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# Cardiovascular Risk Assessment in Type 2 Diabetic Patients at Universitas Sumatera Utara Hospital

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**ABSTRACT**

**Background.** Diabetes is a major health problem worldwide including in Indonesia. There is a close relationship between diabetes and cardiovascular disease, with cardiovascular events being the most prevalent cause of morbidity and mortality in diabetic patients. This study aims to describe the profile of cardiovascular risk in diabetes patients at Universitas Sumatera Utara Hospital.

**Methods.** A descriptive, cross-sectional study was conducted in the internal medicine outpatient clinic at Universitas Sumatera Utara Hospital. All subjects were diabetic patients who had not developed any cardiovascular complications. The risk of cardiovascular disorders was assessed using the Jakarta Cardiovascular Score. Data were collected through medical records, interviews, and physical examinations.

**Results.** There were 64 subjects in this study. The majority of subjects (81.3%) were classified as high risk for cardiovascular disease.

**Conclusion.** Most patients with diabetes have a high degree of risk of cardiovascular disease.

**Keyword**: Diabetes, Jakarta Cardiovascular Risk score

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***ABSTRAK***

***Latar.*** *Diabetes adalah masalah kesehatan utama di seluruh dunia termasuk di Indonesia. Ada hubungan erat antara diabetes dan penyakit kardiovaskular, dengan kejadian kardiovaskular menjadi penyebab paling umum morbiditas dan mortalitas pada pasien diabetes. Penelitian ini bertujuan untuk mendeskripsikan profil risiko kardiovaskular pada pasien diabetes di Rumah Sakit Universitas Sumatera Utara.*

***Metode.*** *Studi deskriptif potong lintang dilakukan di klinik rawat jalan penyakit dalam di Rumah Sakit Universitas Sumatera Utara. Semua subjek adalah pasien diabetes yang tidak mengalami komplikasi kardiovaskular. Risiko gangguan kardiovaskular dinilai menggunakan Jakarta Cardiovascular Score. Data dikumpulkan melalui rekam medis, wawancara, dan pemeriksaan fisik.*

***Hasil.*** *Terdapat 64 subjek dalam penelitian ini. Mayoritas subjek (81,3%) diklasifikasikan sebagai risiko tinggi untuk penyakit kardiovaskular.*

***Kesimpulan.*** *Kebanyakan pasien dengan diabetes memiliki tingkat risiko penyakit kardiovaskular yang tinggi.*

***Kata kunci****: Diabetes, Jakarta Skor Risiko Kardiovaskular*

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## 1 Introduction

Diabetes remains to be a large and growing global burden. International Diabetes Federation (IDF) reported in 2021 that around 537 million adults are living with diabetes worldwide and it is estimated that there are 19.5 million diabetic patients in Indonesia.[1,2] There is a direct connection between cardiovascular disease and diabetes. Patients with diabetes have a two-to four-fold increased risk of developing heart disease and cardiovascular disease serves as the primary cause of morbidity and mortality in diabetic patients.[3]

Therefore, early detection and risk stratification of cardiovascular disease in diabetic patients is necessary to determine the appropriate preventive measures and therapy needed.[4] Cardiovascular risk stratification can be determined through several methods, including identifying traditional risk factors, scoring systems, and biomarkers.[4] A scoring system is a screening method that is quite simple and cost-effective to implement. Several scoring systems are available such as WHO/ISH risk prediction chart, PROCAM score, Reynolds risk score, or Framingham risk score.[5,6] These score systems showed good and consistent results. The Jakarta Cardiovascular Score, a modification of the Framingham risk score has been developed in Indonesia since 2002 as a specific cardiovascular risk score for the Indonesian population. This score showed good sensitivity (77.9%) and specificity (90.0%).[7] This study was conducted to

describe the profile of cardiovascular risk in diabetes patients at Universitas Sumatera Utara Hospital using the Jakarta Cardiovascular score.

## 2 Methods

This was a descriptive study with a cross-sectional design conducted on diabetic patients at the internal medicine outpatient clinic Universitas Sumatera Utara Hospital from June to November 2022. All eligible patients have explained this study and asked for approval. Furthermore, the researchers collected the necessary data through medical records, interviews, and physical examinations.

