Tinnitus Among Medical Students Using Personal Sound System

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ABSTRACT

Introduction

Statistical data on prevalence of tinnitus in India and on the relationship between exposure to recreational sound/music and the presence of tinnitus are scarce. This study was conducted to assess relationship between tinnitus and the use of personal sound system(PSS) in medical students.

Materials and Methods

A questionnaire based study was conducted on 100 randomly selected medical students to assess their sound habits with the use of PSS. Information on commonly used intensity, frequency, duration of use, type of earphones and severity of tinnitus was sought. Conventional frequency audiometry (0.25-8kHz) was also performed.

Results

The prevalence of tinnitus was found to be 33%, which was on the higher side of the global prevalence data. All the medical students surveyed in this study used personal sound system. Majority of the students (45%) used PSS less than 1 hour daily. More than 60% of the students complaining of tinnitus preferred louder settings in their PSS.

Discussion

The most common personal sound system used was mobile phones. No statistically significant association was seen with relation to the type of personal sound system, the type of ear phone used, average duration of use and hearing loss. Tinnitus was found to have statistically significant association with volume in our study with majority having tinnitus listening to higher levels of sound.

Conclusion

Use of personal sound system is common in medical students. Though duration of use of the personal sound system was not associated with the complaint of tinnitus, exposure to louder sounds had statistically significant association with tinnitus.

Keywords

Tinnitus; Students, Medical; Cell Phones; Leisure Activities; Noise.

Tinnitus is defined as a sound perceived for more than 5 min at a time, in the absence of any external acoustic stimulation of the ear and not occurring immediately after exposure to loud sound.[1] Common causes for it are ear diseases (conductive and sensorineural hearing loss), neurologic disease, bone/joint disorder, endocrine/metabolic diseases, mental disorders, ototoxic drugs, temporomandibular joint disorder or unknown.[1]

Tinnitus is classified into two types, objective and subjective. Objective tinnitus is the sounds or noises that can be heard by others as well as the sufferer with or without the need of a stethoscope or other forms of noise amplifying instrumentation.[2] It can be because of a vascular phenomenon or due to the spasm of the muscle of the middle ear or the palate. In patients with tinnitus it is present in less than 1%. Whereas in subjective tinnitus, the neural signals responsible for tinnitus, may be produced by a lesion in the cortex itself or in the auditory pathway.[2]

Worldwide prevalence statistics indicate that 10% to 33% of the population has tinnitus.[3,4] Although there is positive relationship with age, according to some studies 75% of adolescents had experienced at least a single episode of tinnitus.[5]

The popularization of Personal Sound System (PSS)

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because of its low price, increased storage capacity, easy downloads and reduced size of the devices has increased over time, especially among the younger population. A survey of 18-25 year olds in Nottingham (UK) revealed that, listening to various devices made up 58% of the total average leisure-time activity.[6] Similarly studies have shown that 94.3% of Korean adolescents used personal music players[7] and 66.7% of college students used iPods in USA.[8]

Given that tinnitus can be due to temporary or permanent noise-induced hearing loss, and it can act as a warning sign even before the hearing loss becomes apparent, we sought to study the relationship between exposure to recreational sound and the presence of tinnitus. It will also form a baseline data for further research in understanding tinnitus in the younger people.

Materials and Methods

The study was conducted on medical students of an urban Medical College in Karnataka. Ethical clearance was obtained for this study. A sample size of 100 was selected and subjects were selected by random sampling. Students with pre existing ear disease, previous ear surgery, those with active upper respiratory infections and nasal allergy, pregnant and breast feeding women, those with systemic illness, those with noise trauma and those on medications (antibiotics, diuretics, antimalarials, cytotoxic drugs and analgesics) were excluded.

Students who were selected for the study was asked to fill a questionnaire which included demographic data, containing open and closed questions - addressing their sound habits with the use of PSS, information on commonly used intensity, frequency and duration of use, type of earphones, and symptoms associated with exposure, highlighting the presence of tinnitus. A detailed ENT evaluation was followed by Pure Tone Audiometry conducted in a sound treated room using a calibrated clinical audiometer.

Statistical analysis was done using Chi square test and Pearson correlation.

Results

All the 100 subjects were found to be using personal sound system and prevalence of tinnitus was found to be 33 percent. The most common personal sound system used was mobile phones (45%). (Table I, p value = 0.4) No statistically significant association was found with the type of personal sound system. The most common tool used for hearing was earphones. 38 % used earphones alone, while 24 % used earphones along with speakers and 18% used earphones and headphones. (Table II, p value = 0.455) There was no statistically significant association between tinnitus and tool used for hearing. In earphones, 45% used insertion type of earphones, 40% used both insertion and earmuffs, 13% used ear muffs alone. There was no statistically significant association between tinnitus and the type of ear phone used. (Table III, p value = 0.364) 45% of the students surveyed used PSS for less than 1 hour, 29% used it between one to three hours, 18% between three to five hours & 8% for more than 5 hours. (Table IV, p value = 0.576) There was no association between tinnitus and daily use time. 50 % students surveyed showed the usage of PSS to be more than 5 years. (Table V, p value = 0.414) There was no statistically significant association between tinnitus and total use of PSS in years.

The daily use time was one to three hours in majority (35%) of subjects using personal sound system for more than 5 years. (Fig. 1) There is statistical association between tinnitus and volume of usage. Though majority was using low volume of one to three (77 %), the majority of tinnitus positive patients (61%) were using a high volume in their PSS. (Table VI, p value = 0.00) and Fig.2) There was no statistically significant association between the use of PSS and hearing loss. (Table VII, p value = 0.240) It was found that 11 % had bilateral conductive hearing loss, 2 % unilateral conductive hearing loss and 2% had unilateral sensorineural hearing loss.

