

## Correlation Study of Demographic Variables and its Association with Blood Pressure Control

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Hypertension is a global health burden to the society. Global Burden of Disease 2015 study stated that there has been a steady increase in mortality due to cardiovascular diseases in India and worldwide. We conducted a correlation study of various demographic factors and its association with control of hypertension. A pre-tested questionnaire survey was done among hypertensive patients attending a tertiary care hospital in Chennai, India. Hypertensive patients, more than 20 years of age on antihypertensive therapy with or without co-morbid disease were taken for the study. Statistical analysis was performed using Chi square test and Pearson's correlation. Correlation analysis shows that age ( $p = 0.017$ ), duration of hypertension ( $p = 0.015$ ), workplace status ( $p = 0.000$ ) had a statistically significant negative correlation and drugs intake ( $p = 0.000$ ) by the patient has statistically significant positive correlation in relation with control of blood pressure level.

**Keywords:** Blood Pressure; Correlation; Demographics; Hypertension.

Non-communicable diseases (NCD) are chronic diseases which occur due to combinations of genetic, physiological, environmental and behavioral factors. People of all age groups, gender, region, profession can be affected. Hypertension is one of the most prevalent NCD which is identified as an important risk factors for cardiovascular disease in India and worldwide<sup>1</sup>.

Previous studies have identified many sociodemographic variables associated with the prevalence and control of hypertension however

there is dearth of literature regarding the degree of correlation between these variables and blood pressure control. Correlation analysis is a statistical procedure to understand the relationship between quantitative and categorical variables. It measures the strength of association between two variables and the direction of the relationship. A negative correlation means that if one variable increases the other variable decrease. ie the variables travel in opposite direction. A positive correlation means that increase in one variable produces an increase in

the other variable or the variables move in the same direction<sup>2</sup>. The aim of this study was to correlate various demographic variables that affect the control of hypertension among patients attending a tertiary health care facility located at the suburban area of Chennai city, India.

#### Aims and Objective

To correlate and measure the degree of association between demographic variables affecting hypertension control.

#### METHODS

A pre-tested questionnaire survey was done from June 2016 – June 2018. Hypertensive patients visiting Medicine outpatient department of Sree Balaji Medical College and Hospital with history of anti-hypertensive drugs for more than one year, both genders, age > 20 years, with or without co-morbid diseases were considered for this study. Psychiatric and terminally ill patients were excluded from the study. Statistical analysis was performed using SPSS version 17.0. Chi square test and Pearson's correlation were applied to analyze the data. P-value less than or equal to 0.05 were considered statistically significant. The protocol of this study was approved by the ethics committee of Sree Balaji Medical College and Hospital and all participants signed an informed consent.

#### RESULTS

We enlisted 448 hypertensive patients according to the inclusion criteria. Among the demographic variables studied, we observed that age ( $p = 0.017$ ), duration of hypertension ( $p = 0.015$ ) and workplace status ( $p = 0.000$ ) had a statistically significant negative correlation in relation to control of blood pressure level. Drugs intake ( $p = 0.000$ ) by the patient has statistically significant positive correlation with control of blood pressure. Other variables like gender, body weight, co-morbid disease, marital status, family history of hypertension and education of the hypertensive patients did not correlate with hypertension control. Correlation analysis between various demographic variables and blood pressure control are summarized in Table 1.

#### DISCUSSION

In India, hypertension is regarded as one of the important risk factor for cardiovascular morbidity and mortality. Systematic meta-analysis of two Indian epidemiological studies (Fourth national family health survey, 2014-2015 and District level household survey, 2012-2013) reported that there was a significant positive correlation of human development index (for men: Pearson's  $r = 0.620$ ,  $p = 0.001$  and for women: Pearson's  $r = 0.558$ ,  $p = 0.003$ ) derived from

**Table 1.** Correlation analysis between various demographic variables and blood pressure control

S. No	Variables	Pearson's correlation coefficient (r=)	P value
1	Age	-0.112	0.017
2	Gender	-0.057	0.226
3	Body weight	0.014	0.767
4	Duration of hypertension	0.114	0.015
5	Co-morbid drugs	0.023	0.621
6	Drugs	0.180	0.000
7	Marital status	0.046	0.330
8	Family history of hypertension	0.004	0.939
9	Education	0.066	0.163
10	Employment status	0.180	0.000

income, education, fertility statistics and social development index (for men: Pearson's  $r = 0.739$ ,  $p = 0.001$  and for women: Pearson's  $r = 0.603$ ,  $p = 0.010$ ) derived from multiple socioeconomic factors with respect to hypertension prevalence<sup>3</sup>. Various risk factors have been associated with hypertension and control of blood pressure among hypertensive patients. It was noted from previous studies<sup>4,5</sup> done in various regions of India that demographic factors are associated with hypertension and control of blood pressure. Although the hypertensive patients were on anti-hypertensive drugs, the study groups did not show a good control over their blood pressure (optimum blood pressure  $<140/90$  mm of Hg according to JNC-8). So we performed a Pearson's correlation analysis to correlate between demographic parameters and control of blood pressure.

A total of 448 hypertensive adults participated in this study. It is well known that as the age advances, the risk of hypertension increases. This could be attributed to the influence of pathophysiological changes like decreased baroreceptor sensitivity, increased responsiveness to sympathetic nervous system stimuli, altered renal and sodium metabolism and an altered renin aldosterone relationship which occurs with aging<sup>6</sup>. We observed that hypertension increases with age in our study group and there was a statistically significant negative correlation with age and control of high blood pressure. A study on glycemic and blood pressure control done in a Malay population in Singapore with diabetes and diabetic retinopathy found that with increasing age glycemic and blood pressure control also decreases<sup>7</sup>. In this study, we did a correlation analysis of hypertensive patients suffering from hypertension for more than 5 years with their hypertension control and it was observed that duration of hypertension showed a statistically significant negative correlation similar to previous studies which has shown that good adherence to anti-hypertensive drug therapy leads to better control of blood pressure. A correlation study between compliance in patients with anti-hypertensive therapy and blood pressure control stated that the protective factors for blood pressure control was good compliance (OR 1.54, 95% CI 1.22 – 1.89) ( $p < 0.05$ ) with medication therapy<sup>8</sup>. Our study also showed a statistically significant

positive correlation between drugs intake and control of blood pressure by the study population. In our study population, we observed that there was a statistically significant negative correlation between workplace status and blood pressure control. Researchers demonstrated that there was an inverse relationship with workplace status and cardiovascular health. It was seen that increased risk of hypertension was more in stressful, lack of emotional support, high anxiety types of working conditions<sup>9,10</sup>. Our study participants were mainly housewives and labourers and it was seen that blood pressure control was poor among them. Uncontrolled blood pressure pose serious cardiovascular complications which would add on to the health burden of a society. Hence, correlation of various variables associated with risk of hypertension and poor control of blood pressure remains an important health priority. Limitations of this study are that it was a single-centre study conducted at a tertiary care hospital which limits its generalizability and small sample size.

## CONCLUSION

Our study revealed that age ( $p = 0.017$ ), duration of hypertension ( $p = 0.015$ ) and workplace status ( $p = 0.000$ ) had a significant negative correlation with control of blood pressure. Drugs intake ( $p = 0.000$ ) by the hypertensive patients had a significant positive correlation with control of blood pressure. Hence, this study confers an insight that proper intake of drug therapy, adherence to medication and lifestyle modification practice would improve the overall health status of the patients and would lower life-long complications.

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