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NOISE RELATED HEARING LOSS AMONGST UNDERGRADUATE STUDENTS OF A METROPOLITAN MEDICAL COLLEGE.

Medical Science

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ABSTRACT

After Presbycusis, Noise Induced Hearing Loss (NIHL) is considered the second most common cause of Sensorineural Hearing Loss. The Undergraduate Medical Students of Metropolitan Medical colleges are more exposed to loud noises in multiple ways and means like location of their residence, hostels, rented rooms or a permanent residences in the same city, exposure to gadgets, mobile phones, speakers, exposure to honking during travel, exposure to loud music and constant use of earphones. Therefore, this study has been conducted on 50 Medical students from various semesters pursuing their under-graduation course in Rajiv Gandhi Medical College, Kalwa. It was found that many of the student's audiograms showed a notch at 4000Hz which is suggestive of Noise Induced Hearing loss.

KEYWORDS

Noise induced Hearing loss, Medical Students, Music, Traffic, Loud noise, Earphones.

INTRODUCTION:

Noise Induced Hearing Loss is usually bilateral and symmetrical and it cannot be reversed. Exposure to noise is responsible for most cases of disability due to hearing loss(1). Noise induced hearing loss is the second cause of hearing loss after presbycusis(2). It develops due to chronic and repeated noise exposure such as loud music, gadgets, honking, earphones. Young people, especially belonging to the second decade, are frequently exposed to loud noises like personal listening devices, mobile phones, Bluetooth speakers, in-ear headphones which contribute to the development of Noise induced hearing loss. Music, even when used as an entertainment, can cause hearing damage(3). Young undergraduate medical students, in addition to the above, in their daily routine also get exposed to the noise pollution caused in urban traffic due to constant honking during their daily commute, students living with their rooms facing the highways, railway lines. Considering the necessity of research in this field, the present study sought to examine hearing status and noise exposure levels of the Medical students of Rajiv Gandhi Medical college, Kalwa. Various levels of hearing loss can be measured through audiometric tests(4).

MATERIALS AND METHODS:

This Cross-sectional single observer study was conducted on the Medical Undergraduate students of Rajiv Gandhi Medical College, Kalwa with at least 4 to 5 semesters completed. The study was conducted for a period of 1 year. All the students who gave a written informed consent to be a part of the study were included in the study. All the students who suffered from Otitis Media in the past or present and also those who did not give written informed consent were excluded from the study.

A questionnaire was directly administered to the participants by the observer in the OPD at the time convenient to both the observer and the participant. All the interviews were conducted by a single observer to ensure uniformity of the data. The interviews of the female participants was conducted in presence of the female attendents.

The primary data from the participants was directly obtained by interviews. The data was collected using a questionnaire containing general information (age, religion, gender, distance of residence from main road, the window is on the side facing the main road or on the other side) as well as daily exposure and experiences (intensity of the sound coming from the main road, usage of gadgets with the time duration of its usage and the intensity of sound coming from the gadget, exposure to honking with intensity of sound, exposure to loud music and usage of earphones with its time duration, frequency and intensity of exposure. After completing the questionnaire and clinical examination and otoscopy, the hearing threshold level of participants was determined in both ears at frequencies of 250, 500, 1000, 2000, 3000, 4000, 6000 and 8000 Hz at the Audiometry clinic. Both quantitative and Qualitative data was collected.

The data was statistically analysed using percentage distribution, and appropriate parametric and non-parametric tests of significance.

RESULTS AND OBSERVATIONS:

A total of 50 participants were examined and audiometry was performed in the Department of ENT in Rajiv Gandhi Medical college, Kalwa. The study has been conducted within a span of 1 year. Bilateral tympanic membranes of all the students were found to be intact and mobile.

	TOTAL	PERCENTAGE
MALES	30	60%
FEMALES	20	40%

The Average distance of residence of the students from the Main road was found to be 15 meters.

22 out of the 50 students (44%) were residing in a room facing the Main road.

38 out of the 50 Students (76%) were residing in a room with window facing the Main road.

INTENSITY OF SOUND EXPERIENCED BY THE STUDENTS RESIDING WITH WINDOWS FACING THE MAIN ROAD.

	MILD	MODERATE	SEVERE	TOTAL
TOTAL	18	13	7	38
PERCENTAGE	36%	26%	14%	76%

INTENSITY OF SOUND EXPERIENCED BY THE STUDENTS USING GADGETS FREQUENTLY.

		MILD	MODERATE	SEVERE
1.	Internet	36 (72%)	12 (24%)	2 (4%)
2.	Computer	46 (92%)	4 (8%)	0
3.	Computer games	48 (96%)	2 (4%)	0
4.	Television	22 (44%)	26 (52%)	2 (4%)
5.	Others	50 (100%)	0	0

INTENSITY OF SOUND EXPERIENCED BY THE STUDENTS EXPOSED TO HONKING.

	TYPE	MILD	MODERATE	SEVERE
1.	Train	12 (24%)	30 (60%)	8 (16%)

2.	Cars	18 (36%)	32 (64%)	0
3.	Truck	4 (8%)	20 (40%)	26 (52%)
4.	Others	40 (80%)	10 (20%)	0

INTENSITY OF SOUND EXPERIENCED BY STUDENTS EXPOSED TO LOUD MUSIC AND FREQUENTLY USING HEADPHONES.

