Noise Pollution of Local Train and its Impact on Students Residing Nearby Railway Station

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ABSTRACT

Trains are the major source of transport in Mumbai. It also causes noise pollution which may have a negative impact on health such as hearing impairment, sleep deprivation and low concentration. These side effects have adverse impact on students' academic performance. For the present study, twenty volunteers were selected and they were divided into control and experimental groups. The volunteers from experimental group were from locality near to the station, whereas volunteers from control group live far from that station area. The health condition of the volunteers was recorded normal. The participants were instructed to follow a strict sleep pattern. The present study shows the disturbing pattern of sleep in experimental group. Sleep deprivation may cause stress, negative impact on working capacity and academic performance. Present investigation suggests that improvement is required in nearby area of the station to reduce the impact of noise.

KEYWORDS: *Noise impact, health, train, students*

INTRODUCTION

India is a developing country and industrialization is a key to its growth. When industrialization develops in a country, more traffic load is added which is resulting in high level of environmental noise [1]. Things are easy and better now. Due to transportation any distance is no more count as distance. Beside these time saving and positive effects of transportation there is a negative effect which also exists. More and more noise is produced by these industries, machinery andespecially train transport. Noise is known as air pollutant [2]. Noise from train transport is responsible to noise annoyance [3]. Definition of environmental noise is "any unwanted or harmful outdoor sound created by human activities" [4]. The National Institute on Deafness [5] and Other Communication Disorders, define noise as "Long or repeated exposure to sound at or above 85 decibels can cause hearing loss."

Transport has significant effect on environment as well as on life of individuals [6]. Trains are the major cause of noise pollution, it causes uncomfortable environment for the people who lives in the nearby railways [7]. According to Bhattacharya *et. al.,*when train enters and leave the station it honks on the sound level 100 db [8]. The main causes of noise pollution from train are noise due to wheel movement, horn, and noise in tunnel [8]. During interaction between wheel and railway track rolling, impact and curve squeal are the three types of noise are produced. Less than 1000 Hz frequencies are produced by impact noise whereas curve squeal noise contains large frequency 125 to 500 Hz [9]. Heng found maximum noise by train was near the vertical directions and it was found to be decreased by approximately 10 dB in horizontal direction [10]. Significant noise on high rise flat was also observed by Chui *et. al.* [1]. The present paper suggests the effects of noise on health.This also has a significant role for authorities from transport planning and land use planning.

MATERIALS AND METHOD

Experimental study was conducted on the noise level produced by train near the railway track behind V. K. Krishna Menon College of Commerce and Economics and Sharad Shankar Dighe College of Science, Mumbai and theadverse impact of train noise on student's academic performance. Noise levels were assessed near Bhandup railway station(east) and within college premises. Noise by train is recorded by digital sound level meter/ dB meter. The measurements were done with sound meter at Hi-

range which for this meter is 60 dB to 130 dB. The sound level measurements were carried out for six months continuously. Sound measurements were carried out during day time inside the college premises and on different time period near Bhandup station.

Twenty volunteers were selected for the study. They were divided into control and experimental groups (Ten of each). In healthy condition they maintain normal sleeping pattern. They are not addicted by any tobacco product. The body mass index of the entire volunteer was in normal range. The participants were instructed to follow a strict sleep pattern. For this they have to sleep at 11 pm every night and wake up at 7 am each morning during test period. The volunteer from experimental group were from locality near to the station, whereas the control group consist the volunteers who live far from that station area.

Data were expressed as mean ± SEM., or as percentages (relative numbers) for categorical variables. The response of experimental group was compared with control group.

