

# Prevalence of Hypertension & Diabetes among the Employees of District Office, Purba Medinipur District, West Bengal, India

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## ABSTRACT

**Introduction:** Hypertension and diabetes are two leading risk factors for non-communicable diseases. We assessed prevalence of hypertension and diabetes among office workers of Purba Medinipur district, West Bengal; India.

**Method:** We collected data in the month of May 2023. All employees were asked to participate in the study. Semi-structural questionnaires were prepared to collect data related to age, sex, height, weight, habit of smoking and alcohol. We also measured blood pressure and random blood sugar of participants. Collected data were entered in excel for analysis. Logistic regression analysis and P value was calculated.

**Result:** Total participants were 333 with male participants were 80.80% (267). Maximum participants were in age group of 35 – 49 years [45.95% (153)] followed by 27.63% (92) age group 50 – 64 years. We calculated body mass index (BMI) and found 46.55% (155) were overweight and 11.11% (37) were obese. Only 26.40% (88) had habit of use of tobacco and 20.70 % (69) consumed alcohol. 37.83% (126) had hypertension and 4.80 % (16) had high blood sugar. Tobacco use were significantly related to high blood pressure ( $P < 0.001$ ) but alcohol use was not related, ( $P < 0.51$  for systolic and  $< 0.21$  for diastolic BP). Multiple regression analysis showed age, weight, height and tobacco consumption positive coefficients. Age and tobacco consumption were statistically significant for systolic BP ( $P < .001$ ). Weight and tobacco consumption were associated with diastolic BP ( $< 0.000$  and  $< .001$  respectively).

**Discussion:** Hypertension and diabetes were present among staff. Tobacco consumption, overweight and age were associated with hypertension and diabetes.

**Keywords:** Hypertension, Diabetes, Office workers, Purba Medinipur, district

## INTRODUCTION

Worldwide, 1.28 billion populations over the age of 30 – 79 years have high blood pressure.<sup>[1]</sup> It is also projected to rise 578 million by 2030 and 700 million by 2045.<sup>[2]</sup> People suffers from diabetes also increased from 108 million in 1980 to 422

million in 2014 globally.<sup>[3]</sup> In last thirty years, prevalence of hypertension among the age group 20 – 79 years has increased from 650 million to 1280 million.<sup>[4]</sup> Currently, prevalence of hypertension & diabetes was 25.5% and 7.5% respectively.<sup>5</sup> The prevalence of hypertension among the

young aged group of people (18-25 years) was more common (12.1%)<sup>[5]</sup>

In India, the prevalence of Hypertension varied from state to state and low prevalence was shown in Gujrat (8%) state and highest prevalence was shown in Odisha (51%) state.<sup>[6]</sup> Diabetes and Cardiovascular diseases are collectively accountable for more than half of mortality due to Non Communicable Diseases (NCD).<sup>[7]</sup> NCD was responsible more than 80% of global disease burden in 2020.<sup>[7]</sup> Sedentary lifestyles, smoking and consumption of increased amount of fatty food are associated with development of cardiovascular diseases.<sup>[8,9,10]</sup>

Prevalence of hypertension in West Bengal was 22% and about one crore of adult population had been suffering from hypertension.<sup>[11]</sup> Prevalence of diabetes was also 22% in West Bengal.<sup>[12]</sup> It is observed that diabetes and hypertension were the major risk factor of cardiovascular diseases.<sup>[13]</sup> Prevalence of hypertension among the professional workers such as doctors & nurses was 29.4% and 13.7%, and the prevalence of diabetes was 25.4% and 5.6% respectively.<sup>[14]</sup> The physical inactivity was associated to coronary artery disease and led to premature death.<sup>[15]</sup> So, among the office workers have a tendency for habit of smoking, consumption of alcohol and less physical activities.

Aim of the study is to assess the hypertension, diabetes and obesity among the employees of a government office of Purba Medinipur district, West Bengal, India

## **MATERIALS & METHODS**

A cross sectional study was conducted for assessment of hypertension and diabetes among the employees of district magistrate & collector office at Purba Medinipur district, West Bengal; India. The data was collected in the month of May 2023. All the employees of the office were informed to take part in this study. Willing employees were participated in the study. Before the data collection, informed verbal consent was

obtained after explaining the importance of the study. Predesigned semi- structural questionnaires were prepared for collection of data. Risk factors for NCD were assessed in the questionnaires. Height, weight and blood pressure were measured and recorded in data collection format.

