



The Relationship between Obesity and Diabetes

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General Note

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ABSTRACT

Diabetes is a metabolic state in which the body either fails to produce enough insulin that balances blood glucose levels or the insulin that is produced doesn't succeed in working in an effective manner. Two main types of diabetes are type 1 diabetes and type 2 diabetes. Linked to only type 2 diabetes, obesity is beyond the scope of type 1 diabetes which is not related to obesity or other lifestyle factors, or other forms of diabetes such as gestational diabetes or Maturity Onset Diabetes of the Young. The purpose of this review is to describe the relation of obesity and type 2 diabetes.

Keywords: DM, Obesity, Body mass index, Nursing

Abbreviations: DM - Diabetes mellitus, NDA - National Diabetes Audit, MODY - Maturity Onset Diabetes of the Young, BMI - Body mass index

1. INTRODUCTION

Diabetes mellitus (DM) is a lifelong condition that can transform carbohydrate, protein and fat metabolism. The cause of which is the lack of the hormone insulin as a result of either the ongoing or striking failure of the β -Langerhans islet cells of the pancreas to produce insulin or owing to the flaws in insulin ingestion in the surrounding tissue (Scheen et al., 2003). Diabetes is a metabolic state in which the body either fails to produce enough insulin that balances blood glucose levels or the insulin that is produced doesn't succeed in working in an effective manner. Two main types of diabetes are Type 1 diabetes and Type 2 diabetes (Scheen et al., 2003).

As the cells that produce insulin are damaged, a treatment for a lifetime by means of insulin is necessary so as to preclude death in Type 1 diabetes which is an auto-immune disease. Approximately 10% of people with identification of diabetes have type 1 diabetes (NCC-CC 2008).

Type 2 diabetes is held responsible for no less than 90% of all diabetes events (NCC-CC 2008; IDF 2013; PHE 2014). The occurrence of which is caused by the body ceasing to excrete adequate insulin to fulfill its needs or resisting to the influence of insulin that is produced. This condition is continuous and requires the management (diet and exercise) of lifestyle in all phases. In the course of time, the majority of people who have type 2 diabetes are to require oral drugs and, or insulin. Type 2 diabetes might remain as not detected for many years (IDF 2013; PHE 2014).

Linked to only type 2 diabetes, obesity is beyond the scope of type 1 diabetes which is not related to obesity or other lifestyle factors, or other forms of diabetes such as gestational diabetes or Maturity Onset Diabetes of the Young (MODY) (NCC-CC 2008; IDF 2013; PHE 2014).

This article aims to describe the relation of obesity and type 2 diabetes.

