

Research article

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Frequency and Associated Factors of Prediabetes Among Outpatients at Polyclinic Pham Ngoc Thach University of Medicine

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Abstract

Background: Prediabetes is a condition characterized by elevated blood glucose levels that are not yet high enough to meet the diagnostic criteria for diabetes. It is associated with an increased risk of progressing to type 2 diabetes and other metabolism disorders. The frequency of prediabetes is increasing globally, and Vietnam is no exception. This study aim to determine the frequency of prediabetes and its risk factors among outpatients at Polyclinic of Pham Ngoc Thach University of Medicine.

Methods: A cross-sectional study was conducted at Polyclinic of Pham Ngoc Thach University of Medicine. The study included 240 patients attending the Polyclinic from March to May 2023. Data were collected through structured interviews, review of medical records, and blood tests, including fasting plasma glucose and HbA1c levels.

Results: Of the 240 patients, 15.4% (n=37) were diagnosed with prediabetes. Significant factors associated with prediabetes included age over 45 years (OR: 2.42; 95% CI: 1.04–6.1), smoking at least 20 cigarettes per day (OR: 13; 95% CI: 1.7–157), and comorbidities such as hypertension (OR: 3.48; 95% CI: 1.6–7.8) and dyslipidemia (OR: 4.45; 95% CI: 1.8–10.6).

Conclusions: The study reveals a significant frequency of prediabetes and its risk factors among outpatients at Polyclinic of Pham Ngoc Thach University of Medicine. Early screening and targeted interventions might be encouraged for high-risk outpatients.

Keywords: Prediabetes, Risk Factors, Outpatients, Vietnam, Screening, Diabetes Prevention

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1. INTRODUCTION

Prediabetes is a metabolic condition characterized by elevated blood glucose levels that fall below the threshold for a

diabetes mellitus diagnosis. Without timely intervention, individuals with prediabetes face a heightened risk of progressing to type 2 diabetes mellitus (T2DM), as well as

developing other metabolism disorders and complications [1].

The global rise in prediabetes is alarming. The global prevalence of impaired glucose tolerance in 2021 was 9.1% (464 million) and is projected to increase to 10.0% (638 million) in 2045, while the percentage of impaired fasting glucose in 2021 was 5.8% (298 million) and is projected to increase to 6.5% (414 million) in 2045. This condition not only increases the likelihood of developing T2DM but is also associated with an important risk of cardiovascular disease (CVD), even in the absence of overt diabetes. Prediabetes and T2DM are closely linked to obesity, hypertension, dyslipidemia, and sedentary lifestyles, all of which are growing concerns in both developed and developing nations [2].

Vietnam, mirroring trends in many other low- and middle-income countries, is experiencing rapid economic growth and urbanization, which have contributed to significant shifts in lifestyle and dietary habits. The transition from traditional diets rich in vegetables and low in fats to urbanized diets high in processed foods, sugars, and unhealthy fats has contributed to an increase in non-communicable diseases, including diabetes and prediabetes. In addition to dietary changes, the rise in sedentary behaviors due to urbanization has exacerbated the public health burden associated with obesity and metabolic syndrome, further increasing the risk of prediabetes and diabetes [3, 4].

The frequency of prediabetes in Southeast Asia is increasing at a rate similar to that seen in Western countries, with Vietnam being no exception. A 2021 report by the International Diabetes Federation (IDF) indicated that approximately 8.6% of the Vietnamese adult population had impaired glucose tolerance

(IGT) [5], a key marker of prediabetes. This translates to millions of individuals who are at risk of progressing to T2DM if effective preventive measures are not implemented. The growing frequency of prediabetes, combined with the burden of undiagnosed cases, presents a significant challenge for the Vietnamese healthcare system.

Despite the growing concern of prediabetes in Vietnam, data on its frequency and associated risk factors remain limited, particularly in clinical settings. Identifying the frequency of prediabetes in clinical settings is important, as these patients are more likely to be at higher risk due to preexisting conditions such as obesity, hypertension, or dyslipidemia. Moreover, understanding the factors that contribute to prediabetes in these patients can help inform targeted interventions aimed at reducing the incidence of T2DM and its complications.

Primary care settings, such as general outpatient clinics, play a vital role in the early detection and management of prediabetes. Polyclinic of Pham Ngoc Thach University of Medicine, situated in District 10, Ho Chi Minh City, serves a diverse patient population and is a key facility for providing comprehensive healthcare services, including diabetes screening and prevention.

