

## Prevalence of Impaired Glycaemia & Pre-Diabetes on Elderly Patients with Hypertension

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### ABSTRACT

**Background:** Prediabetes is considered an intermediate stage leading to diabetes. Elderly people with high blood pressure, diabetes and prediabetes increase the risk of cardiovascular events and mortality. Scientific data of prediabetes in elderly hypertensive patients in primary care in Viet Nam now are lacking. Therefore, we conducted a study to investigate the prevalence of prediabetes and some risk factors in the elderly with hypertension treated at outpatient department of District 1 Hospital.

**Objective:** Determination of prediabetes prevalence and some risk factors in hypertensive elderly outpatients at outpatient department of District 1 Hospital, Ho Chi Minh City.

**Method:** The study recruited all elderly patients ( $\geq 60$  years old) who have a history of hypertension or currently meet the criteria for diagnosis of hypertension but never been diagnosed as diabetes type2 before. They have been treated as hypertension at outpatient department of District 1 Hospital, Ho Chi Minh City, and were selected for the study with a cross-sectional descriptive research design.

**Result:** From September 2020 to June 2021, there were 361 cases that met the criteria for admission to the study. Prediabetes rate is 25, 8%; new onset diabetes rate is 11% in the study population. Family history of diabetes and sedentary lifestyle are respectively risk factors for prediabetes with OR: 2,44, 95% CI:1,43-4,17 ( $p=0,001$ ) and OR: 1,9, 95% CI: 1,02 -3,55 ( $p=0,04$ ). Other factors (age, gender, address, marital status, education level, overweight, obesity, large waist circumference, large waist/hip ratio, current smoker, alcohol/beer consumption, Sarcopenia, comorbid conditions, polypharmacy) not associated with prediabetes condition.

**Conclusion:** The prevalence of pre-diabetes in elderly hypertensive patients currently treated at outpatient department of District 1 Hospital, Ho Chi Minh City is 25.8% with two risk factors: having family history of diabetes, reduced physical exercise lifestyle. Therefore, relating to primary care of public health, physicians at outpatient department should pay more attention to this group of hypertension diseases that are increasing in the current time.

**Keywords:** Prediabetes, The elderly with hypertension, Risk factors for prediabetes

### INTRODUCTION

Prediabetes is considered an intermediate stage leading to diabetes because there are no signs of recognition, the development is silent, often confusing with some other common diseases [1]. If pre-diabetic patients have early and appropriate interventions for cardiovascular risk factors and plasma glucose it can delay or even prevent the onset of diabetes [2,3]. Elderly people with high blood pressure associated with diabetes and/or pre-diabetes increase the risk of cardiovascular complications and mortality. Therefore, early detection of hypertensive elderly in Vietnam with pre-diabetes and risk factors for pre-diabetes is very important and necessary in clinical practice in the real world.

Therefore, we conducted the study "Surveying the prevalence of pre-diabetes and some risk factors in the

elderly with hypertension in outpatient department at the clinic of District 1 hospital." with 2 objectives:

- Determine the rate of pre-diabetes and the rate of dysglycemia in elderly hypertensive patients

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- Identification of some risk factors for pre-diabetes in hypertensive elderly

**SUBJECTS: RESEARCH METHODS**

**Study design:** A prospective cross-sectional description.

**Study population:** All elderly patients (≥ 60 years of age) with a history of hypertension or currently meeting the criteria for a diagnosis of hypertension, being treated at outpatient department of District 1 hospital's clinic, have never been diagnosed with diabetes Type 2 before during the study period from September 2020 to June 2021

**Inclusion Criteria:**

Age ≥ 60 years old, agree to participate in the study and meet the following criteria:

- Meet the criteria for diagnosis of hypertension according to WHO/ISH guidelines 2003 and the Ministry of Health in Vietnam, issued in 2019.
- Complete tests for serum lipids, fasting plasma glucose and/or impaired plasma glucose tolerance test, HbA1c.
- Do not have diabetes or are being treated as diabetes type 2.

**Exclusion Criteria:**

- Patient did not agree to participate in the study
- Patient has a history of diabetes or is being treated for diabetes.
- Patients with severe renal impairment, severe liver failure or severe infection.

