 2663-421X, ISSN(p): 2706-8404
Website: https://www.sumerianz.com
DOI: https://doi.org/10.47752/sjmh.62.8.12

Original Article Open Access

Unpacking the Factors of Overweight/Obesity in Type 2 Diabetes: What You Need to Know: Review Article

Fatma Ibrahim Abdel-latif Megahed
Lecturer at family and community health nursing Department, Faculty of Nursing, Suez Canal University
Email: Dr.fm_2013@yahoo.com

Article History

Received: 27 March 2023

Revised: 20 May 2023

Accepted: 5 June 2023

Published: 8 June 2023

How to Cite

Fatma, Ibrahim. Abdel-latif. Megahed., 2023. "Unpacking the Factors of Overweight/Obesity in Type 2 Diabetes: What You Need to Know: Review Article." *Sumerianz Journal of Medical and Healthcare*, vol. 2, pp. 8-12.

Abstract

The rising prevalence of overweight and obesity among type 2 diabetic patients has become a major concern for healthcare professionals. Obesity and overweight are significant risk factors for the development of type 2 diabetes. In fact, it is estimated that over 90% of individuals with type 2 diabetes are either overweight or obese. Obesity and type 2 diabetes are becoming increasingly prevalent worldwide, leading the World Health Organization to label them as pandemics of the 21st century. In this article, we will explore the different factors that contribute to overweight/obesity among individuals with type 2 diabetes. Genetics and family history play a crucial role in the development of obesity. Lifestyle factors, such as poor dietary habits, physical inactivity, sedentary behavior and poor sleep quality and duration are also a significant risk factor for obesity.

Keywords: Type 2 diabetes mellitus; Obesity; Overweight; Associate factors.

1. Introduction

Diabetes is a global health concern, with more than 400 million people currently living with the condition worldwide. Egypt is no exception, with 8.9 million cases of diabetes among adults, a number that is expected to increase to 11.9 million by 2030 and possibly reach 16.9 million by 2045. Type 2 diabetes mellitus (T2DM) is the most common form of diabetes, representing 90-95% of all diabetic cases globally, and its prevalence is still on the rise. Shockingly, at least 50% of people with diabetes are not even aware of their condition, according to the International Diabetes Federation (IDF). In Egypt, over 8 million adults are estimated to be living with diabetes, which translates to a prevalence rate of almost 15%. The situation is further compounded by the fact that Egypt is the 9th country worldwide with around 8,850,400 cases and a prevalence rate of 15.2% in adults, according to the IDF in 2019. Moreover, by 2045, Egypt is predicted to become the 7th country worldwide with the highest number of diabetes cases [1-3].

In less affluent nations, the burden of disease is moving away from infectious diseases and towards non-communicable diseases (NCDs). NCDs, which are also called chronic illnesses, are often long-lasting and stem from a variety of factors including genetics, physiology, environment, and behavior. The primary types of NCDs, such as cardiovascular diseases (like heart attacks and strokes), cancers, chronic respiratory illnesses (such as asthma and chronic obstructive pulmonary disease), and diabetes, are disproportionately impacting individuals in low- and middle-income nations, where over three-quarters of worldwide NCDs fatalities (31.4 million) occur. Every year, 17 million individuals die from NCDs before the age of 70, with 86% of these untimely fatalities occurring in low- and middle-income nations. Of all NCDs fatalities, 77% are in low- and middle-income nations, owing to longer life expectancies and population aging. The consumption of tobacco, lack of physical activity, excessive alcohol consumption, and unhealthy eating habits all contribute to the likelihood of dying from non-communicable diseases. These diseases pose a threat to achieving the 2030 Agenda for Sustainable Development, which aims to reduce the probability of death from any of the four primary NCDs by one third between the ages of 30 and 70 by the year 2030 [4].

The "100 million health" survey conducted in Egypt in 2019 screened a staggering 49.7 million adult Egyptians (≥18 years old) and discovered some alarming statistics. According to the survey, a whopping 39.8% of adult

Egyptians suffered from obesity (BMI ≥ 30 kg/m2). However, the prevalence of obesity was not uniform across genders, with adult females being more affected than adult males (49.5% of Egyptian adult females suffered obesity compared to 29.5% for males). What's even more concerning is that T2DM had the highest prevalence attributable to obesity in adult Egyptians. Shockingly, 85% of females and 62% of males with diabetes mellitus type 2 can be attributed to obesity alone. This equates to a staggering 4,759,839 and 3,004,347 females and males, respectively [5]**.** It's clear that the obesity epidemic in Egypt is a major public health concern and requires urgent attention. With such high rates of obesity and its associated health risks, it's imperative that effective interventions are put in place to curb this alarming trend.

