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Noise And Health Evaluation Using Blood Pressure Measurement As Indicator

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Abstract: ***Noise is considered by world health organization, WHO as the third most hazardous type of pollution. It is a silent killer in most uniformed society. The impact ranges from; physical, pathological and psychological. This study seeks to evaluate the noise impact on the University of Port Harcourt Science and engineering workshop. Using staff and industrial attachment students. The test involves their blood pressure variation with increasing sound level as index. The physics is that stressors like heat, light and sound can induce psychological expressions and constriction of muscles, which by Boyles law are psychological reactions associated with the noise stressors at a range of 90-110 dBA using a post-traumatic stress disorder Keame scale where applicable and other physical observations. The analysis of variance with P value of 0.682 and 0.343 for $x \leq 90$ dBA and $y \geq 110$ dBA for a five minute exposure shows no significant difference in blood pressure measurement. The psychological impact evaluation shows level of restlessness and loss of concentration at 100 dBA. There are study indicative that long term exposure can aggravate health condition and hearing loss which was avoided in this preliminary research.***

I. INTRODUCTION

The subject noise is highly topical and controversial because of individual differences and adaptation, health challenges and overriding economic interest of those that generate the noise.

The noise which is a wave function can be;

- ✓ Intermittent e.g. ringing of telephone,
- ✓ Fluctuating in nature e.g motor traffic
- ✓ Steady source e.g generators and transformers
- ✓ Impulsive e.g drilling, welding, fire arms and handling of materials, all of which have different impact on health.

This study focuses on the impact of varying steady noise level on the blood pressure of the University of Port Harcourt Science and Engineering Staff and Students, using a range of 50-110 dBA Sound level. Along the line of studies, Fogari et al (2001) with other scholars claimed that workers exposed to high-level industrial noise and having their BP Measured via ambulatory BP monitoring (ABPM) Showed BP increase during exposure to noise for a few hours.

In another development, Ising and Michalak (2004) assert that the systolic BP Reponses to moderate noise in field conditions were more consistent than those intense noise in a Laboratory on same individual due to environmental influence while using et al (2004) claimed that emotional responses such as anger or fear may magnify and prolong the effect of the noise. In other development Carter et al (2002) discovered that sleep laboratory (BP) and heart rate (HR) were traced after acoustic stimuli or recorded transport noise arousal.

From a social study angle, Blanc et al (1997) found that both systolic and diastolic BP level as well as heart rate HR increased with higher noise level during the preceding minutes which is indicative that persistent noise affect health more.

On the compliment Dave et al (1993) conducted studies on five subjects groups and found an increase in diastolic BP from 4 to 6mmHg associated with arousal according to sleep stages.

There are however major differences between Laboratory and real life condition. For instance in real life condition, other fluctuating noise have its side effect. Many factors apart from the environmental element determine noise impact.

Haralabidise et al (2008) claimed that illness that can affect BP measurement include the following medication and conditions;

- ✓ Antihypertensive medication
- ✓ Diagnosis of diabetes mellitus
- ✓ Diagnosis of obstructive sleep sponoea syndromes
- ✓ Working in night shift
- ✓ Using sleeping pills and sedative
- ✓ Diagnosis of hearing impairment
- ✓ Regular use of earplugs or exposed to industrial noise
- ✓ Diagnosis of atrial fibrillation

Effort is made to use the experiences of the past study group to guide the present experiment by limiting our self to 11OdBA within a five to ten munities exposure to play safe on standards.

Other related studies include. Gary *et al* (2007), Singh and Davo, (2010), Ising and Kruppa (2004) and Babisch (2005).

II. MATERIALS AND METHOD

The three most significant equipment in this study are the electronic sphygmomanometer for measuring the blood pressure before and during treatment, the audio source which is a sonic media stereo, and a digital noise level meter for measuring the noise level, supported by a noise dosimeter. The screened candidates were moved to the electrical and electronics section of the workshop where they were exposed to an alarm noise source of 50d BA to 110 dBA for a space of 5 to 10 minutes while the reading where taken.

III. RESULTS

This study tries to look at the health impact of the noise using the blood pressure4 level before and during exposure with varying noise level as an index.

'C' = 50-60dBA which is the control, x≤ 90dBA, y ≤ 110dBA for a 5 to 10 minutes exposure.

RESULTS

Table 1 Paired Samples Statistics 'C' with 'x'

	Mean	N	Std. Deviation	Std. Error Mean
BLOOD PRESSURE BEFORE AND AFTER 90 Dba EXPOSURE	1.7968 1.88186	40 40	.20554 .28333	.03250 .04480

Table 1

Tabled Paired Samples Test 'C' with 'x'

		Paired Differences					T	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% confidence Interval of the differences				
					Lower	Upper			
Pair 1	Blood pressure before and after 90dBA	-.02185	.33474	.05293	-.12890	.0520	-.413	39	.682

Table 2

The analysis shows that there is no significant difference between the health impact of the noise using BP before and during exposure with varying noise level, since p-values is 0.343 greater than the α level of significance at 0.05

IV. ANALYSIS OF RESULT

The experiment within the bound of 100-110d BA for a 5 minutes exposure shows there is no significant difference in the BP rise since p value of 0.682 for X and 0.343 for Y are greater than the level of significance at 0.05. The psychological studies however shows that the sound above 100dBA was painful to the ear which informed the decision to limit the exposure of the study persons to five minutes to accommodate their threshold tolerance.

V. CONCLUSION AND RECOMMENDATION

The theory of possible BP rise with sound level rise is centered on the claim that harmful stimuli causes blood vessels to contract as a defence mechanism thereby making the hairs to stand erect which is observable. With increase heart rate over the contracted blood vessels there is bound to be an increase in BP by the application of Boyles law which stresses that the pressure 'P' of a system is inversely proportional to the volume 'V".

The fact that the study recorded no significant difference in the BP rise is indicative that most BP challenge has a pathological origin which is aggravated by the environmental stressors, such as noise and not the other way round. The time of exposure and the pain taken to select healthy young persons for the trial may not give the same effect like the industrial noise and its impact on communities which is a mixed setting over a longer period of exposure.

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