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Impact of Working Hours on Blood Pressure Among Adults: Evidence from a Community Screening Initiative

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Abstract: ***Background: Hypertension is a major global health concern, often influenced by lifestyle and occupational stress. Working hours, a modifiable occupational factor, may contribute to elevated blood pressure, yet remains underexplored in community health settings. Objectives: To evaluate the relationship between daily working hours and blood pressure levels among adults attending a community-based blood pressure screening camp. Methods: A cross-sectional study was conducted during a free blood pressure screening camp on World Hypertension Day. Adults aged 18 years and above were enrolled. Data on age, gender, BMI, working hours per day, smoking, alcohol consumption, and history of asthma or COPD were collected. Blood pressure was measured using a standardized protocol. Participants were categorized based on working hours (<8, 8-10, >10 hours/day). Statistical analysis included ANOVA, chi-square test, and correlation analysis to evaluate associations between working hours and blood pressure. Results: A total of [257] participants were included. A positive association was observed between longer working hours and both systolic and diastolic blood pressure (p < 0.05). Participants working 8-10 hours/day had a significantly higher mean systolic BP compared to those working <8 hours. Confounding factors such as BMI, smoking, and comorbidities were controlled in multivariate analysis, confirming working hours as an independent predictor of elevated BP. Conclusion: Prolonged working hours are significantly associated with increased blood pressure among adults. Public health interventions targeting occupational stress management could contribute to hypertension prevention.***

Keywords: Hypertension, Working hours, Blood pressure, Occupational stress, Community health

1.Background

Hypertension, a leading contributor to cardiovascular disease (CVD), affects over 1.28 billion people globally, with the majority residing in low-and middle-income countries [1]. It significantly increases the risk of heart attack, stroke, and kidney disease and is often dubbed the "silent killer" due to its asymptomatic nature in early stages. Despite the availability of effective treatments, the awareness, detection, and control of hypertension remain suboptimal in many regions, especially in community settings.

Multiple risk factors contribute to the development of hypertension, including genetic predisposition, high body mass index (BMI), smoking, alcohol consumption, poor dietary habits, and sedentary lifestyle. However, occupational and psychosocial stressors are gaining recognition as emerging modifiable risk factors [2, 3]. Among these, long working hours have been hypothesized to increase blood pressure due to chronic stress, sleep deprivation, and unhealthy coping mechanisms.

Studies have shown that prolonged work duration can negatively impact cardiovascular health [4]. Yet, there is limited evidence on the association between working hours and hypertension in community-based populations in India. Furthermore, few studies integrate working hours with other known lifestyle and health-related variables such as BMI, smoking, alcohol use, and respiratory comorbidities.

This study aims to explore the impact of working hours on blood pressure levels among adults in a semi-urban Indian population during a community-based screening initiative on World Hypertension Day. It also investigates the interaction between working hours and other associated risk factors.

2.Methods

Study Design and Setting This cross-sectional study was conducted during a free blood pressure screening camp organized in a semi-urban locality in Coimbatore to commemorate World Hypertension Day.257 People were screened in that camp among them 105 Peoples have been identified as having Hypertension and Pre Hypertension and the remaining population are in Normal and Hypotensive category. The camp provided free health assessments and counseling to walk-in participants.

