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Case Report Paper

Type 2 Diabetes Causes: Review

Amanda Shelvia Savitri[1]

[1] *Department of Pharmacy, Program of Pharmacy, Faculty of Health, Sari Mulia University. Banjarmasin, Indonesia.*

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***Corresponding Author:**
Amanda Shelvia Savitri
Email:
savitriiamandaa@gmail.com

Abstract: Indonesia is seventh rank from 10 countries with the highest diabetic patients based on the International Diabetes Federation in 2020. One of the research result shows that women have higher risk type 2 diabetes (T2D) than men, because there is difference in body tissues where women have more adipose tissue. The purpose of this literature review is to analyze genetic factors who caused T2D. This literature research uses a narrative review design. The keywords to search the article are type 2 diabetes, type 2 diabetes factors, genetic type 2 diabetes, and factors that affect type 2 diabetes. The conclutions of causes of T2D are heredity, obesity, age, gender, education, lifestyle, food, stress, socio economic status and physical activity.

Keywords: Diabetic, Genetic Factors, Type 2 Diabetes.

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1. Introduction

Indonesia is seventh rank from 10 countries with the highest diabetes patients based on the International Diabetes Federation in 2020. Type 2 diabetes (T2D) is a metabolic disorder characterized by impaired glucose absorption in muscle and fat tissue, glucose that induces insulin secretion and increase production hepatic glucose that can cause hyperglycemia [2]. Based on International Diabetes Federation in 2014 382 million people live with T2D in the world, estimated it will increase to 592 million people in 2035. From these 382 million people, it is estimated that 175 millions of them have not been diagnosed. In 2015, 5 millions causes of death because of T2D [3].

The results from two provinces in Indonesia, it's Central Borneo and South Borneo state that Central Borneo was in the twelfth place out of thirty-four provinces in Indonesia with T2D sufferers aged > 15 years (DinKes Prov KalTeng, 2015) and T2D without insulin was in the 14th of the ten list of diseases, In South Borneo, the prevalence of T2D is estimated at 38,113 (1.4%) of the total populations >14 years old. Based on WHO Global Report the percentage of deaths that caused by diabetes before 70 years old is higher in low- and middle-income countries than in high-income countries [4]. A person with a low level of education generally has lack of knowledge about healthy lifestyle and the causes of chronic diseases, including DM and people with higher education will be concern with health of their body [5]. The complex etiology of T2D includes risk factors and disease evolution such as family history, obesity, lifestyle, poor nutrition and ethnicity [6].

2. Literature Review

A narrative review is presenting a summation and analysis of available literature on a specific topic of interest. Narrative review has non systematic, there are no acknowledged formal guidelines for writing it [1].

There are several steps to write a narrative review. First step is define topic and audience, a Tip is to select a topic that not only holds your interest, but which is also of interest to others because it is clearly relevant to contemporary clinical practice or policy in some way. Second step is toSearchand‘‘Re-Search" theLiterature. The Task is to identify the most relevant literature in your selected topic area, generally via keyword searches on relevant electronic databases, such as, but not only, PubMed, EMBASE, and the Cochrane Database of Systematic Reviews. The third step is to be critical when reading your selected literature. The last step is find a logical structure for the narrative review, the narrative review will have an introduction that sets the scene and a conclusion that recapitulates the main points and a body between the two [1].

3. Methodology

This article was made by in several stages, namely determining the topics to be discussed and then searching for literature from various databases such as Google Scholar, PubMed, and MDPI. The keywords used are type 2 diabetes, type 2 diabetes factors, genetic type 2 diabetes, and factors that influence type 2 diabetes. Articles deemed to meet the criteria will be used as sources and further reviews.

4. Finding and Discussion

4.1. Heredity

The case-control study design stated that a person with a family history of T2D was 5 times more likely to develop T2D than a person without a family history [7]. Heredity plays a major role in T2D. Genetic defects in beta cells can lead to the development of diabetes and insulin resistance [8]. However, to get T2D there are several underlying factors, namely obesity, diet, aging process, stress, taking drugs that can increase blood glucose.