The Jakarta Cardiovascular Score consists of 7 risk factors including sex, age, blood pressure, body mass index, smoking, diabetes, and physical exercise/activity (Table 1). A total score between -7 to 1 is considered low risk, a score of 2-4 is moderate risk, and a score ≥5 is considered as high risk. Normal blood pressure systole and diastole (<130/<85 mmHg), High normal (130–139/85–89 mmHg), Grade 1 Hypertension (140–159/90–99 mmHg), Grade 2 Hypertension (160–179/100–109 mmHg), Grade 3 Hypertension (≥180/≥110 mmHg).[7] Criteria under weigh (BMI <18.5 kg/$m^2$), normal weight (BMI 18.5-24.9 kg/$m^2$), overweight (BMI 25.0–29.9 kg/$m^2$), obese (BMI>30.0 kg/$m^2$).[1]

## 3 Results

This study included 64 research subjects, taking place at the internal medicine outpatient clinic Universitas Sumatera Utara Hospital. There were 35 subjects (54.7%), females, with the majority age range between 60-64 years (45.3%). Twenty-seven subjects (42.2%) has normal blood pressure, 24 subjects (37.5%) overweight, 44 subjects (68.8%) never smoke, and 26 subjects (40.6%) with low physical activity (Table 1).

**Table 1** Baseline Characteristic

| Variables | N (%) |
|---|---|
| **Sex** | |
| Female | 35 (54.7) |
| Male | 29 (45.3) |
| **Age (years)** | |
| 25–24 | 2(3.1) |
| 35–39 | 2 (3.1) |
| 40–44 | 3 (4.7) |
| 45–49 | 4 (6.3) |
| 50–54 | 9 (14.1) |
| 55–59 | 15 (23.4) |
| 60–64 | 29 (45.3) |
| **Blood Pressure** | |
| Normal | 2(3.1) |
| High normal | 2 (3.1) |
| Grade 1 Hypertension | 3 (4.7) |
| Grade 2 Hypertension | 4 (6.3) |
| Grade 3 Hypertension | 9 (14.1) |
| **Body Mass Index (kg/m$^2$)** | |
| Underweight | |
| Normoweight | 26 (40.6) |
| Overweight | 24 (37.5) |
| Obes | 14 (21.9) |
| **Smoking** | |
| Never | 44 (68.8) |
| Ex-smoker | 16 (25) |
| Smoker | 4 (6.3) |
| **Diabetes Mellitus** | |
| No | 0 (0) |
| Yes | 64 (100) |
| **Physical Exercise/Activity** | |
| No | 4 (6.3) |
| Low | 26 (40.6) |
| Medium | 24 (37.5) |
| High | 10 (15.6) |

The total Jakarta Cardiovascular Score was found in the range of 0-14. A score ≥ 5 was found in 52 subjects, therefore the majority of subjects were classified as high-risk for cardiovascular disease (81.3%) (Table 2).

**Table 2** Jakarta Cardiovascular Score.[7]

| Variables | N (%) |
|---|---|
| **Cardiovascular risk** | |
| Low risk (score -7–1) | 5 (7.8) |
| Moderate risk (score 2–4) | 7 (10.9) |
| High risk (score ≥ 5) | 52 (81.3) |

## 4 Discussion

This study aims to describe the degree of cardiovascular risk in patients with diabetes. There was a greater proportion of women in 64 subjects (54.7%) than men (45.3%) in this study. This is

consistent with the study by Al-Hadi (2020), where female prevalence (59.5%) in patients with diabetes was higher than in men (40.5%).[8] However, there are differences in the data of the International Diabetes Federation (2021), where the estimate of diabetes prevalence among women in the adult population is slightly lower (10.2%) than among men (10,8%).[1]

Most subjects in this study were in the age group between 60–64 years. This result is consistent with the study by Raraswati (2018) that the majority of people with diabetes in Jatinangor were in the age group between 60–64 years (32.5%).[9] The high prevalence of diabetes in the elderly age group is associated with aging processes in the human body leading to dysfunction of energy homeostasis and abnormality of carbohydrate metabolism.[10]