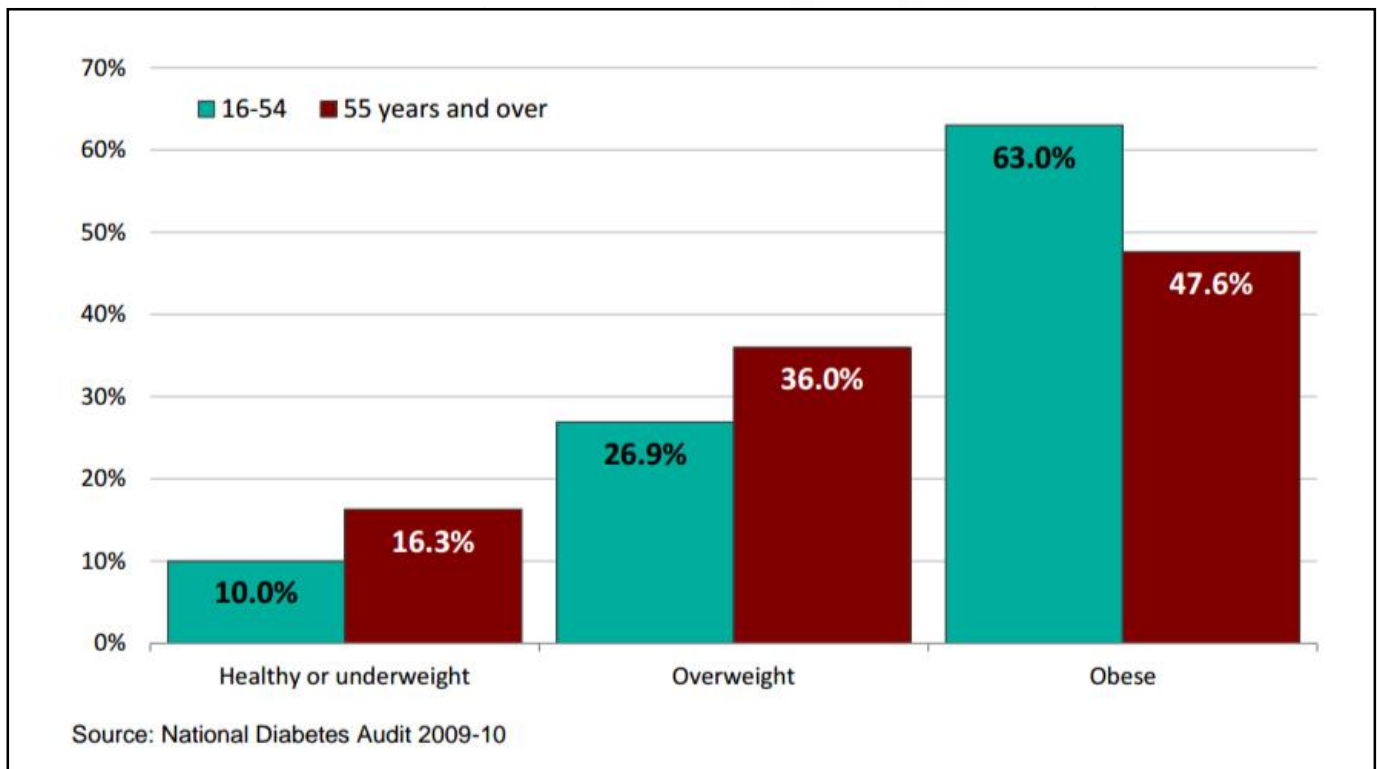


Figure 1

Weight status among adults with type 2 diabetes, 2009-10

2. PREVALENCE OF DIABETES AND OBESITY

As a result of its constantly increasing prevalence, and the contingency of cardiovascular and renal diseases with which it is associated, Diabetes mellitus is currently known as a worldwide major public health problem. It comes as no surprise that the

estimations suggested that 382 million people had DM in 2013, and by the year 2035 the predictions are that this number will have reached 592 million (IDF 2013; Katchunga et al., 2016) whereas in 1985 and 2000, this disease had effect on only 30 and 157 million people respectively (IDF 2013; Katchunga et al., 2016).

The data from western settings and most developed areas in low-and middle- income countries show that the increase in the number of diabetic patients has primarily two reasons which are the increasing amounts of obese people and the fact that the general population is getting old (Hossain et al., 2007; WHO 1994; Katchunga et al., 2016).

In diabetes mellitus statistics, the stunning rise in obesity stimulates a parallel upward swing (Golay et al., 2005). As stated by Ford et al, each kilogram of weight gain corresponds to 4.5% to 9% of risk to have diabetes. Nearly 200 million people were estimated as the total obese population in 1995. In 2002, 115 million people were added to this number, that is 315 million in total. 1-3 It is striking that, similar inclinations have been observed in T2DM statistics, and prospective estimations are disturbing (Golay et al., 2005; Ford et al., 1997). As a consequence of which, the term 'diabesity' was coined by Zimmet et al in order to emphasize the connection between these diseases (Golay et al., 2005; Zimmet et al., 2001).

'Diabesity' is known as the relation between DM and obesity, whether there are other risk factors or not (Kalra, 2013; Katchunga et al., 2016). The insulin resistance pattern of which is clinically determined by the marks of the metabolic syndrome (MS) (Alberti et al., 2009; Katchunga et al., 2016).

Obesity and DM often develop simultaneously, and according to the statistics, 60-90% of all patients that have T2DM are or once have been obese (Golay et al., 2005; Stumwoll et al., 2005; Halpern et al., 2005). The former is considered to be a substantial risk for eventual development of T2DM. Following the studies upon this problem, one question whether obesity is more than and not only a risk factor but also a cause of T2DM.

The majority of patients that have type 2 diabetes are obese and the global prevailing of obesity explains to a large extent that over the past 20 years, there has been a striking increase in the incidence and prevalence of which. Nowadays, more than a third (34%) of U.S adults are obese (defined as BML 30kg/m²), and more than 11% of people at the age of 20 have diabetes (Eckel et al., 2011; CDCP 2011), and by the year 2050, it is expected that this percentage of prevalence will increase to 21% (Eckel et al., 2011; Boyle et al., 2010).