	TYPE	MILD	MODERATE	SEVERE
1.	FESTIVALS/OCCASIONS	8	32	10
2.	MUSIC/MOVIES/CONVERSATIONS	2	40	8

Out of the 50 students, 39 students (78%) had complains of subjective feeling of hearing loss, 31 students (62%) reported with complaints of tinnitus and 11 students (22%) presented with a dip at 4000 Hz in the audiometry report suggesting Noise Induced Hearing Loss.

DISCUSSION:

Exposure to excessive noise is the most common preventable cause of hearing loss and It has been suggested that 12% or more of the global population is at risk for hearing loss from noise(2). The World Health Organization estimated that one-third of all cases of hearing loss can be attributed to chronic noise exposure(5).

Exposure to Loud noises for extended periods of time is hazardous to the residents of Metropolitan cities. This study was conducted on 50 Medical under-graduate students from Rajiv Gandhi Medical College, Kalwa in a span of 1 year.

Exposure to Honking noise in rush hours from cars, buses, trains in cities during daily commute make the residents more prone to noise induced hearing loss. 47 out of the 50 students (94%) who participated in this study, Studying Medicine in the Rajiv Gandhi Medical College, Kalwa, live at permanent residences in the city of Mumbai and Thane and commute daily to the Medical college. Few of them travel by cars and motorbikes and the rest travel by trains. All these students have experienced mild to moderate subjective Hearing loss due to loud noise exposure in traffics and trains and almost all of them have experienced tinnitus and earache due to the same.

In another study on Consequences of traffic noise on residents of Karachi, Pakistan it was found that the Subjects included in the study exposed to noise for more than 12 hours per day were 36.8%. Hearing of 17.6% were found to be normal, 33.6% had mild hearing loss, 45.6% had moderate and 3.2% had moderately severe hearing loss. Traffic noise was found to bother 55.2% of subjects. This study establishes that there exists a concrete direct link between NIHL and duration of exposure to noise above permissible levels(6).

Another Cross-sectional Study of Hearing loss among Freshmen in University was done in China which concluded that there is a high prevalence of high frequency hearing loss in university students (20.91%), which was highly related with traffic noise exposure(7).

Exposure to loud music has become a common hazard among the young Medical students. They tend to listen to loud music in their pass-time by using either earphones or play loud music on speakers. The recent trends of frequently attending night-clubs, lounges and live concerts which play music way louder than the permissible levels (90dB) have made the youngsters more prone to Noise induced Hearing loss. In a study on an audience of 204 individuals in a concert, almost 38% of the participants complained of hearing impairment(8).

In another Study showing Music induced Hearing Loss in children, Adolescents and Young Adults: A Systemic Review and Meta-Analysis, it was found that the prevalence of increased hearing levels (>15 dB HL) was 9.6%, and high-frequency hearing loss was found in 9.3%. The average hearing thresholds were 4.79 dB HL at low frequencies (0.5, 1, and 2 kHz) and 9.54 dB HL at high frequencies (3, 4, and 6 kHz). Most studies reported no significant association between pure-tone air thresholds and exposure to loud music. However, significant changes in hearing thresholds and oto-acoustic emissions, and a high tinnitus prevalence suggested an association between music exposure and hearing loss(9).

In a Study done on Auditory Risk Behaviours and Hearing Problems among college students in Serbia it was found that A total of 640 out of 780 (82.1%) of students had a habit of listening to loud music, 421 (65.8%) experienced tinnitus and 79 (10.1%) had a subjective feeling of hearing loss. The most significant association between self-reported hearing loss was living in noisy environments, and the appearance of difficulties (vertigo, anxiety), as well as usage of personal music devices(10).

Noise trauma can result in two types of injury to the inner ear, depending on the intensity and duration of the exposure: either transient attenuation of hearing acuity a.k.a. temporary threshold shift (TTS), or a permanent threshold shift (PTS) (11). Hearing generally recovers within 24–48 hours after a TTS (12).

The recovery of TTS is probably a result of reversible uncoupling of the outer hair cell stereocilia from the tectorial membrane and/or reversible central gain increase and associated hyperacusis and tinnitus (13, 14). However, even when there is recovery of auditory pure tone thresholds, there can be considerable damage to the ribbon synapses, a rapid degeneration termed synaptopathy (15,16). Synaptopathy results in loss of connections between the inner hair cells and their afferent neurons in the acute phase of noise-induced cochlear trauma (15,17), and is most likely a result of glutamate excitotoxicity causing damage to the post-synaptic terminals (16). This is also referred to as Noise-Induced Hidden Hearing Loss, as it is not accompanied by a pure-tone threshold shift (16). Although the extent to which synaptopathy contributes to NIHL is unknown, it is argued that these synaptopathic mechanisms, similar to synaptopathic disease in certain types of auditory neuropathy, are involved in NIHL (18). This is also supported by research in animals showing intact hair cells but extensive noise-induced spiral ganglion loss (15).

The characteristic pathological feature of NIHL with PTS is the loss of hair cells, particularly the prominent loss of outer hair cells at the basal turn, while loss of inner hair cells is limited.

CONCLUSION:

The Medical Students of Rajiv Gandhi Medical College are well exposed to loud noise on daily basis and Out of the 50 students, 39 students (78%) had complains of subjective feeling of hearing loss, 31 students (62%) reported with complaints of tinnitus and 11 students (22%) presented with a dip at 4000 Hz in the audiometry report suggesting Noise Induced Hearing Loss.

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