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THE PREVALENCE OF ORTHOSTATIC HYPOTENSION AMONG BUS CONDUCTORS- A HOSPITAL BASED OBSERVATIONAL STUDY

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ABSTRACT

The Prevalence of Orthostatic Hypotension among Bus Conductors- a Hospital Based Observational Study. **Introduction:** Orthostatic hypotension is defined as fall in systolic blood pressure of at least 20mmHg or diastolic blood pressure of at least 10 mm Hg within three minutes of standing. **Aim:** To find out the prevalence of orthostatic hypotension among bus conductors. **Objectives: 1.** To document the occurrence of orthostatic hypotension among bus conductors. **2.** To identify the key predisposing factors for the association. **Study design and setting:** This is a cross sectional study conducted at Dispensary Hospital, Head office of Tamil Nadu State Transport Corporation, Villupuram. The participants were bus conductors between age group of 30 to 40. **Sampling:** 40 individuals were considered. They were selected using a systemic random sampling procedure. **Procedure:** The patient's blood pressure is measured after 5-10 minutes of rest in supine position. The patient arises and the measurements are then repeated while he stands motionless for 3-5 minutes with the cuffed arm supported at heart level. **Result:** The statistics were done with student spss software. The study had a significance of **22%** (p **0.004)** individuals with orthostatic hypotension whose duration of years of service had an average of above 17 years with a age group of **above 38(p 0.000**). **Logistic regression** for Age is **0.019** and for Duration of years of service **0.005. Conclusion:** The study is an attempt to investigate the prevelance of orthostatic hypotension in bus conductors irrespective of their duration of service, whose profession demands long standing and autonomic stability. Pharmacological treatment is less successful for orthostatic hypotension than non-pharmacological measures. **Relevance:** Our study aims at unraveling sub clinical autonomic dysfunction in bus conductors, so that early non-pharmacological interventions can be advocated.

KEYWORDS: Orthostatic hypotension, occupational hazard.

INTRODUCTION

Orthostatic/ Postural hypotension is defined as fall in systolic blood pressure of atleast 20mmHg or diastolic blood pressure of at least 10 mmHg within three minutes of standing.[1] In healthy individuals, orthostaticpooling of venous blood in the legs and abdomen begins immediately upon changing from supine to erect posture. A normal hemodynamic response to change in posture requires normal functioning of the cardiovascular and autonomic nervous systems.[2] It is estimated that depending on the type of orthostatic stress one half to one liter of thoracic blood is transferred to the regions below the diaphragm **(Self *et al.*1996).**[3] Sustained elevation of efferent sympathetic activity is preempted by hours of standing at work. The aforementioned response can have its attendant consequence- cardiac stress **(Ziegler *et al.* 1977).**[4] Bus conductors in London who in London, who spent their working hours, standing for longer time, experienced half thecoronary heart disease (CHD) mortality rates of their driver counterparts. (Morris, et al. 1953).

AIM

To find out the prevalence of orthostatic hypotension among bus conductors.

Objectives

1. To document the occurrence of orthostatic hypotension among bus conductors.
2. To identify the key predisposing factors for the association.

MATERIALS AND METHODS

Study design and setting: This is a cross sectional study conducted atDispensary Hospital, Head office of Tamil Nadu State Transport Corporation, Villupuram.

Study period and target population: Thestudy period was from 20th November 2017 to 10th February 2018.

The participants were bus conductors between age group of 30 to 40.

Sampling: 40 individuals were considered. They were selected using a systemic random sampling procedure. Each participant was interviewed separately, and confidentiality was assured.

Data collection: Data was collected by means of personal interview with the sampled participants using a predesigned questionnaire covering the following items:
(1) Socio-demographic characteristics including age, sex, educational and marital status.
(2) Smoking status and common comorbidities like Diabetes, Hypertension, coronary artery disease, bronchial asthma and stroke.
(3) Anthropometric examination included height and weight measurements and calculation of body mass index (BMI). Normal weight was defined as BMI<25kg/m2, overweight as 25≤BMI<30kg/m2 and obesity as BMI≥30 kg/m2.[11]

Inclusion Criteria
1. Adult males between 30 -40 years of age, who have been working as conductors for a minimum duration of 5 years.

