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Screening for Prediabetes withChecking Blood Glucose

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Abstract— Prediabetes (intermediate hyperglycemia) is a high-risk state for diabetes that is defined by glycaemic variables that are higher than normal, but lower than diabetes thresholds. 5–10% of people per year with prediabetes will progress to diabetes, with the same proportion converting back to normoglycaemia. The prevalence of prediabetes is increasing worldwide and experts have projected that more than 470 million people will have prediabetes by 2030. This study aims is to describe checking blood glucose for screening prediabetes and type 2 diabetesin "Kita Clinic", Depok. The study's characteristics were age, sex, and blood glucose. The study design uses descriptive studies. The study population was all patients who have their blood glucose checked in "Kita Clinic". This study sample was people from July to December 2020 in "Kita Clinic", 735 patients. The results showed that people age 25 to 34 years old 67.48%, female 84.76%, had normal blood glucose 94.3%, prediabetes 4.2%, and type 2 diabetes 1.5%.

Keywords— Screening, prediabetes, blood glucose, Depok

1. Introduction

Prediabetes is defined as an intermediate state of hyperglycemia with glucose levels above the normal state but below the diagnostic levels of diabetes. It is increasingly recognized as an important metabolic state, as individuals with prediabetes are at high risk of developing overt diabetes and its associated complications. A better understanding of prediabetes could help with earlier identification, thereby allowing earlier intervention, potentially lowering the number of individuals who go on to develop diabetes. The definitions and screening criteria for prediabetes differ between guidelines published by different organizations, resulting in estimations of prevalence that can vary widely from one another. Despite these differences, these estimates suggest that the number of individuals affected by prediabetes is increasing rapidly in all areas of the world. This short review compares and contrasts the diagnostic criteria for screening of prediabetes, the impact of various glycaemic measures on prevalence estimates, and discusses current and future trends in the global prevalence estimates of prediabetes(1).

Prediabetes is highly prevalent in patients with the macrovascular disease and increases the risk for type 2 diabetes and macrovascular events with adverse outcomes. Prediabetes could therefore become an important therapeutic target in both primary and secondary prevention. Both lifestyle modification and antidiabetic drugs decrease the risk of developing type 2 diabetes and also prevent developing macrovascular disease. Whether the treatment of prediabetes in patients with the established macrovascular disease is beneficial as part of secondary prevention needs further studies (2).

Around 5–10% of people with prediabetes become diabetic every year, although the conversion rate varies with population characteristics and prediabetes definitions (3, 4). In a meta-analysis of prospective studies published between 1979 and 2004, annualized incidence rates of progression to diabetes in patients with isolated impaired glucose tolerance (IGT) (4–6%) or isolated impaired fasting glycemia (IFG) (6–9%) were lower than in those with both IFG and IGT (15–19%) (5).

The American Diabetes Association (ADA) lowered body mass index (BMI) from 27 kg/m^2 to 25 kg/m^2 as a diagnostic criterion of obesity in the Asian American population (6). Thus, the ADA probably continues to indicate insulin resistance as a major pathophysiologic mechanism of altered glucose metabolism in Asian subjects as among the lean population in the United States. However, by older criteria, the same population would be considered lean as still recognized in non-Asian Americans (6). In a recent study, glimepiride, an insulin secretagogue, was documented to delay progression from prediabetes to type 2 diabetes in more lean subjects and for a longer duration of time in comparison with treatment with metformin in an obese non-Asian population (7).

The prevalence of prediabetes (based on impaired glucose tolerance data) in Indonesia is 10%. Predictors of pre-diabetes are male, old-age, high socio-economic status, low education level, hypertension, obesity, central obesity, and smoking. Priority for pre-diabetes and diabetes prevention in Indonesia directed to decrease blood pressure (Attributable Risk (AR) 56.5%), reduce waist circumference (AR 47.3%), and stop smoking (AR 44.4%) (8).

This research aim is to describe checking blood glucose for screening prediabetes in “Kita Clinic”, Depok.