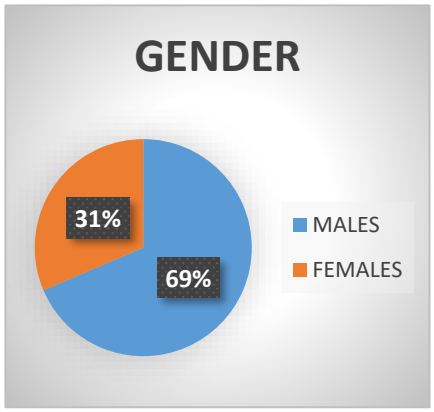

Figure 1.1

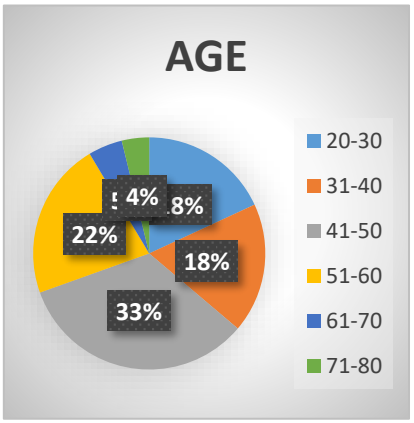

Figure 1.2

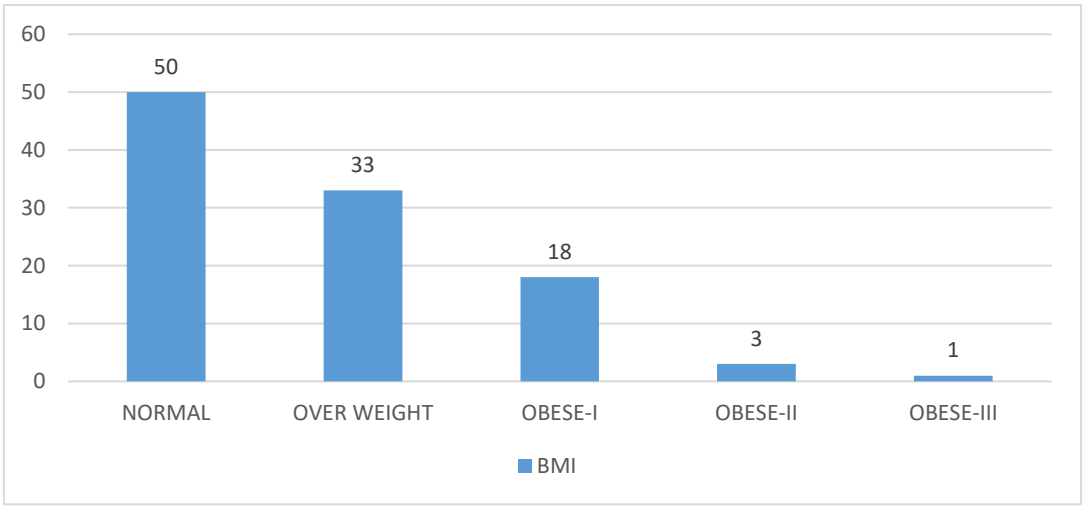

Figure 2.1

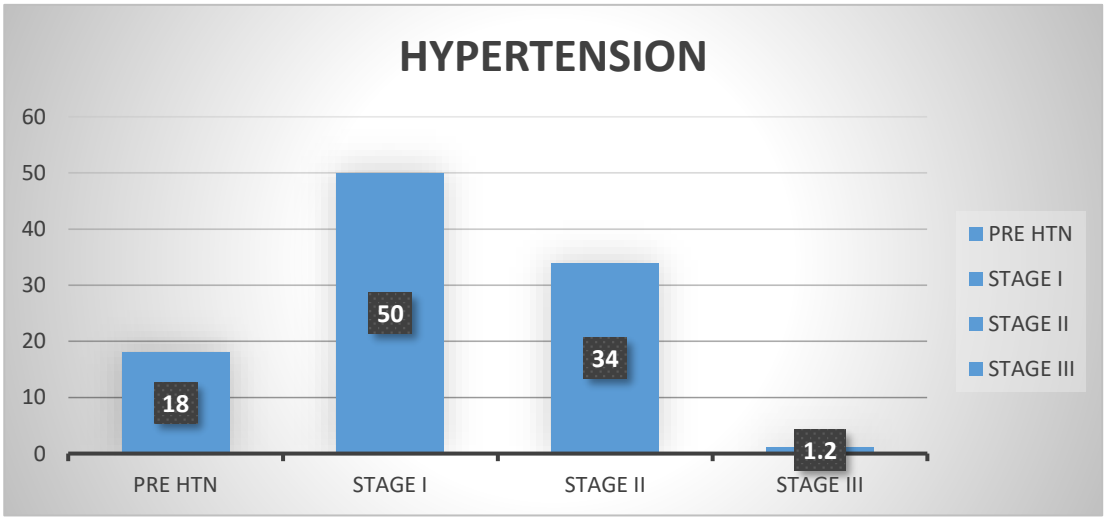

Figure 2.2

Data Collection Data were collected using a structured proforma by trained healthcare volunteers. The following variables were documented:

- **Demographics:** Name, Age, Gender
- **Anthropometry:** Height and weight (to calculate BMI)
- **Lifestyle habits:** Smoking status (current/former/never), alcohol consumption (yes/no)
- **Occupational factors:** Self-reported daily working hours
- **Medical history:** Presence of asthma or COPD (self-reported or documented diagnosis)
- **Blood pressure measurement:** Systolic and diastolic BP were measured using a calibrated aneroid sphygmomanometer after the participant had rested for at least five minutes in a seated position. Two readings were taken at five-minute intervals, and the average was recorded.

Working Hours Categorization Participants were divided into three groups:

- Group A: <8 hours/day
- Group B: 8-10 hours/day
- Group C: >10 hours/day

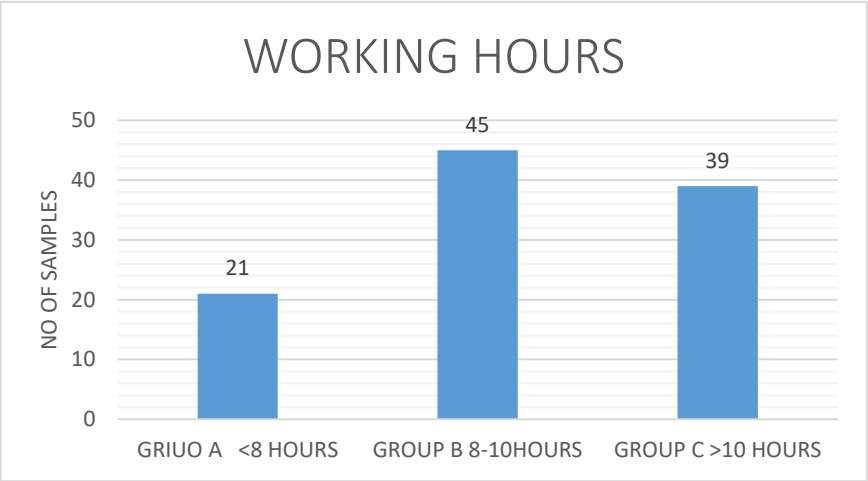

Figure 3.1

Blood Pressure Classification Blood pressure readings were classified according to the American College of Cardiology/American Heart Association 2017 guidelines [5]:

- Normal: <120/80 mmHg
- Elevated: 120-129/<80 mmHg
- Stage 1 Hypertension: 130-139/80-89 mmHg
- Stage 2 Hypertension: ≥140/90 mmHg