A total of 42.2% of subjects in this study had normal blood pressure with systolic pressure <130 mmHg and diastolic blood pressure <85 mmHg. This result differs from Haryati (2022) where the majority of patients with diabetes had grade 2 hypertension (39. 5%).[11] Theoretically, diabetes can increase the risk of hypertension due to increased levels of glucose, which cause intravascular fluid retention. Consequently, there is an increase in body fluid volume and vascular damage leading to increased peripheral arterial resistance. Both of these conditions underlie the occurrence of high blood pressure.[12]

The majority of subjects had a body mass index in the range of 13.79-25.99 (40.6%). This result was different from the results of the study conducted by Putri (2022), which reported that more than half of patients with diabetes were obese (58.1%).[13] Body mass index has a strong relationship with diabetes and insulin resistance where in individuals with obesity, the amount of NEFA, glycerol, hormones, cytokines, pro-inflammatory substances, and other substances that play a role in the occurrence of insulin resistance increases.[14]

Table 2 showed that 68.8% of people with type 2 diabetes are either non-smokers or have quit smoking in at least the last 10 years. This is consistent with a report from Purwanti (2020), that the majority of patients with diabetes have a non-smoking status (67%).[15] This may be related to the proportion of samples that are mostly women, where there are generally significant differences in prevalence between female and male smokers that can be attributed to the assumption that female smoking is considered deviant behavior in society.[16]

Most subjects in this study obtained low physical activity (40.6%). This result was different from the study by Brahmantya (2021), where the majority of patients with diabetes had a moderate level of physical activity of 43 (45.7%).[17] This may be because most subjects were geriatrics that obtained difficulty performing heavy physical activity.

This study showed that the majority of patients with diabetes had a high risk of cardiovascular disease (81.3%). This finding is consistent with Purwanti (2020), which assessed the

cardiovascular risk in patients with diabetes in Purwosari and found that the majority of patients were classified as high-risk (50%).[15] This finding is also consistent with Einarson (2018), which stated that diabetes is a substantial risk factor for cardiovascular disease.[4] Coronary artery calcification (CAC) has recently been revealed as a powerful predictor of cardiovascular risk in high-risk women, which can be used to supplement the Jakarta Cardiovascular Assessment (JAKVAS). The CAC and JAKVAS approaches can be used to consider patient preferences for early predictive markers of heart disease and the use of preventive drugs.[18] In multivariate analysis, there was no significant association between family disease history and Cardiovascular Stratification. Most of the health Cadres in Jatinangor, West Java have a low and moderate risk of cardiovascular disease, even though there is a small percentage that is at a high risk.

## 5 Conclusion

The majority of patients with diabetes have a high degree of risk for cardiovascular disease based on the Jakarta Cardiovascular Score which approaches can be used to consider patient preferences for early predictive markers of heart disease and can use preventive drugs.

## REFERENCES


[1]. International Diabetes Federation (IDF). IDF Diabetes Atlas 10th Edition, International Diabetes Federation (IDF). 2021

*[2]. Kemenkes RI. 2018. Riset Kesehatan Dasar; RISKESDAS. Jakarta: Balitbang Kemenkes RI*

[3]. De Rosa S, Arcidiacono B, Chiefari E, Brunetti A, Indolfi C, Foti DP. Type 2 Diabetes Mellitus and Cardiovascular Disease: Genetic and Epigenetic Links. Front Endocrinol (Lausanne). 9:2. 2018

[4]. Einarson, T.R., Acs, A., Ludwig, C. and Panton, U.H. Prevalence of cardiovascular disease in type 2 diabetes: a systematic literature review of scientific evidence from across the world in 2007–2017. Cardiovascular diabetology, 17(1), pp.1-19.2018

*[5]. Aini F.N., Wicaksana, A.L. and Pangastuti, H.S. Tingkat Risiko Kejadian Kardiovaskular Pada Penyandang Diabetes Melitus Tipe 2. Jurnal Persatuan Perawat Nasional Indonesia (JPPNI), 4(3), pp.182-192.2020*

[6]. Ettiappan, S. and Ponnusamy, M. Cardiovascular risk scores in women undergoing stress myocardial perfusion scan and comparison with scan-predicted risk. Indian Journal of Nuclear Medicine: IJNM: The Official Journal of the Society of Nuclear Medicine, India, 35(4), p.305.2020