According to the World Health Organization (WHO)b [6], obesity is a disease that affects multiple body systems, such as the heart, liver, kidneys, joints, and reproductive system, leading to a range of non-communicable diseases (NCDs) such as type 2 diabetes mellitus (T2DM), cardiovascular disease, hypertension, stroke, various forms of cancer, and mental health issues. Shockingly, WHO estimates that by 2025, roughly 167 million people (adults and children) will be negatively impacted by being overweight or obese. With such alarming statistics, it is no wonder that obesity and T2DM are already being referred to as pandemics of the 21st century, with T2DM prevalence expected to double by 2030. Studies have shown that excess weight increases the risk of death significantly, with the overweight group at a 40% higher and the obese group at up to 300% higher risk of death than those with normal BMI [7]**.**

BMI, or body mass index, is an anthropometric measurement that is widely used as an index of obesity. It's a simple and effective way to measure total body adiposity in epidemiological studies. However, it's important to note that BMI has its limitations and may not always accurately reflect an individual's body composition or health status. The World Health Organization (WHO) recommends a BMI range of 18.5-24.9 Kg/m2 as the criteria for normal weight and 25-29.9 Kg/m2 as overweight. It's interesting to note that these criteria were largely derived from mortality statistics from European and American populations [8]**.**

While BMI is a useful tool for population-level studies, it's important to interpret the results in the context of an individual's health history and lifestyle factors. It's also important to acknowledge that there are other measures of body composition that may provide additional information, such as waist circumference and body fat percentage. In conclusion, BMI is a commonly used measure of obesity that has its limitations but remains a useful tool in epidemiological studies. It's important to interpret BMI results in the context of an individual's health and lifestyle factors, and to consider other measures of body composition for a more comprehensive assessment.

The prevalence of obesity in the European region in 2016 was found to be quite varied, ranging from 14.2% to 32.1% in adults. This disparity highlights the complex nature of obesity and its association with different factors in different regions. Furthermore, developing countries are particularly challenged by the double burden of under-nutrition and over-nutrition, which can lead to a limited capacity to handle chronic diseases. Obesity is a serious health concern that can have significant consequences on the quality of life and overall health outcomes of individuals. Its association with chronic diseases such as cardiovascular disease (CVD) and type 2 diabetes mellitus (T2DM) is well-established. In order to prevent these diseases, it is important to identify the risk of CVD and T2DM through obesity measurement [9]**.** However, it is important to note that diseases are often caused by a complex interplay between several risk factors. As such, an effective health intervention must take into account each risk factor distinctly. By targeting each factor appropriately, it may be possible to prevent the development of chronic diseases and reduce the burden of obesity on individuals and societies alike.

Multiple studies have identified various factors that increase the risk of overweight and obesity among patients with type 2 diabetes mellitus (T2DM). These factors include physical inactivity, comorbid hypertension, higher socio-economic status, residence area, gender, older age, and alcohol consumption. However, identifying modifiable risk factors for overweight and weight management among T2DM patients can have significant impacts on treatment, metabolic control, and cardiovascular risks associated with diabetes [10]**.** In Egypt, the most prevalent risk factors for obesity are a combination of inherited factors, which cannot be modified, and poor eating habits and physical inactivity, which can be changed. However, a lack of awareness and education about the importance of exercise, as well as limited access to exercise facilities, especially in rural areas, results in physical inactivity. Moreover, due to the overcrowding of people and traffic, Egyptians tend to avoid walking or running in public places, which may be their only alternative due to the limited and expensive access to gyms or sports clubs. It is also common for Egyptians to have a deficiency in vitamin D, which is linked to obesity and diabetes, due to the lack of sun exposure [3]**.**

Furthermore, Egypt's love affair with trans-fat is a troubling trend that has caught the attention of health experts worldwide. This fatty acid is notorious for wreaking havoc on our health by promoting dyslipidemia, which is characterized by elevated levels of LDL cholesterol, while lowering HDL cholesterol. This dangerous combination poses a significant risk for type 2 diabetes, a disease that has become increasingly prevalent in Egypt. Unfortunately, trans-fat is present in many of the foods that Egyptians consume in large quantities, including margarine, cakes, cookies, biscuits, and fried dishes. In addition to trans-fat, junk food has become a ubiquitous presence in Egyptian cities, contributing to an epidemic of central obesity and type 2 DM. These foods are high in calories, salt, and fat but low in nutritional value. The result is an unhealthy diet that has a devastating impact on public health. However, the situation is not the same in rural areas, where poverty is more common. In these areas, people's diets consist primarily of high-carbohydrate and high-fat foods, with fewer animal proteins [3]**.**