The increased prevalence of obesity and diabetes led to the term that considered both to be the '21st Century epidemic', by The World Health Organization. The former is a metabolic disease throughout the world, which is the most frequently confronted one. In addition, the incidence and prevalence of which are increasing at speed (Golay et al., 2005; WHO 2004). The overweight population of the world is considered to be over 50% (Golay et al., 2005; Field et al., 2001).

National Diabetes Audit (NDA) data show that in England, 90% of adults with type 2 diabetes aged 16-54 years were overweight or obese, compared to only 10% who were a healthy weight or underweight in 2009-10 (Golay et al., 2005).

3. THE RELATIONSHIP BETWEEN OBESITY AND TYPE 2 DIABETES

There remains a close relationship between obesity and type 2 diabetes. Both of which have a close relation to the body mass index (BMI). The risk of diabetes among the obese is seven times greater when compared to people who are healthy in terms of weight, with an increase of risk three times more regarding overweight people (Abdullah et al., 2010; Mary et al., 2014). Although the fact that the body fat percentage is an important indication of increased risk of diabetes is known, the accurate mechanism as to the relation preserves its uncertainty. As for the questions why all obese people do not develop type 2 diabetes and why all people with type 2 diabetes are not obese remain uncertain as well (Eckel et al., 2011; Neeland et al., 2012; Mary et al., 2014) (Figure 2).

Obesity is the cause of chronic inflammation in adipose tissue, the liver, the hypothalamus and pancreatic islets, which contributes to a mechanism for systemic insulin resistance and also β -cell dysfunction. The secretion of incretin from the gastrointestinal tract recovers β -cell dysfunction and affects central nervous system patterns for eating behavior. NAFLD, non-alcoholic fatty liver disease; NASH, non-alcoholic steatohepatitis (Eckel et al., 2011; Neeland et al., 2012; Mary et al., 2014).

Type 2 diabetes and obesity are both related to insulin resistance. Even though most obese individuals are insulin resistant, they do not experience hyperglycemia. Pancreatic β -cells of the islet of Langerhans excrete enough amounts of insulin that are sufficient to overcome insulin level reductions under normal conditions, thereby achieving normal glucose tolerance (Al-Goblan et al., 2014).

Endothelial dysfunction has always been related to obesity/insulin resistance in the history of type 2 diabetes (including people with impaired glucose tolerance and/or impaired fasting glucose). On the condition that β -cells aren't capable of compensating totally for decreased insulin sensitivity, one can develop insulin resistance and obesity, and therefore type 2 diabetes. The root of the hypothesis that insulin resistance and β -cell dysfunction are associated with one another can be the adipose tissue excretion, which is the nonesterified fatty acids (NEFAs) (Kahn et al., 2006; Al-Goblan et al., 2014).

