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Research Article

**HEARING IMPAIRMENT AMONG PUBLIC TRANSPORT
DRIVERS BECAUSE OF THE NOISE POLLUTION ON ROADS**¹Ijaz Ali, ²Hamza Aslam, ³Zarnab Younis Rana, ⁴Dr. Aftab Azam¹MO, RHC Haiderabad Thal, Bhakkar²Medical Officer, THQ Hospital Manawan Lahore³DHQ Hospital Sahiwal⁴PGR Nephrology, Sir Ganga Ram Hospital Lahore**Abstract:**

Objective: The research purpose is to find out the effects of pollution caused by noise on hearing of public transport drivers.

Methodology: The research method is descriptive, carrying out cross-sectional study at Allied Hospital, Faisalabad Department of ENT (January, 2016 – August, 2016). A subject size of 100 drivers of public transport, who were in driving for eight to ten years in Lahore city, was selected for study. Twenty-five drivers were selected, each having bus, wagon, taxi car and auto-rickshaw. All drivers were examined at ENT wards and Pure-Tone Audiometry and questioned according to a questionnaire Performa.

Results: With 41.36 year mean age, a percentage of 51 were driving from last eight to ten years. Among them, having disabling hearing loss (10.00%), normal hearing threshold of 25.00%, and 65.00% were having Noise Induced Hearing Loss.

Conclusions: Most of the public transport drivers are facing Noise Induced Hearing Loss due to excessive exposure to noises at roads in the city of Lahore.

Keywords: Public Transport (PT), Public Transport Drivers (PTD), Noise Induced Hearing Loss (NIHL), Noise Pollution.

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INTRODUCTION:

By definition, an unwanted sound is called noise but according to subjectivity, any sound can be a noise for someone [1]. Physically, sound and noise are the same but sound can be called a sensory perception while noise, speech or music are complex sound wave pattern. In industrialized society, the common most cause for hearing loss is environmental noise. The noise at workplace causing hearing loss is called Occupational NIHL. Environmental, domestic, or residential noises are called community noise. Air traffic, road and rail noises are the main sources of community noise. Machines, appliances, neighbours or ventilation system are examples of indoor noise. Noise is one of the "Stress Factors" for man these days and recently it has given the name of 'noise pollution' to increase its importance. Being a metropolitan city, Lahore is populated with around 7 million people having 3 million or more vehicles on its road. Type of these vehicles ranges from 2 to 6 wheelers but public transport, which are extensively used, includes buses, coasters, trucks, wagons, taxi cars, and auto-rickshaw. Noise pollution is a constant threat to the residents of Lahore. A survey report states an average of 95dB more or less 5dB noise is produced by vehicles in Rawalpindi, Lahore, Karachi, Quetta, and Peshawar [2,3]. Noise level of auto-rickshaws is from 100dB to 110dB, hence contributing a lot in noise pollution [4]. Public transport drivers are constantly exposed to community NIHL affecting threat. In city, exhaust system of buses, small trucks, autos, motor bikes and noise of motors are the leading source of traffic noise. Getting echoed and reverberated by tall buildings and narrow streets, this noise gets augmented. This traffic noise directly affects transport drivers. Due to several hours' noise exposure, hearing organs get damaged. The slow process of hearing loss is not alarming and drivers usually become aware when the damage reaches irreversible stage. The research purpose was to find out the effect of noise pollution on an individual's hearing while public transport driving.

SUBJECTS AND METHODS:

The research method is descriptive, carrying out cross-sectional study at Allied Hospital, Faisalabad Department of ENT (January, 2016 – August, 2016). Public transport drivers with eight to ten years (minimum) spent driving in the city of Lahore. criteria: subjects suffering from otosclerosis, otitis media, supportive otitis media, or any middle year disease of ear. Hypertension, head trauma, diabetes mellitus or any systematic disease.

A selection of 100 drivers from city of Lahore through purposive sampling (Non-probability). Subjects were divided into 4 groups.

