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PREVALENCE OF HYPERTENSION IN WORKERS OF BELL METAL INDUSTRY

Physiology

Dr Padmaja Barua* Assistant professor, Department of Physiology, Gauhati Medical College, Assam.
* Corresponding Author

Dr Jolly Bhattacharjya Assistant professor, Department of Physiology

Dr Nandita Dutta Assistant professor, Department of Physiology

ABSTRACT

Noise is an occupational hazard and over and above its known auditory hazards, non auditory effects are alsofound to occur in the exposed subjects. Different studies have found an association between noise and blood pressure. As per the findings of these studies prevalence of hypertension is more in the noise exposed group as compared to the non exposed group. Sarthebari, a place of Assam is famous for its bell metal industries. In these industries hammering of metal and various other activities done to manufacture utensils lead to production of noise with level much more than maximum permissible limit of noise at the industry level. Till now no research work has been done here to find out the impact of noise in these employees. So present study was done to find out the prevalence of hypertension in this noise exposed group. A total of 163 employees of Bell metal Industries of Sarthebari, Assam, in the age group of 18-62 were included in the study. After taking informed consent and proper history on food habit, work duration, health status; blood pressure, height, weight are measured and BMI was calculated. Moreover noise level of the site was measured by a decibel meter. Result was analysed by using Microsoft excel and SPSS software. In our study prevalence of hypertension of all 3 categories (isolated systolic, isolated diastolic, hypertension with both values increased) were found (p value<0.05) in the employees of bell metal industries of Sarthebari. But hypertension was not found to be associated with work duration (P value .311579)

KEYWORDS

Noise, Hypertension

Introduction-

Occupational noise is an important issue that threatens the health of the workers working in the industries involved in generation of noise. Many a times the workers working at the site are exposed to noise level which is quite higher than the maximum permissible level of noise ,90dB (A). Over and above the auditory effects of noise, a lot of other body systems are found to be adversely influenced by noise. A number of studies are going on to find out the impact of noise on blood pressure and the cardio vascular system as a whole. In a study named "The association between noise exposure and blood pressure and ischemic heart disease: a meta analysis" it was found that there is a significant association for both occupational noise exposure and air traffic noise exposure and hypertension (1) Again another study aimed at finding out the association between exposure to road traffic and railway noise and blood pressure, a 0.26 mm Hg higher systolic blood pressure (95%confidence interval(CI) :-0.11 ; 0.630 per 10dB(A) increase in 1 year mean road traffic noise levels was found with stronger association in men. Moreover exposure to railway noise above 60 dB was found to be associated with 8% higher risk for hypertension (95% CI :-2%;19% P=0.11) (2) . A cohort study done in Korea also suggested that chronic noise exposure increases SBP independently among male workers.(3)

Sarthebari, a place of Assam is renowned for its age old bell metal industries. These industries are cottage industries and hammering of metal and other activities are done here to manufacture different utensils. The employees of these industries do not use ear plug or other ear protecting device and are exposed to high noise level ranging from 110 to117dB. Till now no study has been undertaken to find the impact of this occupational noise exposures in these workers. So present study is aimed at finding out the prevalence of hypertension in the employees of these bell metal industries

Materials and methods-

A descriptive cross sectional study was done in the bell metal industries of Sarthebari of Bajali district of Assam. By stratified random sampling a total of 163 adult males in the age group of 18 to 62 were included in the study from 32 cottage industries scattered in the locality. Noise exposure of the industries was measured with the help of a decibel meter.

Exclusion criteria-

All the employees who were not willing to participate in the study and had history of hypertension and cardio vascular disease prior to joining the work.

The subjects were interviewed for their food habit, medical history, work duration and age. Height, weight, pulse and blood pressure of the individuals were measured and BMI was calculated .

Statistical analysis- Data was analysed using Microsoft excel and spss software

Result-

In table 1, mean value of different parameters like blood pressure, RBS, height, weight and BMI are shown against different age groups. The table shows that maximum number of employees are in the age group of 20-40 (62.57%) and only 3% are below the age group of 20. In all the age groups mean RBS is in the normal range. Mean systolic blood pressure is in the pre hypertension range as per JNC 8 criteria in the <20, 20-40 and 41-60 age group and in the stage 1 hypertension range in the 60^{+} age group. In the 60^{+} age group, mean diastolic blood pressure is in the stage II hypertension range.

In table 2, different vitals are shown against work duration. This table shows that work duration of majority workers (25.15%) is in the range of 6-10 yrs. Least number of workers fall in the work duration range of 11-15 years. Mean RBS of all the workers irrespective of the work duration is in the normal range. Mean systolic blood pressures of workers of all the work duration are in the pre hypertensive range. Likewise mean diastolic blood pressures of the workers of all the work durations are in the pre hypertensive range.