We used stadiometer (Height Meter) for the measurement of height; against a wall with bare foot (may be error of 0.1 cm). Weight was measured by using weighing machine with an error of 0.1 Kg. We measured blood pressure of the participants using digital blood pressure machine with maintaining blood pressure measurement protocol. It was under careful notice that avoided the measuring blood pressure (BP) if the participants consumed caffeine and smoked cigarette within 30 minutes. In this case, participants had to wait for 30 minutes for the BP measurement. If some participants took physical activities or exercise within 30 minutes, he or she has to wait for 30 minutes for BP measurement. All data were collected in the data collection format. We used WHO-STEPS measurement methods for blood pressure, height and weight measurement.<sup>[16]</sup> We considered hypertension when blood pressure  $\geq 140/90$  mm of mercury (Hg).<sup>[17]</sup> Two blood pressure reading was taken in case of high blood pressure.

We measured random blood sugar for assessment of diabetes to the participants. We also considered diabetes when random blood sugar  $\geq 180$  mg/dl. We calculated the body mass index (BMI) as weight in Kg divided by height in meter square. When BMI was found  $< 18$  Kg/m<sup>2</sup>, the individual was considered as underweight (in case of adult), when BMI was 18 – 24.9 kg/ m<sup>2</sup> the person was declared as normal BMI. When BMI 25-30 kg/m<sup>2</sup>, the person was considered as overweight and when BMI  $> 30.1$  kg/m<sup>2</sup> the person was identified as obese.

After collection of data, it was entered in the Microsoft excel for measurement central tendency, dispersion and proportion etc.

## STATISTICAL ANALYSIS

Statistical analysis was done in SPSS software, version 20 and Python programming.

## RESULT

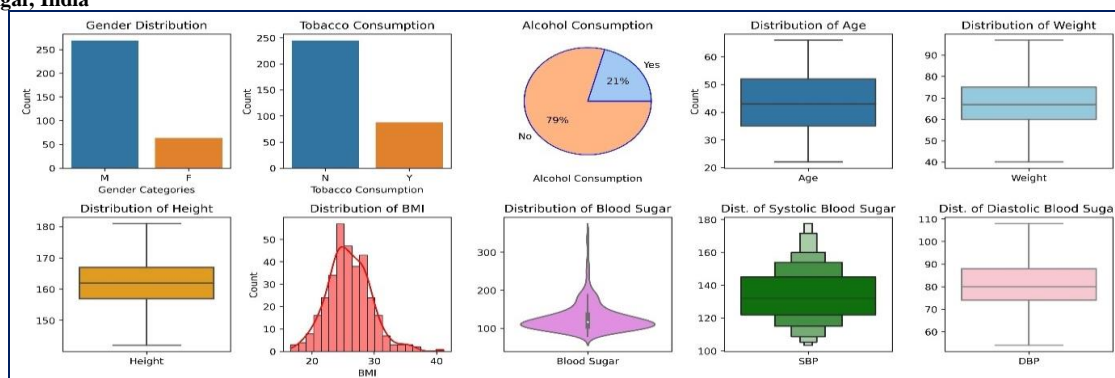
All the staff attached to the office of the District Magistrate and Collector was invited to take part in the study. Total participants were 333 with male participants were 80.80% (267). Both permanent and contractual staffs of the office were taken part in the study. In the age group of 35 – 49 years, the maximum staff were found of 45.95 % (153) followed by 50 – 64 years

27.63 % (92) and 17 – 34 years 25.62% (82). We calculated body mass index (BMI) of all staff participated in the survey. There were 46.55 % (155) of the participants were found over weight (BMI was > 25 – 30 Kg/m<sup>2</sup>). We found normal BMI 41.11 % (137) of the participants and their BMI was 18 – 24.9 kg/ m<sup>2</sup>, but about 11.11% (37) of the participants were found obese and their BMI > 30.1 kg/m<sup>2</sup>. Among the participants, only 26.40 % (88) had habit to smoke tobacco as well as chewing tobacco and 20.70 % (69) of them had habit to consume alcohol. (Table 1 & Figure 1)

Table 1: Demographic status & frequency distribution of variables of study population of Purba Medinipur district, West Bengal; India