Smoking, a notorious habit, has been linked to the development of central obesity, a known risk factor for diabetes mellitus (DM). Interestingly, researchers have discovered that smokers have higher levels of serum cortisol, a hormone that plays a pivotal role in the development of central obesity and DM. Despite the high cost of cigarettes and the increased public health education, cigarette smoking remains a severe public health problem in Egypt, with

devastating consequences for the population. In particular, diabetes patients who are uneducated and living in rural, impoverished areas remain unaware of the dangers and consequences of obesity and DM, leading to a vicious cycle of poor health outcomes [3]**.** It is worth noting that T2DM and overweight/obesity are both established risk factors for all-cause and cardiovascular-specific mortality, which underscores the urgency for weight control as a treatment guideline for this disease, as recommended by experts [11]**.**

Poor sleep quality and duration have been linked to an increased risk of overweight and obesity in T2DM. Lack of sleep disrupts hormonal balance, leading to increased appetite and insulin resistance. According to various studies, insufficient sleep is an independent risk factor for the development of both obesity and T2DM. It has also been found that inadequate sleep can negatively impact the outcomes of weight loss treatments. While some studies suggest that changes in sleep duration can have a positive impact on weight, this is not always the case, and there is no evidence to suggest that it can reduce the risk of T2DM. The connection between sleep, obesity, and T2DM may be explained by changes in energy homeostasis, insulin resistance, and beta-cell function. It is possible to manipulate sleep, as shown by multiple studies. However, it is currently unknown whether sleep manipulation can prevent obesity or T2DM and requires further examination [12]**.**

The connection between non-communicable diseases and the degree of modernization in developing nations, such as Egypt, is of paramount importance. Egypt, among other countries, is experiencing a rise in both conditions, with women being particularly affected. The consequences of these conditions, such as cardiovascular disease and osteoarthritis, make it crucial to identify and address the risk factors associated with overweight and obesity in type 2 diabetic patients. The ways of life in these countries have undergone significant changes, with unhealthy diets and physical inactivity becoming the norm. As a result, the global non-communicable disease death toll has reached a staggering 32 million. It is important to note that evidence suggests that the majority of deaths related to NCDs occur between the ages of 30 and 69 years, affecting millions of people worldwide. One such disease that has gained significant attention is Type 2 Diabetes Mellitus (T2DM). If left unchecked and ineffectively controlled, T2DM can lead to several diabetes-related complications such as coronary artery disease, stroke, visual deficiency, renal failure, and foot amputation. These complications can cause increased morbidity rates and pose a significant threat to public health. Therefore, it is crucial to understand the importance of managing T2DM and its complications to minimize their impact on overall health and wellbeing. [13]**.**

The relationship between overweight and obesity and a range of life-threatening diseases is well-established. From cardiovascular diseases to type 2 diabetes mellitus, musculoskeletal diseases, and cancer, the risks associated with carrying excess weight are significant. That's why BMI, which estimates ideal weight based on height, is often used as a screening tool for overweight and obesity. According to Chen, *et al.* [14]**,** overweight and obesity are quantified as BMI 25-29.99 kg/m2 and ≥30 kg/m2 respectively. So, if you're concerned about your health and well-being, it's important to keep tabs on your BMI and take action if it falls outside the healthy range.

Over weight	**25-29.9 kg/m2**
Class I Obesity	**30-34.9 kg/m2**
Class II Obesity	**35-39.9 kg/m2**
Class III Obesity	**≥ 40 kg /m2**

Health assessment is a multifaceted and indispensable nursing function that forms the bedrock of quality nursing care and intervention. It serves as a comprehensive tool for identifying a patient's present and potential nursing problems, thus enabling the nursing staff to develop personalized care protocols. Nursing practice, on the other hand, involves the actual provision of nursing care to patients. This encompasses a wide range of activities, including the implementation of nursing care plans, which are developed based on a patient's initial assessment. The importance of health assessment in nursing cannot be overstated, as it is crucial for ensuring optimal patient outcomes and the provision of high-quality care [15]**.**

