

Research Article

Is the Work Pressure Accelerating Blood Pressure? A Cross-Sectional Study in a Pressure Cooker Manufacturing Industry

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A B S T R A C T

Background: High blood pressure is one of the major risk factors for cardiovascular disease in the current scenario. Epidemiological studies have shown that psychosocial factors such as workplace psychosocial health may also contribute to high blood pressure. Accumulative effects on frequent or continuous exposure to work-related strain, job dissatisfaction and lack of peer/ social support can affect both psychological and physical health.

Objectives: The aim of the study is to find the impact of work pressure/ job strain on blood pressure and also to screen non-communicable diseases such as hypertension among workers.

Methods: In this cross-sectional observational and descriptive study, the readings of blood pressure of the participants were noted twice a day: the first one on entering the factory for work and the second one after the 4th hour of his/ her 8-hour shift. These readings were then compared and the variations in blood pressure were noted and analysed.

Results: One participant among all had 32 mmHg of systolic blood pressure variation on comparing both readings of blood pressure and another was found to be newly diagnosed with hypertension on this screening.

Conclusions: The risk of cardiovascular disease due to hypertension was found to be less among the employees of that particular manufacturing plant at that particular time.

Keywords: Blood Pressure, Screening Tool, Employee Health, Health at Work

Introduction

High blood pressure is one of the major risk factors for cardiovascular disease in the current scenario. Epidemiological studies have shown that psychosocial factors such as workplace psychosocial health may also contribute to high blood pressure.¹

Accumulative effects on frequent or continuous exposure to work-related strain, job dissatisfaction and lack of peer/ social support can affect both psychological and physical health.²

This paper focuses on and analyses blood pressure acceleration due to work pressure. It will provide insight into the current health status of the workforce and will be helpful for future research.

Aim of the Study

The aim of the study was to find the impact of work pressure and job strain on blood pressure and also to screen for non-communicable diseases such as hypertension among workers.

Material & Methods

This cross-sectional observational and descriptive study involved recording the blood pressure readings of employees of a pressure cooker manufacturing factory. Two readings were recorded in a day: the first one on entering the factory for work and the second one after the 4th hour of his/ her 8-hour shift. The sample size was 624. The study was conducted for a week from April 1 to April 7, 2018 in a pressure cooker manufacturing industry in the Coimbatore district of Tamil Nadu. Ethical clearance was obtained as per the institution's guidelines. The data were tabulated, analysed and compared with previous similar studies.

Informed consent was obtained from all the participants and they were asked to sit with both feet touching the ground while recording blood pressure readings. The procedure can be explained in the following two steps:

Step 1: All employees, entering on a single particular week for workers, both on-roll and contractual, both white- and blue-collar workers underwent blood pressure screening. The majority of the workers were employed for blue collar work in that particular manufacturing plant. History on medication, known diseases, and lifestyle activities was noted for both 1st and 2nd shift workers at the main entrance on coming for work.

Step 2: After the 4th hour of their 8-hour shift, they again underwent blood pressure screening at the workplace itself. The readings were then compared and variations in blood pressure were noted and analysed.

Additionally, a history of smoking and consumption of blood pressure medicine was collected to rule out the possibility of error in reporting. Department-wise and overall work pressure/ stress-induced accelerating blood pressure was concluded for the particular pressure cooker manufacturing plant. The results of a week-long screening were recorded, along with a history of socioeconomic status.

Widely used mercury sphygmomanometers, regarded as the "gold standard" for hospitals and clinics for blood pressure measurement, and other mercury devices have been banned from use in hospital settings. Mercury devices have largely been phased out in Indian hospitals. This has led to the increasing usage of non-mercury devices which is now the preferred modality of blood pressure measurement in clinics and hospital settings.

So, we used the oscillometer technique, in which the oscillations of pressure in a sphygmomanometer cuff are recorded during gradual deflation of the cuff, the point of maximal oscillation is recorded and it corresponds to the mean intra-arterial pressure.