Table – I: Group wise distribution

Group – I	Contains 25 rickshaw drivers
Group – II	Contains 25 taxi drivers
Group – III	Contains 25 wagon drivers
Group – IV	Contains 25 bus drivers

To record subjects' detail, a questionnaire (semi-structured) was used. Details included drivers age, no days and hours working, and driving years. Subjects were questioned about the awareness of noise effects and use of protective devices during excessive noise. Subjects' consent was taken before entering the above-mentioned data in research Performa. Subjects went through local examinations for tympanic membrane perforation, presence of wax or any such abnormality. After this, subjects went through Pure-Tone audiometry. For this purpose, a sound proof room was used. Frequencies of 8 KHz, 6 KHz, 4 KHz, 3 KHz, 1 KHz and 500 Hz were used in Pure-Tone audiometry. Grading of impairment of hearing was carried out according to World Health Organization criteria (WHO 1990) [5]. Better ear hearing levels were taken as 500 Hz, 1, 2 and 4 KHz on average (Table-I). hearing loss of 25 dB or better threshold was labelled normal. NIHL criteria for labelling case is as follows: [4]

1. Noise exposure history. (Existed in all subjects)
2. 'Better ear' threshold is more than hearing lever of 25 dB at above mentioned frequencies.
3. Impairment of hearing is mainly sensorineural (Gap of air-bone on average at 1, 2, and 4 KHz < 15 dB).
4. Hearing impairment is not unilateral (Asymmetry average < 15 dB at 1, 2, and 4 KHz). The collected data was entered in 'Master sheet' and manually analysed.

RESULTS:

Subject size of 100 male drivers of Lahore city with 33 to 55 years' age range (41.36 mean age). At the time of interview, 51.0% drivers were driving from last eight to ten years, 14.0% from more than twenty years, 21% from 15 to 20, and 14% from 10 to 15 years. Daily average driving hours for 42% was 10 to 12 hours, 6 to 8 for 35.0%, 8 to 10 for 17.0%, and more than twelve hours for 6%. Vehicle maintenance was a concern for 72.0% drivers. The rest of drivers (28%) carried irregular maintenance of vehicles. Drivers working seven days a week were 62.0% and for six days were 38%. Protection in the presence of noise is used by 4.0% and 84.0% were aware of excessive noise ill effects.

According to WHO criteria mentioned in (Table-I), 25.0% drivers had normal hearing levels (Grade 0), Grade 1 hearing loss (26-40 dB hearing loss) 65.0%, and 10.0% subjects had Grade 2 (41 – 60 dB) hearing

impairment.

Table – II: Driving Years and Hours Comparison

Driving		Percentage
Driving Years	Driving from last 8 - 10 years	51.00
	More than twenty years	14.00
	Driving from 15 - 20 years	21.00
	Driving from 10 - 15 years	14.00
Driving Hours	Driving from 10 - 12 hours	42.00
	Driving from 06 - 08 hours	35.00
	Driving from 08 - 10 hours	17.00
	Driving from more than 12 hours	6.00