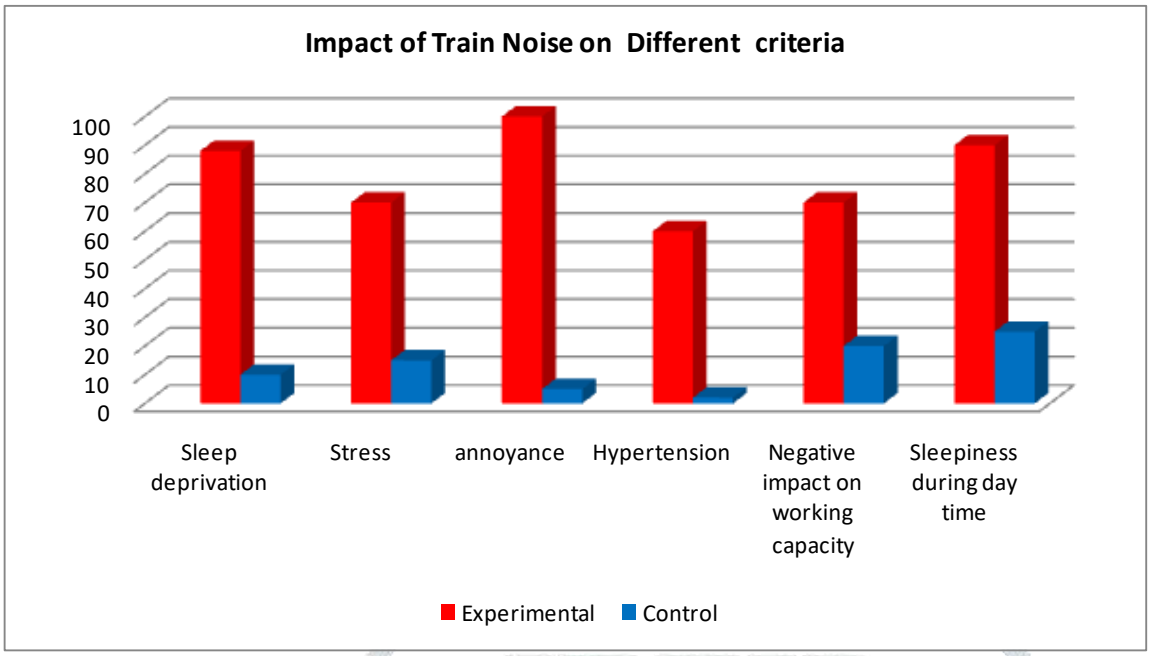
(Figure1) Map showing the study area

RESULT AND DISCUSSION

Our finding shows that noises produced by train are responsible for increased number awaking in night. An increased risk was observed among those students living in areas with the near railway station. In present study it was observed that student volunteer from experimental group experienced more harmful effect as compare to their control group peers. The 90% student of experimental group shows sleep deprivation, whereas in control group sleep deprivation was observed only in 10% students. Stress was observed in 70% students in experimental group, whereas 15% students suffered from stress in control group. In experimental group annoyance was recorded in 100% students, whereas only 5% students from control group shows annoyance. Negative impact on academic performance was observed in 70% students (experimental group), whereas 20% students from control group shows negative impact on working capacity. Sleepiness during day time was observed in 90% volunteers from experimental group, whereas it was observed 25% in control group (Table 1, Figure 2).

(Table 1) Negative impact of train noise on students performance

Symptoms	Sleep deprivation	Stress	annoyance	Negative impact on working capacity	Sleepiness during day time
Experimental	90 %	70 %	100 %	70 %	90 %
Control	10 %	15 %	5 %	20 %	25 %



(Figure 2) Impact of train noise on different criteria

Sound level was recorded 88.05556 ± 0.248817 on the time of train arrival at the railway station. 88.55556 ± 0.166121 sound scales were observed when train leave the station. Train horn noise was observed 107.8333 ± 0.325897 at the station (Table 2).

(Table 2) Train noise at Bhandup station

Sr. No.	Sound level in dB when train arrives on station (Mean ± SEM)	Sound level in dB when train leave the station (Mean ± SEM)	Sound level in dB when train horn honks (Mean ± SEM)
1	88.05556 ± 0.248817	88.55556 ± 0.166121	107.8333 ± 0.325897

Health is a most valuable thing for humans. According to WHO [11] definition of health is "Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." Noise has negative effect on sleep pattern, it also has an impact on heart rate during sleep and it may be responsible for cardiovascular disease [12, 13, 14]. Exposure to transportation noise showed negative health effects in children and adults [15]. Stress is caused by noise and this stress is responsible for many health problems [16]. In present study sleep disturbance, negative impact on working capacity was observed in students of experimental group it may be due to biological changes by noise. Halprin [17] suggests that noise in night induced biological changes in the form of stress and these changes affect sleep pattern and quality. Findings of Babisch [12] also suggest that noise has negative effects on the concentration, relaxation or sleep. Noise exposure may harm the intellectual abilities of students [16]. Daytime sleepiness and tiredness, annoyance, stress, was observed in present study which is supported by Halperin's [17] finding. Noise is known as a psychological stressor that activates the endocrine system [12, 18]. In control group low percentage of noise impact was observed this may be due to noise generated by vehicles on road or community noise [19].

Noise produced by train can be reduced by different mechanisms such as building and technical noise arrangements. These arrangements can be of following type:

- Regular maintenance of the railway track

- Application of modern types of crossing points and switches
- Brakes in train with an anti-slip device, new brake materials
- Noise enclosure or Noise barrier can be implemented near railway track

By using these mechanisms it would be possible to reduce the noise level [20].

In present research work negative impact of train noise was observed in students which significantly affect their working capacity. The present study suggests that improvement is needed in the railway station near the study area / residential area to reduce the impact of noise.

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