1.1 Research Question
How does the blood glucose for screening for prediabetes in “Kita Clinic”, Depok?

1.2 Objectives
This research objective is to describe blood glucose for screening prediabetes in “Kita Clinic”, Depok.

2. Method
2.1 Design Study
The study design used in this study was a descriptive study design, a study conducted with the aim of know the blood glucose for screening prediabetes.

2.2 Data Collection
Data collection from medical records in “Kita Clinic”, contains complete information about age, gender, and blood glucose. The medical records collected from July to December 2020 were 735 medical records.

2.3 Variable Definition
The respondent's blood glucose is measured in mg/dL. Characteristics of respondents studied included: age and sex.

2.4 Data Analysis
Quantitative data will later be entered into a computer database using SPSS version 22 to see the frequency distribution of the characteristics of the respondents.

3. Result
The data processed is secondary data taken from the clinic’s medical the data were taken from February12-15th 2021. The population in this study were all patients who were examined in “Kita Clinic”, Depok, the sample used in this study from July to December 2020 at “Kita Clinic”, Depok. The data obtained were by following per under the characteristics, age, sex, and blood glucose. The results showed that of the patients from the age, 67.48% were between 25 to 34 years old (496 patients), 24.22% were between 35 to 44 years old, 6.53% were between < 25 (48 patients), 1.5% were between 45 to 54 (11 patients) and 0.27% were

between more than 55 years old (2 patients). Based on the gender showed that patients, 84.76% were female (623 patients) and 15.24% male (112 patients).Based on the blood glucose that patients, 94.3% had normal blood glucose (693 patients), 4.2% with prediabetes (31 patients), and 1.5% with type 2 diabetes (11 patients).

Table 1. Demographic characteristics

	N	Percentage (%)
Age		
<25	48	6.53
25-34	496	67.48
35-44	178	24.22
45-54	11	1.5
≥55	2	0.27
Gender		
Male	112	15.2
Female	623	84.8
Blood Glucose		
Normal	693	94.3
Prediabetes	31	4.2
Type 2 Diabetes	11	1.5

4.Discussion

The prevalence rate of prediabetes from another study increased from 11.6% to 35.3% from 2003 to 2011. By 2011, 50.6% of the population who were overweight (body mass index (BMI)>25) and ≥40 years of age had prediabetes (9). The results of this study have differences from the characteristics of other studies. About one-third of the study population, men and women likewise, were affected by prediabetes, identified by elevated fasting and/or 2-h glucose. Mean age did not differ between men and women (10).The mean age of men and women was 43.0 and 38.6 years, respectively (11). Studies from Mahat describe that age (years) 39.07 ± 7.60 39.90 ± 8.84 not significant(12).

The other study comprised of 500 subjects of which 306 (61.2%) were male and 194 (38.8%) female. The mean age of the cases was 49.42±7.73 years. Prediabetes was found in 147/500(29.4%) cases of which 109 were female and 38 were male (13). The mean ages of the male and female groups were 51.1 ± 15.7 and 49.4 ± 15.1 years, respectively ($p<0.05$). The diabetes prevalence in adults was 11.5% (8.4% after standardization), while the prevalence of prediabetes in adults was 32.0% (27.6% after standardization). The prevalence of diabetes and that of prediabetes gradually increased with age (both $p < 0.05$) (14).

The majority of the participants were from Arabic tribes as expected. The age distribution reflects the growth in the population of Saudi Arabia; adults aged < 30 years formed 43.1% of the participants, while only 8.1% were ≥ 60 years old. The effect of age and sex on the prevalence of DM and prediabetes is presented. Following blood testing to confirm a diagnosis, 19 individuals previously unaware of their condition were found to be diabetic, and 122 were found to be prediabetic. The overall crude prevalence of DM and prediabetes was 15.7% and 10.2% respectively. The prevalence of DM was slightly lower among women than men, but the difference was not statistically significant($p = 0.58$).The prevalence of both DM and prediabetes increased with age; DM exponentially and prediabetes up to 60 years of age. Among people aged 18–39 years, prediabetes was slightly more common than DM, while in people aged 40 years or older DM was much more common than prediabetes. Of people aged 50 years or over 46.1% of men and 44.4% of women had DM. Less than half of the people aged 50 years or over were normoglycemic (15).