Exclusion Criteria
1. Participants with comorbid illnesses like Diabetes, Hypertension, Coronary Artery Disease, Stroke and Obesity.
2. Chronic smokers and alchohol abusers.
3. People on drugs like beta blockers,alpha blockers and CNS depressants.

Ethical considerations
Data collector gave a brief introduction to the participants by explaining the aims and benefits of the study. Informed written consent was obtained from all participants. Anonymity and confidentiality of data were maintained throughout the study. The study was approved by the Istitutional Ethics Committee.

Procedure
The method used was lying to standing orthostatic test .The patient's blood pressure is measured after 5-10 minutes of rest in supine position. The patient arises and the measurements are then repeated while he stands motionless for 2-3 minutes with the cuffed arm supported at heart level. On standing the patient is asked to reportdizziness, faintness or light headedness with the examiner recording its persistence/transience. Pulse rate is also measured along with blood pressure as a precaution to rule out postural orthostatic tachycardia syndrome (**POTS**). The examination was done premeal or 3 hours thereafter to avoid the confounding effect of post prandial hypotension.

RESULTS

Statistical analysis: We utilized the statistical package for social sciences, version 16 (SPSS Inc., Chicago, Illinois, USA) to analyze the study data. The results were displayed as counts and percentages. The X^2 test was used as a test of significance, and differences were considered significant at P value less than 0.05.

Mean Difference

Systolic BP	13+/-8.01
Diastolic BP	7.25+/-6.6

Logistic Regression

AGE	0.019
Duration of Years Of Service	0.005

DISCUSSION

Orthostatic hypotension is an important health concern among professionals like conductors with antecedent implications. The study showed a significance of 22% (p-0.004) individuals with orthostatic hypotension whose duration of years of service on an average of above 17 years with a age group of above 35(p-0.000).

Introduction
Orthostatic/hypotension is defined as a decrease in systolic blood pressure of 20 mm Hg or a decrease in diastolic blood pressure of 10 mm Hg within three minutes of standing when compared with blood pressure from the sitting or supine position. It results from an inadequate physiologic response to postural changes in blood pressure. Orthostatic hypotension may be acute or chronic, as well as symptomatic or asymptomatic. Common symptoms include dizziness, lightheadedness, blurred vision, weakness, fatigue, nausea, palpitations, and headache. Less common symptoms include syncope, dyspnea, chest pain, and neck and shoulder pain. Causes include dehydration or blood loss; disorders of the neurologic, cardiovascular, or endocrine systems; and several classes of medications.[1]

Pathophysiology
A normal hemodynamic response to changes in posture requires normal function of the cardiovascular and autonomic nervous systems. Standing results in blood pooling of approximately 500 to 1,000 mL in the lower extremities and splanchnic circulation. This initiates an increase in sympathetic outflow, which increases peripheral vascular resistance, venous return, and cardiac output, thereby limiting the decrease in blood pressure.[2]

These compensatory mechanisms result in a decrease in systolic blood pressure (5 to 10 mm Hg), an increase in diastolic blood pressure (5 to 10 mm Hg), and an increase in pulse rate (10 to 25 beats per minute). However, orthostatic hypotension may result if there is inadequate intravascular volume, autonomic nervous system dysfunction, decreased venous return, or inability to increase cardiac output in response to postural

changes. Decreased cerebral perfusion produces the neurologic symptoms of orthostatic hypotension.[2]