SI No	Variables (N=333)	%
1	Age Group (in years)	
	17 - 34	24.62 (82)
	35 - 49	45.95 (153)
	50 - 64	27.63 (92)
	> 65	1.80 (6)
2	Gender	
	Male	80.80 (267)
	Female	19.2 (64)
2	BMI (Weight in Kg/Height in Meter square)	
	Under weight: < 18	1.20 (4)
	Normal: 18.5 - 24.9	41.14 (137)
	Over weight: (25 - 29.9)	46.55 (155)
	Obesity: > 30	11.11 (37)
3	Tobacco user	26.40 (88)
	Tobacco non user	245 (73.60)
4	Alcohol consumer	20.70 (69)
	Alcohol non consumer	79.30 (264)
5	Hypertension (BP mmHg)	
	Normal (SBP<119 & DBP < 80 mm Hg)	14.11(47)
	Pre-Hypertension (SBP 120 -139 & DBP 80 - 89 mm Hg)	48.05 (160)
	HTN	37.83 (126)
	HTN Stage -I (SBP140 - 159 & DBP 90 -99) mmHg	30.33 (101)
	HTN Stage -II (SBP > 160 & DBP > 100 mmHg)	7.51 (25)
6	Diabetes (RBS mg/100 ml)	
	Normal Blood sugar (<139 mg/100ml)	75.98 (253)
	Pre-diabetes (140 - 199 mg/100ml)	19.22 (64)
	Diabetes > 200 mg/100ml)	4.80 (16)

Figure 1: Frequency distribution of the Gender, Tobacco, Alcohol consumption, Age, Weight, Height, BMI, Blood Sugar Level, Systolic Blood Pressure (SBP), and Diastolic Blood Pressure (DBP) of the study participants of Purba Medinipur district, West Bengal; India



We measured blood pressure to the participants and found 37.83 % (126) of them had high blood pressure and called as hypertension. Their blood pressure either systolic was  $\geq 140$  mm of Hg and or diastolic was  $\geq 90$  mm Hg. A good number of participants had pre-hypertensive state [48.05 % (160)] and their systolic blood pressure was  $> 120 - 139$  mm of Hg and diastolic blood pressure was  $80 - 89$  mm Hg. We also measured blood sugar of the participants in random method. A number of them had normal blood sugar 75.98 % (253) with random blood sugar  $< 139$  mg/100 ml. Only 4.80 % (16) of the participants had random blood sugar level  $> 200$  mg/ 100ml.

(Table 1& Figure 1) A few of the participants were already diabetic and hypertensive and they were under medical treatment.

Systolic blood pressure and diastolic blood pressure was significantly related to tobacco use. P value was  $< 0.01$  both for the systolic and diastolic blood pressure respectively. But the alcohol consumption was not related with high blood pressure (systolic and diastolic). P value was 0.51 for systolic blood pressure and 0.21 for diastolic blood pressure. There was no statistically significant difference in blood sugar level with respect to use of tobacco and alcohol was found in this study. (Table 2)

**Table 2: Bivariate visualization of the continuous parameters with reference to tobacco and alcohol use of the study population of Purba Medinipur district, West Bengal; India**

Variables	Tobacco Use		T Statistics	P value
	YES	NO		
	Mean (SD)	Mean (SD)		
Blood Sugar Level	129.26(41.86)	128.48(37.73)	0.16	0.87
Systolic Blood Pressure	138.06(18.38)	132.55(17.67)	2.48	0.01*
Diastolic Blood Pressure	83.59(10.12)	80.31(10.57)	2.52	0.01*
Variables	Alcohol Use		T Statistics	P value
	YES	NO		
	Mean (SD)	Mean (SD)		
Blood Sugar Level	125.94(41.65)	129.41(38.07)	-0.66	0.51
Systolic Blood Pressure	135.31(16.93)	133.67(18.29)	0.67	0.51
Diastolic Blood Pressure	82.60(10.05)	80.81(10.64)	1.27	0.21

\*Statistically Significant difference @  $\alpha$  (level of significance) 0.05

In multiple regression age, weight, height and tobacco consumption showed positive coefficients, indicated positive association with systolic blood pressure. Among them age and tobacco consumption were statistically significant. P value was  $< 0.001$ . There were positive associations with age,

weight, height and tobacco consumption with diastolic blood pressure. Among them weight and tobacco consumption were statistically significant with diastolic blood pressure. P value were  $< 0.000$  and  $< 0.001$  for weight and tobacco consumption respectively. (Table 3)

**Table 3: Multiple linear regression for Systolic Blood Pressure and Diastolic Blood Pressure in the study population of Purba Medinipur district, West Bengal; India**