Almost 15% of these young adults had prediabetes. Many modifiable and nonmodifiable risk factors were present in these patients, but only age and a higher BMI were independent variables significantly associated with pre-diabetes. Timely interventions in primary health care are needed to prevent or delay the progression to diabetes (16).

Gender differences in the risk factor association were observed among the reviewed studies. Overall, the reported an association between risk factors and prediabetes apparently stronger among men. In particular, abdominal obesity, dyslipidemia, smoking, and alcohol drinking habits were risk factors that showed a prominent association among men. Hypertension and poor diet quality may appear to be stronger among women. General obesity showed stringent hold, while physical activity was not significantly associated with the risk of prediabetes in both of the gender(17). The baseline characteristics of another study population are presented. The mean age was 64.0 (10.9) years, 78.0% were male and all participants in the study were Caucasian of European origin (18). Studies from Mahat describe that sex (M/F) 112/88 106/ not significant(12).

Individuals progressing to prediabetes or diabetes experienced a greater loss in the physical component score than patients with persistent normal glucose tolerance (-2.31 and -7.44 vs. -1.08), but the difference was only significant for subjects converting to diabetes. Subjects with prediabetes at baseline and diabetes at follow-up had a significant loss in mental health compared to subjects with persistent prediabetes (19).

Fasting plasma glucose was significantly elevated in those who developed diabetes at least 10 years before the diagnosis of diabetes, and this was also the case in those who developed prediabetes. Glucose dysregulation precedes the diagnosis of diabetes at least for 20 years (20).

People whose blood glucose levels are higher than normal but do not fulfill the criteria for a diagnosis of type 2 diabetes are considered to have prediabetes, also known as dysglycemia or intermediate hyperglycemia (21). Identification of these individuals is important because they have a high risk of developing type 2 diabetes (22).

Another study mentioned that a total of 2144 elderly individuals in rural areas of Yiyang underwent the oral glucose tolerance test for prediabetes screening, and 461 elderly individuals with prediabetes were screened out in this population. Among the 461 prediabetic subjects, 425 subjects completed the questionnaire regarding risk factors for prediabetes (30 did not respond and 6 had incomplete data; response rate: 93.5%). Then, 425 subjects with normal glucose tolerance were matched with the 425 prediabetic individuals of the same gender and similar age (within 3 years) living in the same village. The average age was 69.4 ± 6.5 years in the case group and 69.5 ± 6.6 years in the control group. The male-to-female ratio was 1:1.36 in the case and control groups (23).

Over the 7 years studied, the overall prevalence of prediabetes and diabetes increased from 8.4 and 7.7% to 19.0 and 9.5%, respectively ($P < 0.01$), and the increasing rates were found among the subgroups stratified by gender, age, ethnicity, education and income (24). The hazards of prediabetes definitions may differ between genders depending on the outcome of interest. IFG-WHO among men and impaired glucose tolerance among women are particularly important because of their association with incident stroke and coronary heart disease, respectively. Considering these sex differences could improve the personalized management of prediabetes (25).

5. Conclusion

Patients in "Kita Clinic", Depok had the characteristics of people age 25 to 34 years old 67.48%, female 84.76%, had normal blood glucose 94.3%, prediabetes 4.2% and type 2 diabetes 1.5%.For prediabetic individuals, lifestyle modification is the cornerstone of diabetes prevention, with evidence of a 40–70% relative risk reduction. Type 2 diabetes need to identify early to prevent the occurrence of the disease. Routine blood glucose checks can detect prediabetes and type 2 diabetes early so that disease progression can be controlled earlier.

6. Conflict of Interest

The author states that there is no conflict of interest in this study

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