**Data processing and analysis:**

The data were entered and processed using the statistical software SPSS 22.

**RESEARCH RESULTS**

We recruited all elderly patients (≥ 60 years old) with hypertension who were treated at the clinic of District 1 hospital from September 2020 to June 2021, in which 361 cases met the admission criteria. All patients were done physical examination, blood tests and plasma glucose tolerant test. All records have the following results.

**Demographic characteristics of the study population**

The group of patients aged 60-69 years old accounted for the highest proportion with 56%, male accounted for 31.3%, family history of diabetes accounted for 27.4%; patients with smoking, or drinking alcohol have small proportion; the ratio of big waist/hips, big waist circumference and overweight/obesity is 70.4%, 30.5%, 55.1%, respectively. The rate of reduced mobility lifestyle is only 1/5 of the research population (**Table 1**).

**Table 1.** General characteristics of the study population.

Population characteristics(n=361)	Frequency	Percentage %
Age		
60-69 years old	202	56
70-79 years old	105	29,1
≥ 80 years old	54	14,9
Sex (Male %)	113	31,3
Family history of diabetes mellitus (DM)	99	27,4
Smoking	30	8,3
Regular Consumption of Alcohol/Beer	10	2,8
Large waist circumference	110	30,5
Large waist/hip ratio	254	70,4
Overweight/ Obesity	199	55,1
Sarcopenia	102	28,3
Dyslipidemia	215	59,6
Reduced physical exercise lifestyle	73	20,2

**Characteristics of blood sugar of the study population**

The highest fasting blood sugar was higher than the threshold for pre-diabetes (6.92 mmol/L) and had an average reading of 5.51 ± 0.58 mmol/L; The plasma glucose value 2 hours after the 75g glucose tolerance test had the highest value exceeding the threshold for diagnosis of new-onset diabetes (specifically, 21 mmol/L), the lowest value was 4.08 mmol/L and has an average value of 9.78 ± 3.37 mmol/L. The average value of HbA1c of the study population was 5.8 ± 0.72%, the highest HbA1c index was very high with 12.36% (**Table 2**).

**Table 2.** Glycemic index (n=361).

Characteristics	Minimum	Maximum	Average ± SD
Fast blood sugar	4,02	6,92	5,51 ± 0,58
HbA1c	4,9	12,36	5,98 ± 0,72
Glucose tolerance Test	4,08	21	9,78 ± 3,37

**Prevalence of prediabetes and rates of dysglycemia**

Through analyzing data from the screening study, we recorded that there were 40 elderly hypertensive patients who met the criteria for diagnosis of new onset diabetes type 2 with the prevalence of 11%. According to the ADA 2019

pre-diabetes diagnostic criteria, we recorded that 93 patients in the study were pre-diabetic, accounting for 1/4 of the study population (25.8%). The proportion of elderly hypertensive patients with normal blood sugar in the study was 63.2% (Figure 1).

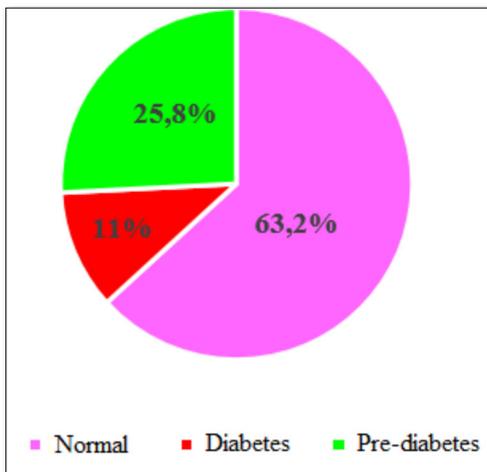


Figure 1. Prevalence of dysglycemia in the study.

**Subgroups of dysglycemia in pre-diabetic patients (n=93)**

In the group of pre-diabetic patients, the group with the highest prevalence (37.62%), is the group having combination of 3 types of dysglycemia (fasting plasma glucose disturbances, impaired plasma glucose tolerance test

and increased HbA1c). followed by the group having combined fasting plasma glucose disturbances and increased HbA1c with 24 patients, accounting for 25.81% of the pre-diabetic population, and the group with increased HbA1c alone accounted for 7.53% (Table 3).