Anthropometric data is an essential component of healthcare assessments, particularly when it comes to determining a patient's weight, height, and body mass index (BMI). To ensure accurate measurements, nurses follow specific protocols. For weight measurements, patients are asked to remove their shoes and any heavy clothing before stepping onto the scale. Height measurements, on the other hand, require patients to stand as straight as possible on a flat surface, with their feet and heels together, buttocks, shoulders, and the back of the head touching the upright. Nurses use a specialized Wall Height Meter/Scale to measure the height, gently contacting the headpiece with the patient's head and recording the nearest centimeter. Finally, BMI is calculated by dividing the patient's weight in kilograms by the square of their height in meters (kg/m2), as outlined by Megahed [16]**.**

By following these standard protocols, nurses can ensure that anthropometric measurements are both accurate and consistent, providing valuable data for healthcare professionals. By summarizing the evidence related to these factors, healthcare professionals can work to prevent and manage overweight and obesity in this population. As a result, nursing curriculums must address these factors associated with overweight/obesity in diabetic patients. Nurses must be trained to provide education and support to diabetic patients to help them manage their weight and overall health. They must also be aware of the potential complications associated with overweight/obesity in diabetic patients, such as cardiovascular disease and neuropathy. By incorporating this knowledge into nursing curriculums, future nurses will be better equipped to care for diabetic patients and improve their quality of life.

Overweight and obesity have a significant impact on the management of T2DM. They increase the risk of complications, such as cardiovascular disease, kidney disease, and neuropathy. They also make it more challenging to control blood sugar levels, as insulin resistance is higher in overweight and obese individuals. Weight loss interventions, such as lifestyle modifications, medications, and bariatric surgery, have been shown to improve blood

sugar control and reduce the risk of complications in overweight and obese individuals with T2DM. Whether you're a healthcare professional, caregiver, or someone living with Type 2 diabetes, this guide is packed with valuable insights and practical tips to help you achieve your weight loss goals and improve your overall health and well-being.

Healthcare providers should prioritize weight management in the treatment of T2DM. Empirical evidence supports the implementation of lifestyle modifications for overweight or obese patients with diabetes mellitus (DM) in order to improve glycemic control and reduce the need for Type 2 diabetes medications. Studies have shown that low-calorie diets can decrease HbA1c values and fasting glucose levels in obese patients with T2DM. Overweight and obese individuals with DM who are willing to lose weight should aim to lose at least 5% of their body weight through lifestyle changes according to the American Diabetes Association guidelines of 2017 [17]**.**

Losing weight is an essential objective as it has positive effects on insulin resistance, glycemic control, blood pressure, and lipid profiles. A moderate weight loss is referred to as a consistent decrease of 5% of the initial body weight and is known to enhance glycemic control and decrease the requirement for glucose-lowering medications. While a 5% reduction is beneficial, a long-term weight loss of over 7% is considered optimal. A structured lifestyle program including dietary adjustments, physical activity, and behavioral changes, as well as continuous support, is required for weight loss. Lifestyle programs typically suggest a reduction of 500-750 calories per day or a daily intake of 1,200-1,500 calories for women and 1,500-1,800 calories for men, adjusted for their baseline weight. Gradual and systematic weight loss of about 0.5-1 kg per week can be achieved by reducing total calorie intake. The selection of a diet plan should be based on an individual's health status and preferences as recommended in the ADA guidelines of 2018 [17]**.** Early evidence suggests that sleep manipulation as part of a lifestyle intervention, such as calorie restriction, can have a positive impact on weight loss or body composition. Nevertheless, well-conducted long-term randomized controlled trials are necessary to explore the role of sleep manipulation during weight loss treatments involving lifestyle changes, pharmacotherapy, or bariatric surgery [12]**.**

2. Conclusion

The review highlights several risk factors for overweight/obesity among individuals with type 2 diabetes mellitus. These factors include genetic predisposition, poor dietary habits, lack of physical activity, smoking, comorbid hypertension, higher socio-economic status, residence area, gender, older age, poor sleep quality and duration and decreased health awareness. To address these risk factors, public health interventions should target these subgroups to enhance their cost-effectiveness. Additionally, it is crucial to comprehensively investigate the level of adherence to weight management modalities among diabetic patients to ensure effective management of this disease. By addressing these factors, we can effectively manage overweight/obesity in individuals with type 2 diabetes mellitus and ultimately reduce the burden of non-communicable diseases in our communities.

Abbreviations

BMI	**Body Mass Index**
CVD	Cardiovascular Diseases
HDL	High Density Lipoprotein
IDF	International Diabetes Federation
LDL	Low Density Lipoprotein
NCDs	Non-Communicable Diseases
T2DM	Type 2 Diabetes Mellitus
WHO	World Health Organization

References

[1] Shelbaya, S., Halawa, M., and NASR, M., 2020. "The management of care of egyptian patients with diabetes: A report from the international diabetes management practices study wave 7." *The Medical Journal of Cairo University*, vol. 88, pp. 1413-1421.