4.2. Age

The age of 45 years is a group at high risk of haveT2D [9], because if the age increases, the risk of T2D will increase [10]. According to WHO, after the age of 30 years, blood sugar levels will increase 1-2 mg/dL/year during fasting and increase 5-6 mg/dL/year at 2 hours after eating. The prevalence of T2D in Indonesia in the population >15 years increased from 1.5-2.3% to 5.6% in 1993 [11]. It is cause of the presence of obesity which is calculated by assessing BMI or BMI in adolescents.

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4.3. Gender

The majority of respondents affected by T2D are women. This is due to differences in body composition and differences in sexual hormone levels between women and men [3]. Women have more adipose tissue, which is known from the normal fat content of women, which is about 20-25% of body weight, while men range from 15-20% of body weight [12]. The decrease in estrogen levels in women increases body fat reserves, especially in the abdominal area [13] thereby causing insulin resistance.

4.4. Education

People with low education have a 1.27 times higher risk of developing T2D than people with higher education. This happens because of the lack of knowledge about healthy lifestyles and the causes of chronic diseases, including T2D. Research by Rika (2019) shows that T2D occurs a lot in housewives due to several factors, namely lifestyle, lack of knowledge, lack of compliance and lack of physical activity [4]. Research by Brod et al (2009) concluded that lack of knowledge about T2D causes sufferers to tend not to adhere to medication, diet, and insulin appropriately [17].

4.5. Lifestyle

Unhealthy lifestyle makes more and more people suffer from T2D at a young age or <30 years old [11]. T2D disease expert Sidartawan Soegondo said that the high number of T2D sufferers was triggered by an unhealthy lifestyle that triggers obesity, thereby increasing a person exposure to T2D. According to a meta-analysis of prospective cohort studies, a heavy smoker has a true T2D risk of 1.6%, while a light smoker is 1.3% and a former smoker is 1.2% [13]. In a recent multi-ethnic cohort, it was reported that there was no association between smoking and the incidence of T2D suggesting a more complex role in causing T2D [18].

4.6. Food

Frequent consumption of sugary foods/drinks will increase the risk of T2D due to an increase in blood glucose. Food is believed to be the cause of increased blood sugar. Refined grains or sugary drinks consistently increase the risk of obesity and T2D [19]. Consumption the high-fat foods, are the cause of diabetes [11]. This makes people who have diabetes must to do the calorie-restricted diet, especially for those who are obese. The composition of the menu needed every day is 50-60% carbohydrates, 25-30% fat and 10-20% protein. Plant foods have a lower T2D risk than meat because low energy density foods are considered more protective than high energy density foods [20]. Foods with complex carbohydrates is recommended by people with T2D because it can slow the increase in blood sugar [3]. Food sources that contain complex carbohydrates include brown rice, potatoes, oats, whole wheat, pumpkin, peas, sweet potatoes and others.

4.7. Stress

Results by prospective study state that there was a significant relationship between stress and T2D in Swedish men and similar results were observed in people with burn-out syndrome [21]. When the stress accurs, the body will try to release the cortisol hormone. It can increase heart rate and breathing. It makes stored glucose and protein from the liver will go to bloodstream to be processed into energy, finally the sugar level in the blood will increase. The results of research conducted on people with symptoms of depression or anxiety indicate an increased risk factor for T2D [22]. Interestingly, living alone was associated with an increased risk of T2D in men.

4.8. Socio-Economic Status

In the English Longitudinal Study of Aging, it is stated that the low socioeconomic study group has more than double the risk of diabetes [23]. A study on health behavior in Australia found smoking and physical inactivity as the main mediators of the increased incidence of T2D in people with low socioeconomic status [24].