Table 3. Subgroups of dysglycemia of pre-diabetic hypertensive patients.

Dysglycemia of pre-diabetic hypertensive patients	Frequency	Percentage %
Fasting plasma glucose disturbances	11	11,83%
Increased HbA1c	7	7,53%
Fasting plasma glucose disturbances and Increased HbA1c	24	25,81%
Fasting plasma glucose disturbances	13	13,98%
Increased HbA1c	3	3,23%
Fasting plasma glucose disturbances and Increased HbA1c	35	37,62%

### The relationship of cardiovascular factors and pre-diabetes

Through multivariable logistic regression analysis, we found that: Family history of diabetes is a risk factor that increases pre-diabetes 2.44 times when compared with the other individuals in the study with OR=2,44, CI 95% 1,43 - 4,17 ( $p<0.05$ ). In addition, pre-diabetes increased in the sedentary group with odd ratio (OR) = 1.90; 95% CI 1.02 - 3.55 with  $p=0.04$ . Specifically, inactive, reduced physical exercise individuals had an increased risk of pre-diabetes is 1.9 times higher than in active individual. Other factors: big/large waist circumference, big/large waist-to-hip ratio, overweight, and obesity were not associated with prediabetes risk factors (Table 4).

**Table 4.** Relationship of risk factors in pre-diabetic population.

Risk Factors	OR	95% CI	P
Family history of diabetes mellitus (DM)	2,44	1,43 - 4,17	0,001
Big/large waist circumference	1,12	0,59 - 2,07	0,75
Big/large waist-to-hip ratio	1,42	0,78 - 2,61	0,25
Reduced speed	0,51	0,21 - 1,23	0,13
Reduced physical exercise lifestyle (sedentary lifestyle)	1,90	1,02 - 3,55	0,04
Overweight, Obesity	1,40	0,80 - 2,45	0,24

## DISCUSSION

### Patient characteristics

In our study, the age group 60 - 69 years old accounted for the highest rate with 56%, followed by the age group 70 - 79 with 29.1%. The result are similar to the research results of author Nguyen Thi Thu Thuy; the age group 60-69 years old accounted for the highest rate and the lowest rate was then the group > 80 years old [4]. The proportion of elderly people with hypertension in our study having a family history of diabetes accounted for 27.4%. It is lower than the research results of authors Zhuang [5] with 39.5%. This difference is due to the study time; our sample size is different from those authors [5]. When analyzing data, we recorded that the proportion of patients with reduced mobility accounted for about 1/5 of the study population (20.2%). The results are similar to the research results of the author Xin Xin Zhuang et al. on 2175 people > 50 years old in Tianjin, China with 38.8% reduced mobility; a other study by author Cao My Phuong et al in 2012 also recorded the rate of reduced movement in hypertensive patients as 38.9% [6,7].

### Characteristics of blood sugar of the study population

The results of study about prevalence of pre-diabetes in the elderly population are similar to the results of several domestic and foreign studies. Specifically, a study by author Wang [8] on the prevalence of pre-diabetes and related risk factors in adults in China recorded prevalence of pre-diabetes, new onset diabetes type 2 is of 27.25%, 5.7% respectively [8]. The results are similar to the results of our study with prevalence of pre-diabetes, new onset diabetes 25, 6%, 11%, respectively.

### The relationship between prediabetes and some risk factors

Family history of diabetes is associated with pre-diabetes rates recorded in our study results with a statistically significant difference with  $p=0.02$ . The percentage of patients with a family history of diabetes increased in the group with pre-diabetes compared with the group having normal plasma glucose. The results of this study are similar to some studies by Lanh [9], Hu [10] in the medical literature [11].

## CONCLUSION

From September 2020 to June 2021 at the outpatient clinic of District 1 Hospital, HCMC, through statistical analysis of 361 elderly patients with hypertension, we recorded: Pre-diabetes rate 25.8%, diabetes rate 11%. Family history of diabetes, and reduced physical activity lifestyle are two risk factors that respectively increase the risk of new-onset prediabetes with OR of 2.44; 95% CI:1.43- 4.1 ( $p=0.001$ ) and 1.9 95% CI: 1.02-3.55 ( $p=0.04$ ).

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