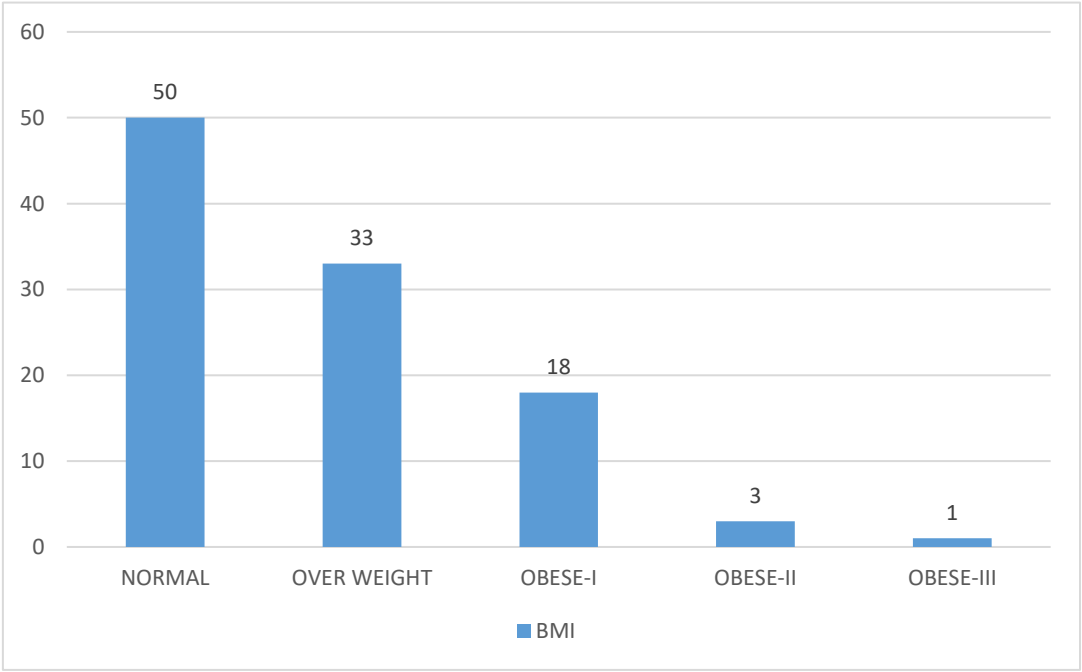

Figure 3.2

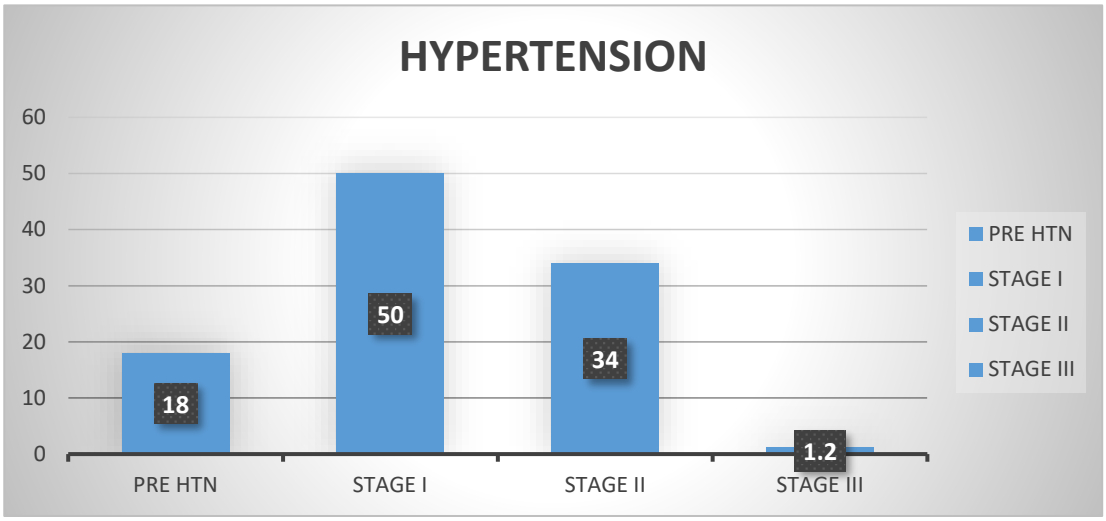

Figure 3.3

Statistical Analysis Data analysis was performed using SPSS version 25. Descriptive statistics (mean, standard deviation, percentages) were computed for demographic and clinical variables. The chi-square test was used to assess associations between categorical variables.

OVER ALL

	SYSTOLIC		DIASTOLIC	
	MEAN	SD	MEAN	SD
GROUP A	139.76	15.14	84.81	13.74
GROUP B	139.18	12.85	85.93	12.81
GROUP C	137.54	13.39	87.25	9.90

GROUP A

	SYSTOLIC		DIASTOLIC	
	MEAN	SD	MEAN	SD
PRE HTN	128.50	1.00	75.50	3.32
STAGE I	132.22	2.44	78.33	8.70
STAGE II	153.88	16.57	96.75	13.48

GROUP B

	SYSTOLIC		DIASTOLIC	
	MEAN	SD	MEAN	SD
PRE HTN	125.14	1.07	82.86	3.08
STAGE I	134.55	3.31	81.18	9.04
STAGE II	149.47	10.32	91.73	14.29