4.8. Physical Activity

Physical activity causes insulin to increase so that there is less sugar in the blood. In people who rarely exercise, food substances that enter the body are not burned but are stored in the body as fat and sugar [11]. Increasing regular physical activity at least 150 minutes per week with light intensity and 3

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times a week with activity duration of 30-60 minutes can increase insulin action systemically for 2-72 hours [25] and can reduce the risk of developing T2D by 58% [25].

5. Conclusion

Heredity is a factor in the occurrence of type 2 diabetes, but until the occurrence of type 2 diabetes due to several factors, namely obesity, age, gender, education, lifestyle, food, stress, socio economic status and physical activity

This research can be used as a basis for further research. Qualitative research is suggested to gain valuable insights of postpartum mothers with a depressive condition and also the coping mechanism that the mothers use.

References

[1] A. T. Gregory and A. R. Denniss, "An Introduction to Writing Narrative and Systematic Reviews — Tasks, Tips and Traps for Aspiring Authors," *Hear. Lung Circ*., vol. 27, no. 7, pp. 893–898, 2018.

[2] E. G. García-chapa et al., "Epidemiologi Genetik Diabetes Tipe 2 di Mestizos Meksiko," *JBR*, vol. 2017, 2017.

[3] D. Prasetyani and Sodikin, "Analisis Faktor Yang Mempengaruhi Kejadian Diabetes Melitus (Dm) Tipe 2," Anal. Fakt. Yang Mempengaruhi Kejadian Diabetes Miletus Tipe 2," *JTK*, vol. 2, no. 2, pp. 1–9, 2017.

[4] P. P. E. Adiana and N. L. Karmini, "Pengaruh Pendapatan, Jumlah Anggota Keluarga, dan Pendidikan Terhadap Pola Konsumsi Rumah Tangga Miskin Di Kecamatan Gianyar," *J. Nutr. Coll*., vol. 1, no. 2, pp. 1–60, 2012.

[5] A. Rika Meldy Agustina, Noor Diani, "Nusantara Medical Science Journal," vol. 4, no. 1, pp. 14–18, 2019.

[6] V. Lyssenko et al., "Clinical Risk Factors, DNA Variants, and the Development of Type 2 Diabetes," *N. Engl. J. Med*., vol. 359, no. 21, pp. 2220–2232, 2008.

[7] G. W. John S. Kekenusa, Budi T. Ratag, "Analisis Hubungan Antara Umur dan Riwayat Keluarga Menderita Dm dengan Kejadian Penyakit Dalam Blu Rsup Prof. Dr. R.D Kondou Manado," *JRT*, vol. 1, p. 6, 2013.

[8] R. Riyanto, "Faktor Risiko Keturunan Diabetes dengan Variabel Perancunya Meningkatkan Prevalensi Diabetes Tipe 2 (Studi Estimasi)," *J. Kesehat. Metro Sai Wawai*, vol. 10, no. 2, pp. 109–118, 2017.

[9] S. A. Soelistijo, "Konsensus Pengelolaan Dan Pencegahan Diabetes Melitus Tipe 2 Di Indonesia 2015 J," *Kesehat. Metro Sai Wawai*, vol. 18, no. 1, 2015.

[10] B. Smeltzer, B. Bare, S. Suddaarth, "Textbook of Medical-Surgical Nursing," *JMP*, vol. 14, 2008.

[11] R. Betteng, D. Pangemanan, and N. Mayulu, "Analisis Faktor Resiko Penyebab Terjadinya Diabetes Melitus Tipe 2 Pada Wanita Usia Produktif Dipuskesmas Wawonasa," *J. e-Biomedik*, vol. 2, no. 2, pp. 404–412, 2014.

[12] F. Emawati, M. Muherdiyantiningsih, R. Effendi, and S. Herman, "Profil Distribusi Lemak Tubuh dan Lemak Darah Dewasa Gemuk di Perdesaan dan Perkantoran," JRD, vol. 4, no.1, pp. 1–9, 2004.