The study aims to: (1) estimate the frequency of prediabetes among patients attending the Polyclinic of Pham Ngoc Thach University of Medicine, and (2) Identify the demographic, comorbidity, and smoking status associated with prediabetes in this population.

2. MATERIALS AND METHODS

This cross-sectional study was conducted at the Polyclinic in Ho Chi Minh City, Vietnam. The study population included patients aged 18 years or older

who visited the Polyclinic between March and May 2023 and had fasting plasma glucose (FPG) or HbA1c test results available. FPG was defined as the plasma glucose level measured after 8–12 hours of fasting, typically before breakfast. HbA1c, which does not require fasting, represents the average blood glucose levels over the past 2–3 months. Patients were eligible to participate if they had sufficient data in their electronic medical records to complete at least 70% of the survey questions and agreed to participate, providing a reliable means of contact (e.g., telephone number). The sample size was calculated using the formula for estimating a proportion in a population. With a 95% confidence interval ($\alpha = 0.05$), a margin of error (d) of 0.05, and an estimated prediabetes frequency (p) of 19.3% based on a previous study conducted

in Tra Vinh, Vietnam, in 2011 [6], the required sample size was determined to be 240 patients. A convenience sampling method was used to recruit participants. Electronic medical records were reviewed to identify eligible patients, who were then contacted by phone and invited to participate until the target sample size of 240 was reached. Prediabetes was defined according to the ADA criteria: FPG between 100-125 mg/dL, or HbA1c between 5.7% and 6.4% [1]. Data were collected through structured telephone interviews lasting approximately 10–15 minutes. The interviews covered demographic information, medical history, and lifestyle factors relevant to prediabetes. The interview questions were designed to be clear, concise, and free of technical jargon to ensure comprehension.

3. RESULTS

Table 1: Demographic, social, and clinical factors associated with prediabetes among outpatients at Polyclinic of Pham Ngoc Thach University of Medicine

Characteristic	Study Population (N, %)	Prediabetes		p-value	OR (IC)
		Yes	No		
Age (Mean + SD)	49.2 ± 15.4				
Min – Max	18 – 86				
Age Group					
Under 45 years old	98 (40.8)	9 (9.2)	89 (90.8)	0.029	1
>45 years old	142 (59.2)	28 (19.7)	114 (80.3)		2.42 (1.04 – 6.1)
Gender					
Female	103 (57.1)	24 (17.5)	113 (82.5)	0.298	1
Male	137 (42.9)	13 (12.6)	90 (87.4)		0.68 (0.3 – 1.5)
Current Residence					
Ho Chi Minh City	154 (64.2)	30 (19.5)	124 (80.5)	0.861	1
Other	86 (35.8)	7 (8.1)	79 (91.9)		2.73 (1.1 – 7.7)
Education level					
Primary School	14 (5.8)	7 (50.0)	7 (50.0)		1

Characteristic	Study Population (N, %)	Prediabetes		p-value	OR (IC)
		Yes	No		
Middle School	35 (14.6)	7 (20.0)	28 (80.0)	0.042	0.25 (0.06 - 0.95)
High School	59 (24.6)	5 (8.5)	54 (91.5)	0.001	0.09 (0.02-0.4)
College/University	132 (55.0)	18 (13.6)	114 (86.4)	0.002	0.16 (0.05-0.5)
Economic Status					
Wealthy	31 (12.9)	7 (22.6)	24 (77.4)		1
Adequate living	189 (78.9)	27 (14.3)	162 (85.7)	0.241	0.57 (0.2 – 1.5)
Insufficient living	20 (8.3)	3 (15.0)	17 (85.0)	0.508	0.61 (0.14 – 2.7)
Current Occupation					
Government employees/ Office workers/ Students	85 (35.4)	9 (10.6)	76 (89.4)		1
Self-employed	36 (15.0)	7 (19.4)	29 (80.6)	0.195	2.04 (0.7 – 6.0)
Homemaker	18 (7.5)	6 (33.3)	12 (66.7)	0.019	4.22 (1.3 – 14.0)
Retired	55 (22.9)	12 (21.8)	43 (78.2)	0.074	2.35 (0.92 – 6.1)
Unemployed	7 (2.9)	2 (28.6)	5 (71.4)	0.180	3.38 (0.6 – 20.0)
Other	39 (16.3)	1 (1.6)	60 (98.4)	0.161	0.22 (0.03 – 1.8)
Marital Status					
Single	40 (16.7)	4 (10)	36 (90)		1
Married/ Living with a partner	177 (73.8)	26 (14.7)	151 (85.3)	0.441	1.55 (0.5-4.7)
Separated/ Divorced/ Widowed	23 (9.5)	7 (30.4)	16 (69.6)	0.049	3.94 (1.01-15.4)
Nutritional Status					
Underweight - Normal	114 (47.5)	14 (12.3)	100 (87.7)	0.201	1
Overweight - Obesity	126 (52.5)	23 (18.2)	103 (81.8)		1.59 (0.7 – 3.5)
Hypertension					
No	152 (63.3)	23 (26.1)	65 (73.9)	<0.001	1
Yes	88 (36.7)	14 (9.2)	138 (90.8)		3.48 (1.6 – 7.8)
Other cardiovascular diseases					