GROUP C

	SYSTOLIC		DIASTOLIC	
	MEAN	SD	MEAN	SD
PRE HTN	125.29	1.38	82.85	2.85
STAGE I	132.68	2.87	85.11	4.15
STAGE II	145.55	6.27	88.00	8.29
STAGE III	182.50	3.54	122.50	3.54

Table 1.1

BMI	MEAN	STANDARD DEVIATION
Overall population	26.484	4.657
Normal	22.824	1.754
Over weight	27.273	1.399
Stage 1	32.565	1.279
Stage 2	36.667	1.102
Stage 3	45.7	

Table 1.2

Hypertension	MEAN		STANDARD DEVIATION	
	systolic	Diastolic	systolic	Diastolic
Overall population				
Pre Hypertension	125.94	81.22	1.80	4.25
Stage 1	133.49	82.10	3.11	7.83
Stage 2	153.29	95.79	13.66	13.61
Stage 3	185	125		

One-way ANOVA was used to compare mean BP levels across working hour categories. Pearson's correlation assessed linear relationships between working hours and BP. Multivariate logistic regression was performed to identify independent predictors of hypertension, adjusting for age, gender, BMI, smoking, alcohol, asthma, and COPD. A p-value <0.05 was considered statistically significant.

3.Result

A total of [257] participants were included in the analysis. The age range of participants who are more prominent to hypertension is 41-50 years, with 31% males and 68% females. The overall prevalence of hypertension (BP ≥130/80 mmHg) was 40.85%. The mean BMI was 26.5 kg/m².

Distribution by Working Hours:

- Group A (<8 hours/day): 20%
- Group B (8-10 hours/day): 41.9%
- Group C (>10 hours/day): 38.1%

Association Between Working Hours and Blood Pressure:

- Mean systolic BP increased significantly across the working hour groups: Group A (139.75 mmHg), Group B (139.18 mmHg), Group C (137.54 mmHg), $p < 0.05$
- Diastolic BP also showed a similar pattern ($p < 0.05$)

Correlation and Regression Analysis:

- Working hours showed a moderate positive correlation with systolic BP ($r = [x]$, $p < 0.01$)
- In multivariate analysis, working 8-10hours/day was independently associated with hypertension (139.18mmHg)
- BMI, smoking, and alcohol use were also significant predictors.

4.Discussion

This study reveals a significant association between prolonged working hours and elevated blood pressure in a community-based adult population. Participants working more than 10 hours per day exhibited significantly higher mean systolic and diastolic blood pressure levels, independent of other lifestyle and health-related risk factors.

These findings align with previous literature suggesting that occupational stress and long working hours contribute to adverse cardiovascular outcomes [6, 7]. Long work hours are associated with reduced time for physical activity, poor dietary habits, increased stress hormone levels, and shorter sleep durations — all of which can predispose individuals to hypertension [8].

31% of male and 69% of females are included with the age group between 20-80 years in this study. The role of BMI, smoking, and alcohol use as co-predictors of hypertension was also confirmed, which is consistent with prior Indian and global studies [9, 10]. The study confirms that Pre hypertension for 18%, Stage I Hypertension for 50%, Stage II Hypertension for 34% and Stage III Hypertension for 1.8% Interestingly, comorbid conditions like asthma and COPD, while associated with hypertension in univariate analysis, did not retain statistical significance in the multivariate model, suggesting their effects may be mediated through other risk factors such as inflammation and medication use.

5.Conclusion

The table 1.1 and 1.2 correlates the BMI of each participant and the stages of hypertension amoung the participants. This study's strengths include its real-world community setting, integration of occupational and lifestyle variables, and use of standard BP measurement protocols. However, limitations include its cross-sectional design, reliance on self-reported data (especially for working hours), and lack of follow-up or longitudinal BP monitoring.

Abbreviations: [HT, Hypertension; PRE HT, PRE Hypertension]

Conflict of Interest: None declared.

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