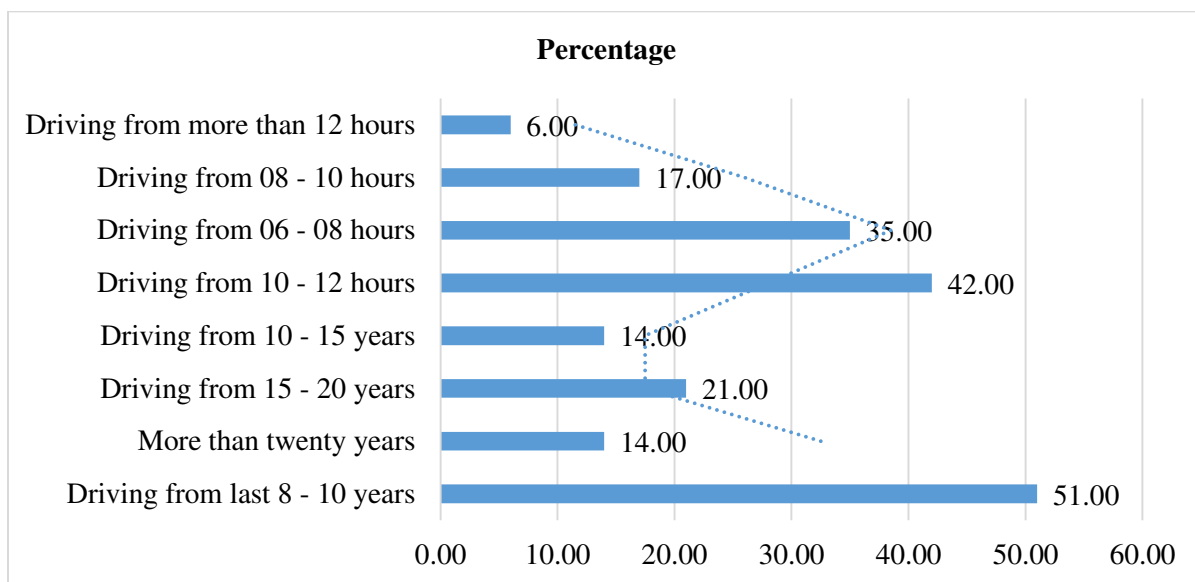


Table – III: Grades of Hearing Impairment

Grades of hearing impairment	Audiometric ISO value Average of 500, 1000, 2000, 4000 Hz.	Performance
0 No impairment	≤ 25 dB (better ear)	No, or very slight, hearing problems. Able to hear whisper
1 Slight impairment	26-40 dB (better ear)	Able to hear and repeat words spoken in normal voice at 1 meter.
2 Moderate impairment	41-60 db (better ear)	Able to hear and repeat words using raised voice at 1 meter.
3 Severe impairment	61-80 dB (better ear)	Able to hear some words when shouted in better ear.
4 Profound impairment, Including deafness	≥ 80 dB (better ear)	Unable to hear and underset and even a shouted voice.

DISCUSSION:

Epidemiological studies support the fact of difference in hearing loss in different noisy professions [7 – 10].

There is a strong noise association with NIHL explained in these research studies, thus increase in magnitude and duration of noise exposure causes

increase in NIHL. Factors like ototoxic drugs, chemicals, and vibrations also contribute in hearing impairment but noise remains the main reason among all. NIHL, being the common most hearing impairment, is preventable [11]. NIHL is quite prevalent occupational (industries, roads) and recreational (musical concerts) condition but our society is lacking awareness about it [12]. NIHL is developed slowly due to intermittent or continuous loud noise in comparison to the acoustic trauma; which is a change in the sudden hearing because of sudden sound burst. WHO presents minimum noise exposure limit as 85 dB (A), moderate exposure as 85 – 90 dB (A) and high exposure as above 90 dB (A), each for eight hours per five days a week. The first effect due to excessive noise exposure is ‘Threshold shift’ (increase in hearing threshold) examined by audiometry. Average 10 dB or more hearing change at 2, 3, and 4 KHz is called threshold shift [13]. Hearing loss due to noise is tested by comparison of hearing threshold at a specific frequency with standardized normal hearing frequency and decibel of Hearing Loss is the unit to report results. Threshold shift originates NIHL. NIHL occurs mostly at 3 to 6 KHz frequencies and is irreversible. Our study included subjects with mean age of 41.36, driving for ten years on average. This long exposure causes significant hearing loss [14]. The subjects of our study drive for ten to 12 hours a day (42.0%) and 62.0% for seven days a week with 84.0% having awareness of noise exposure adverse effects but 4% were in a habit of using protection despite of this awareness. WHO criteria show only 25.0% drivers with normal hearing levels and 75.0% had different grades of hearing impairment (Table-I). Among the subjects, 10.0% had Grade 2 (moderate) hearing impairment and 65.0% had Grade 1 (slight) hearing impairment. Disabling hearing loss is defined by WHO as irreversible threshold level of hearing for healthy ear of 41 or more dBHL for 4 frequencies of 500 Hz, 1, 2, and 4 KHz [5]. Only 10.0% subjects had reached disabling level and 90.0% were at normal hearing impairment according to this criterion but slight hearing impairment had started in 65.0% and continuous exposure will ultimate lead them to irreversible hearing impairment. The excessive noise is not only present in major cities but also in smaller cities of Pakistan according to various studies. Noise level must not exceed seventy dB according to ISO standard [15] and it is proven by various studies that this level seventy dB or less noise all day for lifetime is not damaging [16]. This limit, on roads, in Pakistan is 85 dB(A) within 7.50 meters’ radius according to Environment Protection Agency, National Environment Quality Standards. According to Motor Vehicle Rules 1996: Sec 158, motors shall be

constructed and maintained in such a way to not cause noise while in motion. Facts however show average ninety dB(A) road noise [2, 3, 17]. This noise excess causes hearing impairment in 75.01% drivers studied in Lahore. NIHL is progressive in the presence of noise and leads to irreversible state, therefore, corrective and preventive actions must be taken. Not only hearing loss, but prolonged exposure to noise can cause ischemic heart disease and hypertension as permanent medical conditions. Noise also affects attentiveness, performance and memory adversely [18]. Such deficits on roads/industries can cause accidents. Above 80 dB noise leads to aggression and may change social behaviour. Inability to hear conversations in normal condition is the major social consequence of hearing impairment. Through engineering, administrative approaches, personal protection, and most importantly, community awareness, we can take noise control measurements.

CONCLUSIONS:

About ten percent of public transport drivers have disabling hearing impairment and seventy-five percent have NIHL due to noise exposure on roads in the city of Lahore.

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