(i) Systolic Blood Pressure			
Predictor	Coefficient ( $\beta$ )	95% Confidence Interval	p-value
Intercept ( $\beta_0$ )	59.82	(-109.226, 228.883)	0.487
Age	0.373	(0.193, 0.552)	$< 0.001$
Weight	0.065	(-1.178, 1.307)	0.919
Height	0.218	(-0.837, 1.273)	0.685
Tobacco Consumption (Yes)	14.813	(6.788, 22.837)	$< 0.001$
Alcohol Consumption (Yes)	-11.451	(-20.238, -2.663)	0.011
(ii) Diastolic Blood Pressure			
Predictor	Coefficient ( $\beta$ )	95% Confidence Interval	p-value
Intercept ( $\beta_0$ )	57.99	(34.58, 81.41)	$< 0.001$
Age	0.028	(-0.077, 0.133)	0.597
Weight	0.283	(0.163, 0.402)	$< 0.000$
Height	0.012	(-0.154, 0.177)	0.177
Tobacco Consumption (Yes)	6.879	(2.209, 2.209)	$< 0.001$
Alcohol Consumption (Yes)	-4.701	(-9.814, 0.413)	0.073

\*P  $< 0.001$  significant

In multiple linear regression, age, weight, tobacco consumption showed positive coefficients, indicated a positive association with blood sugar. Among them age was statistically significant with blood sugar

(Diabetes). P value was <0.001. Alcohol consumption was not significant with blood sugar. P value was 0.269. (Table 4)

**Table 4: Multiple linear regression of the variables for Blood Sugar in the study population of Purba Medinipur district, West Bengal; India**

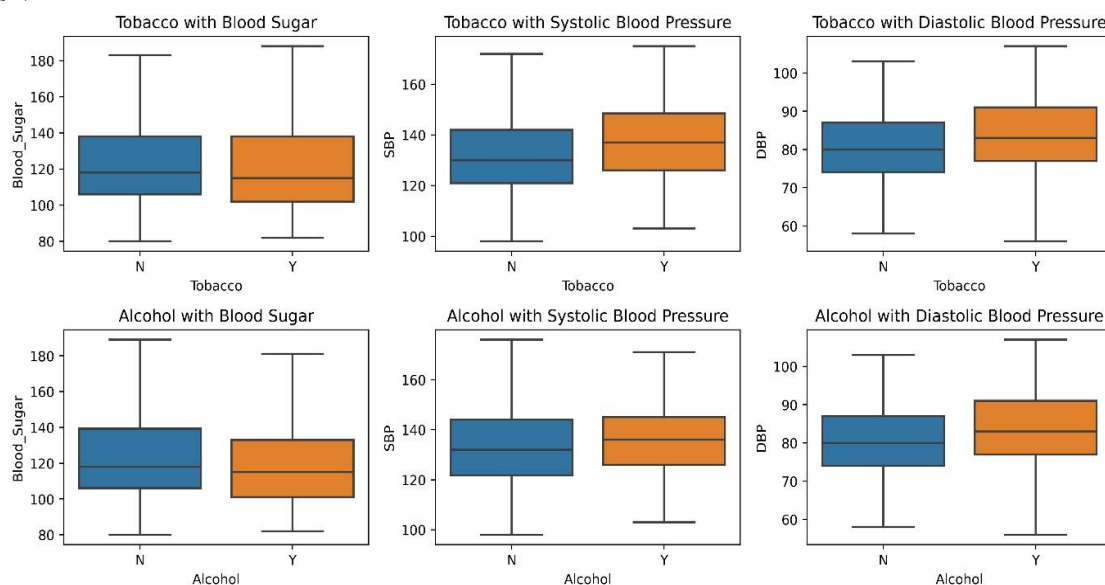
Predictor	Coefficient (β)	95% Confidence Interval	p-value
Intercept (β0)	94.8335	(7.002, 182.665)	0.034
Age	1.0598	(0.667, 1.453)	<0.001
Weight	0.0237	(-0.425, 0.472)	0.971
Height	-0.0866	(-0.708, 0.535)	0.784
Tobacco Consumption (Yes)	10.7408	(-6.780, 28.262)	0.229
Alcohol Consumption (Yes)	-10.7890	(-29.975, 8.397)	0.269