[7]. Kusmana, D. "The influence of smoking cessation, regular physical exercise and/or physical activity on survival: a 13 years cohort study of the Indonesian population in Jakarta", Medical Journal of Indonesia, 11(4), pp. 230-41. 2002

*[8]. Al-Hadi, H., Zurriyani, S.A.S. And Saida, S.A. Prevalensi Diabetes Melitus Tipe 2 Dengan Kejadian Hipertensi Di Poliklinik Penyakit Dalam Rs Pertamedika Ummi Rosnati. Jurnal Medika Malahayati, 4(4), Pp.291-297.2020*

*[9]. Raraswati, A., Heryaman, H. and Soetedjo, N. Peran program Prolanis dalam penurunan kadar gula darah puasa pada pasien Diabetes Melitus tipe 2 di Puskesmas Kecamatan Jatinangor. Jurnal Sistem Kesehatan, 4(2).2018*

[10]. Mordarska, K. and Godziejewska-Zawada, M. Diabetes in the elderly. Menopause Review/Przegląd Menopauzalny, 16(2), pp.38-43.2017

*[11]. Haryati, A.I. and Tyas, T.A.W. Perbandingan Kadar HbA1c pada Pasien Diabetes Melitus Tipe 2 yang Disertai Hipertensi dan Tanpa Hipertensi di Rumah Sakit Umum*

*Daerah Duri, Mandau, Bengkalis, Riau. Jurnal Kedokteran dan Kesehatan, 18(1), pp.33-40.2022*

*[12]*. *Ayutthaya, S.S. and Adnan, N., 2020. Faktor Risiko Hipertensi pada Penderita Diabetes Mellitus Tipe 2. Jurnal Ilmu Kesehatan Masyarakat, 9(02), pp.60-71.2020*

*[13]*. *Putri, M.G., Nugroho, H. and Adi, M.S. Hubungan Indeks Massa Tubuh dan Tingkat Aktivitas Fisik dengan Kontrol Glikemik Diabetes Melitus Tipe 2. Jurnal Epidemiologi Kesehatan Komunitas, 7(1), pp.341-350.2022*

[14]. Al-Goblan, A.S., Al-Alfi, M.A. and Khan, M.Z. The mechanism linking diabetes mellitus and obesity. Diabetes, metabolic syndrome, and obesity: targets and therapy, 7, p.587.2014

[15]. Purwanti, O.S., Muntaha, A.F. and Sudaryanto, A. Assessment of Coronary Heart Disease Risk among Diabetes Mellitus Survivor in Community Health Center Purwosari Indonesia. Executive Editor, 11(01), p.1382. 2020

*[16]*. *Keloko, Alam Bakti. "Survei Prevalensi Perokok di Kota Medan." Jurnal Pembangunan Perkotaan 7, no. 1:13-17.2019*

*[17]*. *Brahmantya, I.B.Y., Puspitasari, K.D., Putri, I.S., Made, I., Dwipayana, P. and Saraswati, M.R. Intensitas Aktivitas Fisik Berpengaruh Terhadap Kadar Glukosa Darah Sewaktu Pasien Prolanis Diabetes Melitus Tipe 2 Di Puskesmas Kota Denpasar. E-Jurnal Medika Udayana, 10(2), pp.68-73. 2021*

[18]. Suprayoga IM, Handari SD.Correlation Between Jakarta Cardiovascular Score and Coronary Artery Calcium Score in High-Risk Women at Siloam Hospital Surabaya, Indonesia, 2020-2021. Heart Sci J; 4(2): 13-17. 2023

[19]. Dharma SG, Soemarko DS, Setianto B. Comparison of coronary heart disease stratification using the Jakarta cardiovascular score between the main office and site office workers. J. Phys. Conf. Ser. 1073 04201:1-4.2018

[20]. Tiksnadi BB, Afrianti R, Sofiatin Y, Ridha A, Fihaya FY. Cardiovascular Risk Profile in Health Cadres in Jatinangor, West Java. AMJ. 6(2):75–79.2019