Characteristic	Study Population (N, %)	Prediabetes		p-value	OR (IC)
		Yes	No		
No	210 (87.5)	35 (16.7)	175 (83.3)	0.121*	1
Yes	30 (12.5)	2 (6.7)	28 (93.3)		0.35 (0.04 – 1.5)
Lipid metabolism disorders					
No	205 (85.4)	24 (11.7)	181 (88.3)	<0.001	1
Yes	35 (14.6)	22 (62.9)	13 (37.1)		4.45 (1.8 – 10.6)
COPD					
No	233 (97.1)	37 (15.9)	196 (84.1)	>0.99*	
Yes	7 (2.9)	0	7 (100)		//
Other comorbidity					
No	195 (81.2)	32 (15)	182 (85)	0.567*	1
Yes	45 (18.8)	5 (19.2)	21 (80.7)		0 (0 – 4.5)
Family history of diabetes					
No	163 (67.9)	24 (14.7)	139 (85.3)	0.703	1
Yes	77 (32.1)	13 (16.9)	60 (83.1)		1.17 (0.5 – 2.5)
Smoking history					
Yes. used to smoke but quit	27 (11.3)	4 (14.8)	23 (85.2)		1
Yes. currently smoking	25 (10.4)	3 (12)	22 (88)	0.767	0.78 (0.2 – 3.9)
Never smoked	188 (78.3)	30 (16)	158 (84)	0.879	1.09 (0.35 – 3.4)
Years since quitting smoking (n=27)					
1-5 years	9 (33.3)	2 (22.2)	7 (77.8)	0.582	1
6-10 years	18 (66.7)	2 (11.1)	16 (88.9)		0.44 (0.2 – 7.4)
Daily smoking status (n=52)					
Yes	50 (96.2)	7 (14)	43 (86)	>0.99*	
No	2 (3.8)	0	2 (100)		//
Number of cigarettes smoked daily (n=52)					
1-29 cigarettes	20 (38.5)	5 (25)	15 (75)	>0.99*	1
≥ 30 cigarettes	32 (61.5)	7 (21.9)	25 (78.1)		0.84 (0.2 – 4)
Cigarettes smoked per day (n=52)					
1-19 cigarettes	40 (76.9)	2 (5)	38 (95)	0.001*	1
≥ 20 cigarettes	12 (23.1)	5 (41.7)	7 (58.3)		13 (1.7 – 157.0)

The study, conducted at the Polyclinic from March to May 2023, included 240 participants. The majority were over 45 years old (59.2%), with 57.1% being female and 42.9% male. Most participants (64.2%) resided in Ho Chi Minh City. In terms of nutritional status, 47.5% were in the underweight or normal group, while 52.5% were in the overweight or obese group. Among the participants, 224 individuals (93.3%) had comorbidities, including 36.7% with hypertension, 14.6% with dyslipidemia, 12.5% with cardiovascular diseases, and 2.9% with COPD. Additionally, 32.1% reported having family members with diabetes. Regarding smoking status, 78.3% had never smoked, 11.3% were former smokers (66.7% of whom had quit for six or more years), and 10.4% were current smokers. Among those who had ever smoked, 96.1% smoked daily, 61.5% had smoked for 30 or more years, and 25% smoked 20 or more cigarettes per day.