\*P<0.034 significant

The result of the multiple linear regression analysis revealed that age, gender, weight, tobacco use and alcohol consumption significantly influenced the systolic blood pressure. Male participants with older age and tobacco consumption were associated with high systolic blood pressure, while increased height was associated with lower blood pressure. (Figure 2) The diastolic blood pressure also significantly influenced by the gender, weight and tobacco consumption. Male, weight and tobacco consumption were associated with diastolic blood pressure while increased height was associated with lower diastolic blood

pressure. Alcohol consumption did not have a significant effect on diastolic blood pressure. (Figure 2) The result of multiple linear regression analysis for random blood sugar level revealed that only age significantly influenced blood sugar level. Older age, being male gender, greater weight, and tobacco consumption were associated with higher random blood sugar level. But increased height was associated with lower random blood sugar level. Alcohol consumption did not have a significant effect on random blood sugar level in this study model. (Figure 2)

**Figure 2: The picture showed the difference in distribution of Blood Sugar Level, Systolic Blood Pressure (SBP), and Diastolic Blood Pressure (DBP) separately for tobacco and alcohol users and non users among the participants of Purba Medinipur district, West Bengal; India.**



## **DISCUSSION**

The prevalence of high blood pressure was 37.83% and diabetes was 4.80 % among the employees of District Magistrate and Collector office of Purba Medinipur district. The prevalence of hypertension in Asian countries like South Korea was 33.7 % and Malaysia was 27.8 % respectively. <sup>[18,19]</sup> The study shown in European country and North America, the average prevalence of hypertension was 44 % and 28 % respectively. <sup>[20]</sup> Hypertensions among the male employees were more (41.57%) than female (23.43 %) employees. The similar findings were found in the study in Chennai. <sup>[21]</sup>

We assessed the random blood sugar level for diabetes. In our study it found only 4.80 % of employees had diabetes. One study done in India among the employees in a tertiary care hospital for assessment of diabetes showed that prevalence of diabetes was 5.8 %.<sup>[22]</sup> This finding was similar to our study.

In this study prevalence of overweight and obesity was found 46.55 % and 11.11 % respectively among the employees. Study in Chennai, India showed that prevalence of overweight and obesity was 24.8 % and 9.2 % respectively. <sup>[14]</sup> Which was quite lower than our study. In this study, age, weight and tobacco consumption was significantly associated with high blood pressure. But alcohol consumption was not positively related with hypertension. Similar findings were found in the study in Meerut, Uttar Pradesh. <sup>[24]</sup> This was may be non-disclosure of alcohol consumption status.

These findings emphasized the importance of considering multiple factors when assessing systolic blood pressure, diastolic blood pressure and random blood sugar level as they collectively contribute to its variation. The identification of modifiable risk factors, such as weight and tobacco consumption, suggests potential targets for interventions aimed at reducing elevated systolic blood pressure, diastolic blood pressure and random blood sugar level.

Overall, this study highlights the complex interplay of demographic and lifestyle factors were influencing systolic blood pressure, diastolic blood pressure and random blood sugar level providing valuable insights for healthcare practitioners and policymakers in the prevention and management of hypertension and diabetes.

Hypertension and diabetes are the two important risk factors for NCDs. The mortality due to NCD is increased over communicable diseases (CD) in now a day. Employees who are smokers, over weight and obese and aged are more risk of development of hypertension and diabetes. To reduce weight, employees should have to control diet and increase physical activities. They have to quit smoking for the sake of prevention of NCD. Further study is required to assess the all risk factors for NCD.

## **CONCLUSION**

Hypertension and diabetes are the two important risk factors for NCDs. The mortality due to NCD is increased over communicable diseases (CD) in now a day. Employees who are smokers, over weight and obese and aged are more risk of development of hypertension and diabetes. To reduce weight, employees should have to control diet and increase physical activities. They have to quit smoking for the sake of prevention of NCD. Further study is required to assess the all risk factors for NCD.

## **Limitation**

The study had several limitations such as we could not find out the employees who were under medication for diabetes and hypertension. We could not ask about the types of works (physical works) they were performed. As data was captured in the office premises, employees were reluctant about disclosure of use of alcohol and tobacco. We only measured random blood sugar.

### Declaration by Authors

**Ethical Approval:** Confidentiality was maintained. Number was used instead of name for data analysis. Administrative approval was obtained for the study from the department as a part of programme evaluation. No ethical approval was obtained.

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**Conflict of Interest:** The authors declare no conflict of interest.

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