Table 3 shows detail data of blood pressure against work duration . It shows that out of 163 employees, 13 persons have normal blood pressure, 80 persons are pre hypertensive, 70 persons are hypertensive. Of the <20 yrs age range , 20% have normal blood pressure, 60% are pre hypertensive and 20% are hypertensive. Of the 20-40 yrs age group, 10.78% persons have normal blood pressure, 54.9% persons are pre hypertensive and 34.31% persons are hypertensive. Of the 41-60 years age group, 2.08% persons have normal blood pressure, 43.75% persons are prehypertensive and 54.16% persons are hypertensive. Of the 60^{+} age group all persons (100%) are hypertensive. If work duration is considered, it is found that of the 1-5 years work duration group, 6.45% employees are normal, 61.29%employees are pre hypertensive and 32.25% employees are hypertensive. Of the 5-10 years work duration group, 7.31% employees are normal, 53.65% employees are pre hypertensive and 39.02% are hypertensive. Of the 10- 15 years group, 52.17% are pre hypertensive and 47.82% are hypertensive.

Table 4 shows observed frequency of persons in different blood pressure level categories against work duration. P value for the chi square test corresponding to table 4 is .311579 and is much greater than 0.05 and hence statistically insignificant. Therefore blood pressure

level is insignificant of the work duration status.

Table 5 shows the Z value and P value for sample prevalence and population prevalence against different blood pressure status categories. Here the hypothesis to be tested is sample prevalence does not differ from population prevalence versus sample prevalence is less than population prevalence. As all the p values for isolated systolic hypertension, isolated diastolic hypertension and for hypertension with both values increased are >.05, so it can be accepted that sample prevalence does not differ from population prevalence and hence it can be concluded that there is prevalence of hypertension of all these three categories.

Discussion-

All the employees of our study are male. They are non vegetarian. They do not use any protecting device like ear plug to reduce the noise exposure.Unlike the large scale industries, the employees of these bell metal industries of Sarthebari cannot be categorised into different groups like office section, marketing section, proper work site employees etc. They are all equally exposed to noise in these cottage industries although they have different period of work. The result of this study states that there is prevalence of hypertension in the employees of bell metal industries of Sarthebari. This study finding is supported by a study done by Uday W Narlawar et al.[4] Another study done in steel industries by Fan Zhou et al[5] also found significantly high blood pressure levels in occupational noise exposed subjects than non exposed ones. But contrary to the assumption, the causative factor of the hypertension cannot be totally attributed to noise exposure in our study as work duration is not associated with hypertension. One study done in Netherland to find out the cardiovascular effect of environmental noise including blood pressure changes, by Elise Van Kempen et al[6] also found inconsistent results . Therefore the results of this study also reveals necessity of searching for other factors for the prevalence of hypertension found in these industries.

Conflict of interest-

There is no conflict of interest

Acknowledgement-

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TABLE 1: Table showing the vitals against age groups:

Parameter	No. of persons(%)	Mean RBS	Mean systolic BP (mm of Hg)	Mean diastolic BP (mm of Hg)	Mean Weight (in kg)	Mean Height (In m)	Mean BMI (in Kg/m^2)
<20Yrs	5 (3.06%)	89mg/dl	120	74	58.00	1.74	19.12
20-40yrs	102(62.57%)	103mg/dl	123	81.5	61.19	1.65	22.57
41-60yrs	48(29.44%)	118mg/dl	135	85.9	54.48	1.60	21.30
60+	8(4.9%)	86mg/dl	154	100	58.20	1.60	22.66
Total	163(100%)	106mg/dl	128	84	59.27	1.64	22.13

TABLE 2: Table showing the vitals against work duration:

Parameter	No. of persons/(%)	Mean RBS	Mean systolic BP	Mean diastolic BP
1-5yrs	31 (19.01%)	100	125.16	82.74
6-10yrs	41(25.15%)	101	124.2	84.21
11-15yrs	23(14.11%)	109	125.4	83.78
16-20yrs	30(18.4%)	110	130.6	83.93
21+	38(23.31%)	108	133.7	83.65

TABLE 3:Detail data of blood pressure against age & work duration:

	NORMAL		PREHYPERTENSION		HYPERTENSION	
	Count	%	Count	%	Count	%
AGE						
TOTAL	13	7.98%	80	49.07%	70	42.94%
<20Yrs	1	20%	3	60%	1	20%
20-40yrs	11	10.78%	56	54.9%	35	34.31%
41-60yrs	1	2.08%	21	43.75%	26	54.16%
60+	0	0	0	0	8	100%
WORK DURATION						
1-5Yrs	2	6.45%	19	61.29%	10	32.25%
5-10yrs	3	7.31%	22	53.65%	16	39.02%
10-15yrs	0	0	12	52.17%	11	47.82%
15-20yrs	3	10%	14	46.66%	13	43.33%
20+	5	13.15%	12	31.57%	21	55.26%

Table 4

	Normal	prehyp	hyp	Total
1-5yrs	2	19	10	31
6-10yrs	3	22	16	41
11-15yrs	0	12	11	23
16-20yrs	3	14	13	30
20yrs+	5	12	21	38
total	13	79	71	163

Table 5

	Isolated systolic hypertension	Isolated diastolic hypertension	hypertension
Sample prevalence rate	0.054545	0.169697	0.212121
population prevalence rate	0.043	0.009	0.1904
Z	0.731076	21.85705	0.710653
P value	0.7673	1.00	0.7611

BMI	Nutritional status
Below 18.5	Underweight
18.5–24.9	Normal weight
25.0–29.9	Pre-obesity
30.0–34.9	Obesity class I
35.0–39.9	Obesity class II
Above 40	Obesity class II

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