[2] Azzam, M., Ibrahim, A., and Abd El-Ghany, M., 2021. "Factors affecting glycemic control among Egyptian people with diabetes attending primary health care facilities in Mansoura District." *Egypt J. Intern. Med.*, vol. 33, p. 33. Available: https://doi.org/10.1186/s43162-021-00065-w

[3] Abouzid, M. R., Ali, K., Elkhawas, I., and Elshafei, S. M., 2022. "An overview of diabetes mellitus in Egypt and the significance of integrating preventive cardiology in diabetes management." *Cureus*, vol. 14, p. e27066.

[4] World Health Organization (WHO)a, 2022. "Noncommunicable diseases." Available: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

[5] Aboulghate, M., Elaghoury, A., Elebrashy, I., Elkafrawy, N., Elshishiney, G., Abul-Magd, E., Bassiouny, E., Toaima, D., Elezbawy, B., *et al.*, 2021. "The burden of obesity in Egypt." *Front. Public Health*, vol. 9, p. 718978.

[6] World Health Organization (WHO)b, 2022. "World obesity day 2022 – accelerating action to stop obesity." Available: https://www.who.int/news/item/04-03-2022-world-obesity-day-2022-accelerating-action-to-stop-obesity

[7] Gray, N., Picone, G., Sloan, F., and Yashkin, A., 2015. "The relationship between BMI and onset of diabetes mellitus and its complications." *South Med. J.*, vol. 108, pp. 29–36.

[8] Shah, A., Bhandary, S., and Malik, S. L., 2008. "Appropriate body mass index cut-off point in relation to type 2 diabetes mellitus in the population of Kavre district." *Kathmandu University Medical Journal,* vol. 2, pp. 184-190.

[9] Alkhalidy, H., Orabi, A., Alnaser, K., Al-Shami, I., Alzboun, T., Obeidat, M. D., and Liu, D., 2021. "Obesity measures as predictors of type 2 diabetes and cardiovascular diseases among the jordanian population: A cross-sectional study." *Int. J. Environ. Res. Public Health,* vol. 18, p. 12187. Available: https://doi.org/10.3390/ijerph182212187

[10] Abdissa, D., Dukessa, A., and Babusha, A., 2021. "Prevalence and associated factors of overweight/obesity among type2 diabetic outpatients in Southwest Ethiopia." *Heliyon,* vol. 7, p. e06339.

[11] Jong, C. B., Li, H. Y., Pan, S. L., Hsieh, M. Y., Su, F. Y., Chen, K. C., Yin, W. H., Chan, S. H., Wu, Y. W., *et al.*, 2019. "Relationship between body mass index, antidiabetic agents, and midterm mortality in patients with both type 2 diabetes mellitus and acute coronary syndrome." *J. Am. Heart Assoc.*, vol. 8, p. e011215.

[12] Antza, C., Kostopoulos, G., Mostafa, S., Nirantharakumar, K., and Tahrani, A., 2021. "The links between sleep duration, obesity and type 2 diabetes mellitus." *J. Endocrinol,* vol. 252, pp. 125-141.

[13] Megahed, F., Hassan, S., Abdelwahid, H., and Farg, H., 2019. "Effect of diabetes education on type 2 diabetic patients' disease knowledge at suez canal university hospitals." *Sumerianz Journal of Medical and Healthcare,* vol. 2, pp. 153-161.

[14] Chen, H. C., Lim, T., and Ivy, N., 2021. "Factors influencing overweight and obesity in nurses: A systematic review and metaanalysis." *J. Obes. Overweig,* vol. 7, p. 202.

[15] Sayd, I., Abood, S., Ali, L., and Ali, G., 2013. "Nurses' knowledge, attitude and practices related to patient's health assessment in minia university hospital." *Zagazig Nursing Journal,* vol. 9, pp. 1-14.

[16] Megahed, F., 2020. *Effect of lifestyle modification on glycemic control of type 2 diabetic patients at suez canal university hospitals. Un-published doctorate thesis*. Faculty of Nursing, Suez Canal University.

[17] Megahed, F., Hassan, S., Abdelwahid, H., and Farg, H., 2021. "Effect of lifestyle modification on glycemic control of type 2 diabetic patients at suez canal university hospitals." *IntechOpen,* Available: https://www.intechopen.com/online-first/effect-of-lifestyle-modification-on-glycemic-control-of-type-2-diabetic-patients-at-suez-canal-unive