[13] B. Thorand et al., "Sex differences in the prediction of type 2 diabetes by inflammatory markers: Results from the MONICA/KORA Augsburg case-cohort study, 1984-2002," *Diabetes Care,* vol. 30, no. 4, pp. 854–860, 2007.

[14] C. V. J. and J. W. L Webber, C Hill, J Saxton, "Eating behaviour and weight in children," *Int. J. Obes.*, vol. 33, no. 1, pp. 21–28, 2009.

[15] W. Dyah, Retnaningtyas, and F. Ibnu, "Faktor risiko timbulnya diabetes mellitus pada remaja SMU," *J. Ners*, vol. 7, no. 77, pp. 37–46, 2007.

[16] E. Teixeira-Lemos, S. Nunes, F. Teixeira, and F. Reis, "Regular physical exercise training assists in preventing type 2 diabetes development: Focus on its antioxidant and anti-inflammatory properties," *Cardiovasc. Diabetol*, vol. 10, no. 12, pp. 1–15, 2011.

[17] M. Brod, J. H. Kongsø, S. Lessard, and T. L. Christensen, "Psychological insulin resistance: Patient beliefs and implications for diabetes management," *Qual. Life Res*., vol. 18, no. 1, pp. 23–32, 2009.

Journal of Advances in Medicine and Pharmaceutical Sciences, vol. 1, no. 2, pp. 65-69, November 2022. **DOI: 10.36079/lamintang.jamaps-0102.455**

[18] R. J. Keith et al., "Tobacco use, insulin resistance, and risk of type 2 diabetes: Results from the multi-ethnic study of atherosclerosis," *PLoS One*, vol. 11, no. 6, pp. 1–15, 2016.
[19] D. C. Greenwood et al., "Association between sugar-sweetened and artificially sweetened soft drinks and type 2 diabetes: Systematic review and dose-response meta-analysis of prospective studies," *Br. J. Nutr.*, vol. 112, no. 5, pp. 725–734, 2014.
[20] H. Kolb and S. Martin, "Environmental/lifestyle factors in the pathogenesis and prevention of type 2 diabetes," *BMC Med.*, vol. 15, no. 1, pp. 1–11, 2017.
[21] M. Novak, L. Björck, K. W. Giang, C. Heden-Ståhl, L. Wilhelmsen, and A. Rosengren, "Perceived stress and incidence of Type 2 diabetes: A 35-year follow-up study of middle-aged Swedish men," *Diabet. Med.*, vol. 30, no. 1, pp. 8–16, 2013.
[22] T. Khambaty, C. M. Callahan, A. J. Perkins, and J. C. Stewart, "Depression and Anxiety Screens as Simultaneous Predictors of 10-Year Incidence of Diabetes Mellitus in Older Adults in Primary Care," *J. Am. Geriatr. Soc.*, vol. 65, no. 2, pp. 294–300, 2017.
[23] S. Stringhini, P. Zaninotto, M. Kumari, M. Kivimäki, and G. D. Batty, "Lifecourse socioeconomic status and type 2 diabetes: The role of chronic inflammation in the English Longitudinal Study of Ageing," *Sci. Rep.*, vol. 6, no. March, pp. 1–6, 2016.
[24] E. D. Williams, R. J. Tapp, D. J. Magliano, J. E. Shaw, P. Z. Zimmet, and B. F. Oldenburg, "Health behaviours, socioeconomic status and diabetes incidence: The Australian Diabetes Obesity and Lifestyle Study (AusDiab)," *Diabetologia*, vol. 53, no. 12, pp. 2538–2545, 2010.
[25] S. R. Colberg, "Exercise and type 2 diabetes: The American College of Sports Medicine and the American Diabetes Association: Joint position statement," *Diabetes Care*, vol. 33, no. 12, pp. e147–e167, 2010.