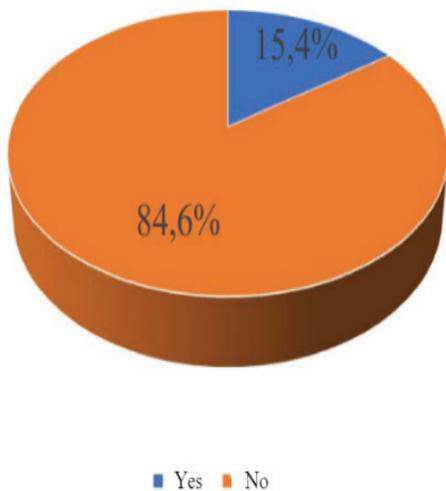


Figure 1: Frequency of prediabetes among outpatients at Polyclinic of Pham Ngoc Thach University of Medicine

The frequency of prediabetes among the study population was 15.4% (37 people).

Prediabetes was higher among older participants, with 19.7% of individuals over

45 years old affected, compared to 9.2% of those aged 45 or younger. Participants over 45 years old were found to be 2.42 times more likely to develop prediabetes compared to those aged 45 or younger (OR: 2.42; CI 95% 1.04 - 6.1). Hypertension significantly increased the risk, as individuals with hypertension were 3.48 times more likely to have prediabetes (OR: 3.48; CI 95%: 1.6-7.8). Similarly, dyslipidemia increased the risk by 4.45 times (OR 4.45; CI 95%: 1.8 - 10.6). Smoking was another critical factor, with individuals who smoked 20 or more cigarettes per day having a 13 times higher risk of developing prediabetes compared to those who smoked fewer than 20 cigarettes per day (OR: 13; CI 95%: 1.7-157).

4. DISCUSSION

This study, conducted at the Polyclinic of Pham Ngoc Thach University of Medicine from March to May 2023, included 240 outpatients and found a prediabetes prevalence of 15.4%. That result is consistent with the finding of other studies conducted in Vietnam. This frequency is slightly lower than those observed in studies focusing on older populations [6, 7], as older age is known to be a risk factor for metabolic disorders. This difference can likely be attributed to the inclusion of a broader range of participants at the polyclinic, who are mostly healthy individuals and visiting for general health check-ups.

Age emerged as one of the most significant factors associated with prediabetes. Participants over the age of 45 were 2.42 times more likely to have prediabetes compared to those aged 45 or younger. This finding aligns with global and national recommendations that people over 45 should be routinely screened for diabetes due to the higher risk of glucose metabolism

disorders, given the increased risk of glucose metabolism with age. Additionally, recent updates to screening guidelines, lowering the age threshold to 35 [1], reflect the growing concern over the earlier onset of diabetes-related conditions.

Hypertension was another critical risk factor, with hypertensive individuals being 3.48 times greater likelihood of developing prediabetes. Patients with both hypertension and prediabetes are at a significantly higher risk of progressing to type 2 diabetes and developing cardiovascular diseases, further emphasizing the need for integrated management of these conditions.

Dyslipidemia was also a notable risk factor, with affected individuals having a 4.45 times higher likelihood of developing prediabetes. Addressing dyslipidemia through lifestyle modifications and pharmacological interventions could be a key strategy in preventing the onset of diabetes in at-risk populations.

Smoking showed a particularly strong correlation with prediabetes, especially for individuals who smoked 20 or more cigarettes per day, who were 13 times more likely to develop prediabetes than those who smoked fewer cigarettes. This result emphasizes the detrimental impact of smoking on metabolic health. Smoking cessation programs should be a crucial component of any public health strategy aimed at reducing the incidence of prediabetes.

A strength of this study is its setting in a busy polyclinic, which realistically represents patient characteristics and the limitations of diagnostic tests. Additionally, the combination of patient interviews and medical records provides a comprehensive approach to data collection. However, patient interviews may introduce inaccuracies due to recall bias in self-reported information,

such as smoking status and the number of cigarettes smoked, or may fail to assess how specific types of dyslipidemia affect prediabetes.

Future studies should explore the role of early diagnosis and management of prediabetes, emphasizing the use of objective diagnostic tools to minimize bias. Additionally, research should evaluate the effectiveness of targeted interventions for hypertension, dyslipidemia, and smoking cessation, while considering genetic factors and long-term outcomes to improve the prevention and management of prediabetes in diverse populations.

5. CONCLUSION

The study reveals a notable prediabetes frequency of 15.4% among patients at Polyclinic, underscoring the urgent need for targeted screening and preventive strategies. Key risk factors associated with prediabetes include being over 45 years old, smoking at least 20 cigarettes per day, and having comorbidities such as hypertension and dyslipidemia. Addressing these factors through integrated healthcare interventions is crucial to prevent the progression to type 2 diabetes and reduce related health complications.

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