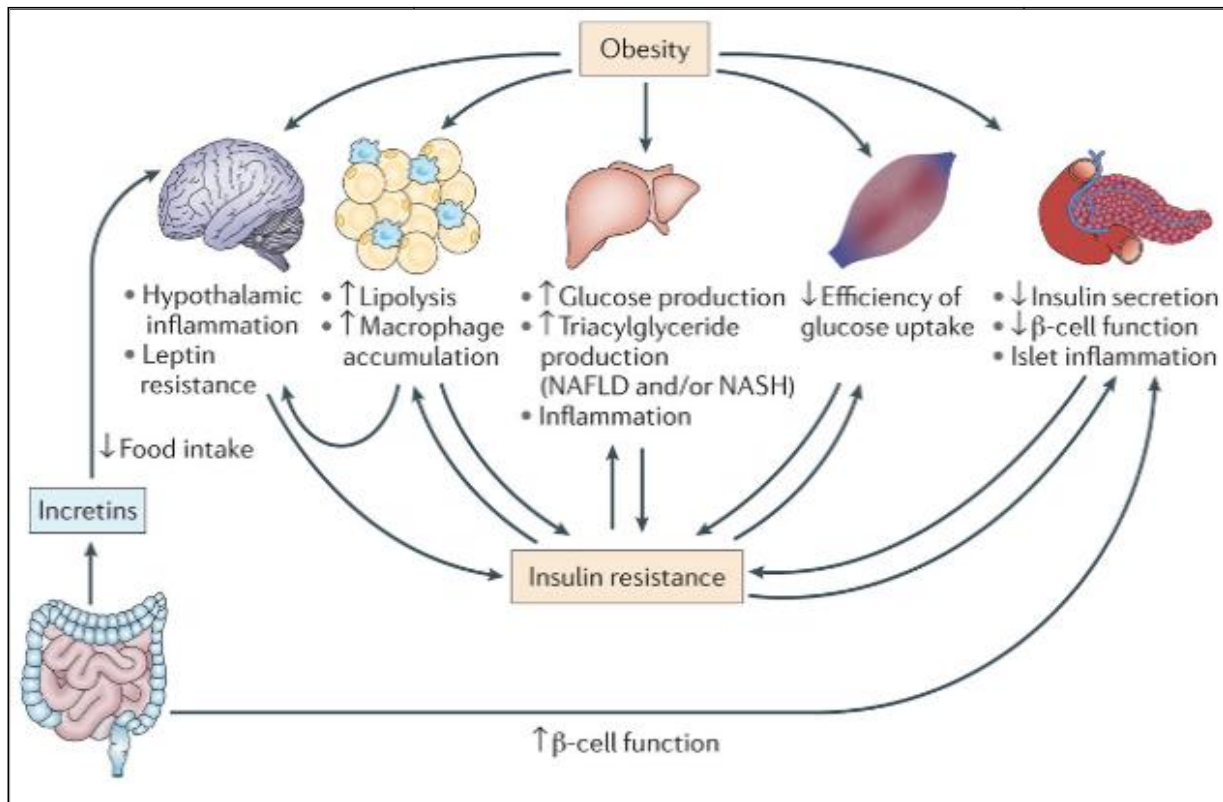


Figure 2 The Relationship Between Obesity And Type 2 Diabetes

(Source: Neeland IJ, Turer AT, Ayers CR, et al. Dysfunctional adiposity and the risk of prediabetes and type 2 diabetes in obese adults. *Jama* 2012;308(11):1150-9.)

Obesity and Diabetes Protective Recommendations

- *Explain the pathogenesis that link obesity and type 2 diabetes;* A further comprehension of mechanisms connecting obesity, insulin resistance and type 2 diabetes might make individualized treatment easier eventually (Eckel et al., 2011).
- *Broaden research on heterogeneity;* A way to expand the comprehension of the relative impact of genetic and environmental factors linking obesity and diabetes is to address more complicated indications of which through extra large-scale population-based analyses (Eckel et al., 2011).
- *Find approaches to pharmacological and surgical management in an innovative manner;* Approaches as such, may decrease specific obstacles which disable treatment of both obesity and type 2 diabetes. An example of which is regulating the incretin axis that can be beneficial for both energy balance and glycemia (Eckel et al., 2011).
- *Put emphasis on primary avoidance of obesity and type 2 diabetes*
- *Use a chronic disease model that links obesity to diabetes care;* The present way of understanding both pathophysiology and management puts forward that it is of necessity to use a chronic disease model of care that links obesity and diabetes care management systems (Eckel et al., 2011).

4. NURSING IMPLICATIONS

Nurses who have an understanding of the interaction between obesity and the onset of type 2 diabetes are better equipped to explain the importance lifestyle changes in the prevention and optimal management of type 2 diabetes. Appropriately provide patient education, creating opportunities to, may lead to families and communities being better informed, enable them to prevent and manage type 2 diabetes. Prevention of obesity through the promotion of a healthy lifestyle reduces the potential for insulin resistance. The two most effective measures to improve insulin sensitivity are weight loss and physical activity. Weight loss and physical activity are independently effective in improving insulin sensitivity; the benefit is improved significantly when combined them (Cloete et al., 2017).

5. CONCLUSION

Diabetes and obesity are chronic disorders that are on the rise worldwide. Body mass index has a strong relationship to diabetes and insulin resistance. The link between the two conditions is important because obesity substantially increases the risk of type 2 diabetes. Nurses are enabled to practice effectively by understanding the link between obesity and the onset of type 2 diabetes (Cloete et al., 2017). Nurses can improve oneself to become more informed about obesity and to position themselves as role models and educators for their families, communities, and patients (Rowen et al., 2009). New approaches in managing and preventing diabetes in obese individuals must be studied and investigated.

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