Clinical presentation and evaluation

Orthostatic hypotension may be acute or chronic. Patients may present with light-headedness, blurred vision, dizziness, weakness, and fatigue, or with syncope (in the acute care setting). [15] Less commonly, they may present with neck and shoulder pain, orthostatic dyspnea, and chest pain. Orthostatic hypotension is defined as a decrease in systolic blood pressure of 20 mm Hg or a decrease in diastolic blood pressure of 10 mm Hg within three minutes of standing compared with blood pressure from the sitting or supine position. Alternatively, the diagnosis can be made by head-up tilt-table testing at an angle of at least 60 degrees.[1]

Previous studies

Previous study in indiato detect the incidence of delayed orthostatic hypotension in patients referred to a autonomic lab using tilt table showed that fifty patients had delayed OH which could have been missed on clinical evaluation. The symptoms can be varying but high clinical suspicion is needed to detect this disorder, and tilt-table testing should be done in suspicious cases since OH is cause of morbidity.[12]

Another study onInvestigation of postural hypotension due to static prolonged standing in female workers suggested that a long resting standing posture may result in a decrease in blood pressure during the work, and both of the decrease in venous return and neurogenicity were inferred as to its mechanism. Hypotension rates in the female standing workers' group by ABPM were 9 persons of 12 participants (75%) for systolic blood pressure (SBP), and were 11 persons of 12 participants (92%) for diastolic blood pressure (DBP). There were significantly higher than those in the female desk workers' group, none of 9 participants (0%) for SBP and 2 of 9 participants (22%) for DBP. The hypotension rates both male standing and female walking worker groups did not differ.[13]

Yet another study on Orthostatic symptoms, blood pressure and working postures of factory and service workers over an observed workday. North American workers usually stand while working, and prolonged standing is associated with discomfort and cardiovascular problems. Moving may alleviate the problems, but optimum mobility is unknown. The results of the study suggested that more static standing postures are associated with Orthostatic intolerance and musculoskeletal symptoms and with a subclinical drop in BP.[14]

Pharmacological treatment is less successful for hypotension with physical exercise or in warm surroundings (Bannister & Mathias, 1992). Non-pharmacological measures are regarded as a cornerstone in the treatment of orthostatic hypotension. Nonpharmacologic treatment should be offered to all patients initially.[16] Patients should avoid large carbohydrate-rich meals (to prevent postprandial hypotension), limit alcohol intake, and ensure adequate hydration.[17] Patients should be encouraged to keep a symptom diary and avoid identified precipitating factors. Older patients should consume a minimum of 1.25 to 2.50 L of fluid per day to balance expected 24-hour urine losses. Water boluses (one 480-mL glass of tap water in one study and two 250-mL glasses of water in rapid succession in another study) have been shown to increase standing systolic blood pressure by more than 20 mm Hg for approximately two hours.[17]

Lower-extremity and abdominal binders may be beneficial. A randomized, single-blind controlled study using tilt-table testing demonstrated effective management of orthostatic hypotension by application of lower-limb compression bandages.[18]

The mechanism of postural hypotension may be a decrease of venous return due to leg swelling, and neurocardiogenic or vasovagal response. Preventing the congestion of the lower limbs by walking, managing standing time and wearing elastic hose to keep the amount of the venous return could prevent postural hypotension during prolonged standing work.[13]

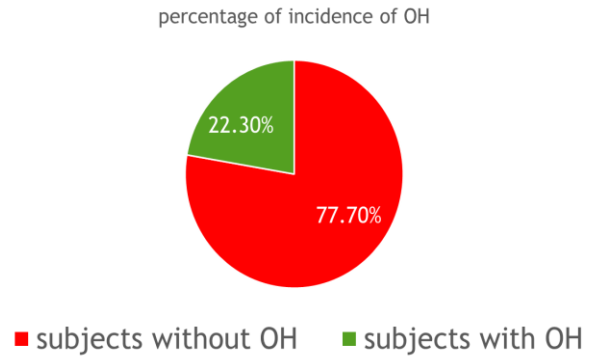

Figure1: pie chart showing the prevalence of orthostatic hypotension in bus conductors.