Cutoff Used: 2017 ACC/ AHA Blood Pressure Guidelines/ Blood pressure categories:

- **Normal:** Systolic blood pressure less than 120 mmHg and diastolic blood pressure less than 80 mmHg;
- **Elevated Stage:** Systolic blood pressure between 120 mmHg and 129 mmHg and diastolic blood pressure less than 80 mmHg;
- **Stage 1:** Systolic blood pressure between 130 and 139 mmHg or diastolic blood pressure between 80 mmHg and 89 mmHg;
- **Stage 2:** Systolic blood pressure of at least 140 mmHg or diastolic blood pressure of at least 90 mmHg;
- **Hypertensive Crisis:** Systolic blood pressure over 180 mmHg and/ or diastolic blood pressure over 120 mmHg, with patients needing early changes in medication if there are no other indications of problems or immediate hospitalisation, if there are signs of organ damage.³

Results

97.37% of the participants belonged to the no-risk category, 2.63% were in the low-risk category, 0% in the moderate-risk category, and 0% were in the high-risk category (Figure 1). One employee had a systolic blood pressure variation of 32 mmHg on comparing both readings of blood pressure and one employee was found to be newly diagnosed with hypertension on this screening. The rest of the employees showed no variation and a normal range of blood pressure on both occasions on the same day. In order to eliminate confounding variables, the comparison was done with socioeconomic status, and the results were compared with differences in blood pressure or abnormalities.

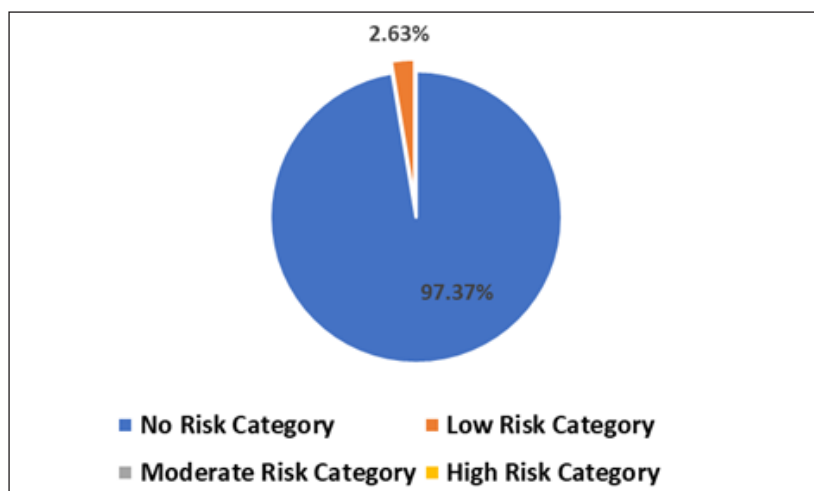


Figure 1. Categorisation of Work Pressure

Discussion

As this study was carried out in a manufacturing environment, employees encountered tasks ranging from walking and standing to heavy lifting and physical exhaustion. However, there was not much variation in blood pressure between the various shop floors and departments in this study.

Five years of cumulative job exposure showed no effect on blood pressure in previous studies by Chapman et al.⁴ and Fauvel et al.⁵ However, a study by Schnall et al. found that systolic and diastolic blood pressure levels were about 5 mmHg higher among workers with 3 years of job exposure.⁶

The total number of employees who reported for work in that particular week was 624, of which, the number of employees in the 1st and 2nd shifts were 371 and 253, respectively. The first round of blood pressure recording was done for everyone at the main gate itself, and a history of medication, known diseases, and lifestyle activities was noted. The second round of blood pressure recording was done for everyone at the workstation within an interval of 4 hours in his/ her 8-hour shift. Both readings of blood pressure of all individuals were compared.

The participants in this study were mostly working-class blue-collar employees, for whom even the most basic healthcare facility is out of reach. This study gave them access to as well as screening for lifestyle-related diseases. It has enhanced the reputation, loyalty, and trustworthiness among the employees of the company, which in turn, will increase their productivity and production.

Limitations

Cross-sectional study designs may be biased by sample selection. In this study, assessment by ambulatory blood pressure monitoring would not be possible due to limited resources. Employees change over in terms of resignation and new appointments happen, especially in the blue-

collar category which makes it difficult to do follow-up. Due to such change, there is a high chance of complete replacement of the entire study subjects within a short span of time.

Corrective Action

The newly diagnosed hypertensive employee was referred for further management.

Low-risk category employee was advised regarding stress management and was kept on the priority list for further follow-up and management.

Periodic medical examination needs to be carried out and proactive intervention is the need of the hour.

Conclusion

The study showed that this particular pressure cooker manufacturing plant was a zero-to-low work pressure/ strain zone and the safest environment to work in. The risk of cardiovascular disease due to hypertension was found to be less among the employees of this manufacturing plant during the study period.

Conflict of Interest: None

Source of Funding: None

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