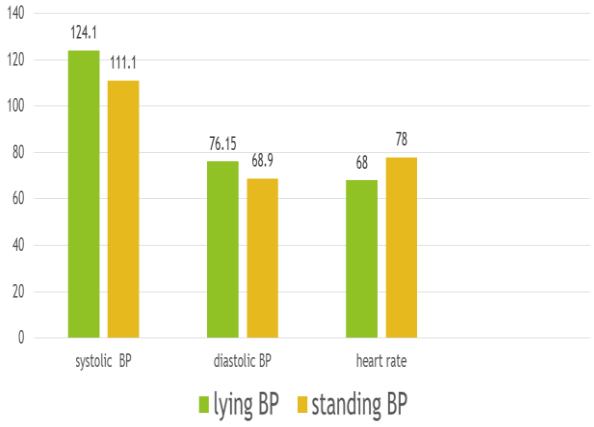

Figure 2: Bar diagram representing the fall in systolic and diastolic BP from lying to standing position.

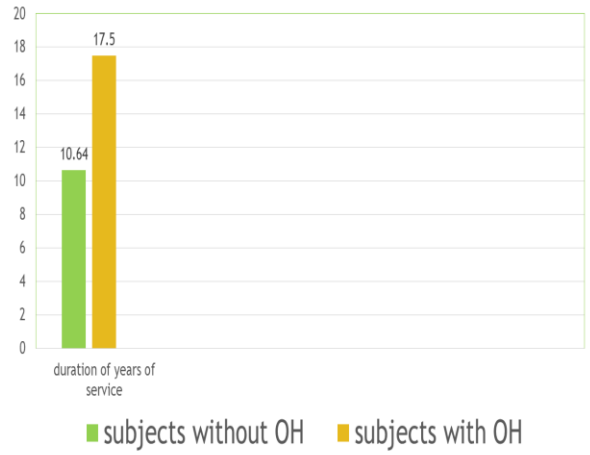

Figure 3: Bar diagram showing orthostatic hypotension in individuals with prolonged duration of service.

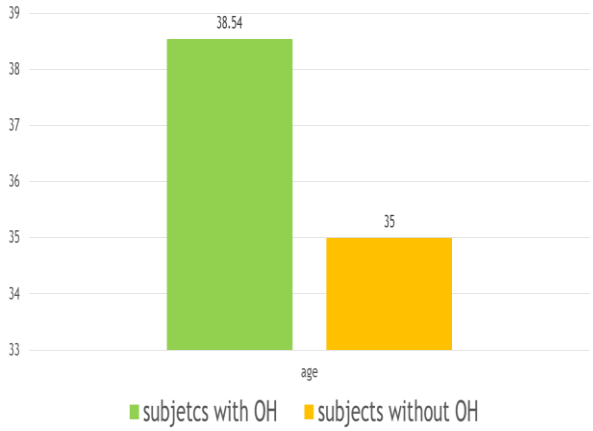

Figure 4: Bar diagram showing orthostatic hypotension in individuals with more than 35 years of age.

CONCLUSION

The study showed a significance of 22% (p-0.004)individuals with orthostatic hypotension whose duration of years of service on an average of above 17 years with a age group of above 35(p-0.000). Thus suggesting that age and long duration of service are factors that predispose to orthostatic hypotension in bus condutors.

The study is an attempt to investigate the prevalence of orthostatic hypotension in bus conductors, whose profession demands long duration standing and autonomic stability.Our study aims at unraveling sub clinical autonomic dysfunction in bus conductors, so that early non-pharmacological interventions can be advocated.

Limitations: The limitations of the study are

1. Less sample size.
2. Prevalence could be confirmed if study was done with comparative group.
3. Upright tilt testing was not done to confirm orthostatic hypotension.
4. Other factors are not concerned.

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The study team

All faculties of Medcine and Physiology Department.

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