Discussion

The prevalence of subjective tinnitus in our study was found to be 33%. In a similar study done on students of

Table I : Tinnitus and type of personal sound system

			TYPE OF PERSONAL SOUND SYSTEM									TOTAL
			ALL	IPOD	MOBILE	MOBILE/ CD PLAYER	MOBILE/ IPOD	MOBILE/ MP3 PLAYER	MOBILE/ MP3 PLAYER/ IPOD	MOBILE/ MP3/ IPOD	MOBILE/MP3/ IPOD/ CD PLAYER	MOBILE/ MP3 PLAYER/ POD	
TINNITUS	ABSENT	Count	4	0	41	1	8	9	2	0	0	2	67
		%	6.0%	0.0%	61.2%	1.5%	11.9%	13.4%	3.0%	0.0%	0.0%	3.0%	100.0%
	PRESENT	Count	4	1	16	1	4	3	1	1	1	1	33
		%	12.1%	3.0%	48.5%	3.0%	12.1%	9.1%	3.0%	3.0%	3.0%	3.0%	100.0%
TOTAL		Count	8	1	57	2	12	12	3	1	1	3	100
		%	8.0%	1.0%	57.0%	2.0%	12.0%	12.0%	3.0%	1.0%	1.0%	3.0%	100.0%

Medicine, University of Lagos, Nigeria, the prevalence was found to be 22 %.[9] This finding lies within the limits of global prevalence of tinnitus among adults which is between 10 & 33 %.[3,4] However no such statistical data is available for Indian population.

The prevalence of use of PSS was found to be 100 percent in our study. A study conducted in Korea, found that 94.3% of adolescents were using personal music player.7 In USA, 66.7% of college students used iPods.[8]

Our study showed that the most common type of earphone used was insert type (Table III); as also found in UK[6] and Korea;[7] it could be because of their better appearance and lesser price. Researchers have found the insert type of earphones are more hazardous compared to headset type.[10,11] This is attributed to the greater coupling of sound directly to ear in this type of earphone.

There was no statistically significant association between tinnitus and duration of exposure. Majority used PSS less than 1 hour daily (45%), though 50% have been using it for more than 5 years. The reduced

Table II : Tinnitus and Tool used for hearing

			TOOL USED FOR HEARING						TOTAL
			ALL	EARPHONES	EARPHONES & HEADPHONES	EARPHONES & SPEAKER	NOT USING ANY	SPEAKER	
TINNITUS	ABSENT	Count	10	25	10	19	2	1	67
		%	14.9%	37.3%	14.9%	28.4%	3.0%	1.5%	100.0%
	PRESENT	Count	7	13	8	5	0	0	33
		%	21.2%	39.4%	24.2%	15.2%	0.0%	0.0%	100.0%
TOTAL		Count	17	38	18	24	2	1	100
		%	17.0%	38.0%	18.0%	24.0%	2.0%	1.0%	100.0%

daily usage of PSS could be the reason for the lack of significant association. Researchers in Australia also found no significant association between years of use or exposure and tinnitus.[12]

Table III : Tinnitus and type of earphone used

			TYPE OF EARPHONE USED				TOTAL
			BOTH	EAR MUFFS	INSERTION	NIL	
TINNITUS	ABSENT	Count	25	7	33	2	67
		%	37.3%	10.4%	49.3%	3.0%	100.0%
	PRESENT	Count	15	6	12	0	33
		%	45.5%	18.2%	36.4%	0.0%	100.0%
TOTAL		Count	40	13	45	2	100
		%	40.0%	13.0%	45.0%	2.0%	100.0%

Table IV : Daily use time of PSS (in hours)

			DAILY USE TIME (IN HOURS)				TOTAL
			MORE THAN 5	ONE TO THREE	THREE TO FIVE	ZERO TO ONE	
	ABSENT	Count (%)	5 (7.5%)	19 (28.4%)	10 (14.9%)	33 (49.3%)	67
	PRESENT	Count (%)	3 (9.1%)	10 (30.3%)	8 (24.2%)	12 (36.4%)	33
TOTAL		Count (%)	8(8%)	29 (29%)	18 (18%)	45 (45%)	100

Table V : Tinnitus and duration of use of PSS (in years)

			TOTAL USE TIME (YEARS)				TOTAL
			MORE THAN 5	ONE TO THREE	THREE TO FIVE	ZERO TO ONE	
TINNITUS	ABSENT	Count	30	13	16	8	67
		%	44.8%	19.4%	23.9%	11.9%	100.0%
	PRESENT	Count	20	5	4	4	33
		%	60.6%	15.2%	12.1%	12.1%	100.0%
TOTAL		Count	50	18	20	12	100
		%	50.0%	18.0%	20.0%	12.0%	100.0%

Table VI : Tinnitus and preferred loudness of the sound system

			LOUDNESS			
			EIGHT TO TEN (80% to maximum volume)	FOUR TO SEVEN (upto 70 % of maximum volume)	ONE TO THREE (upto 30% of max)	TOTAL
TINNITUS	ABSENT	Count (%)	1 (1.5%)	0 (0%)	66 (98.5%)	67
	PRESENT	Count (%)	20 (60.6%)	2 (6.1%)	11 (33%)	33
TOTAL		Count (%)	21 (21%)	2 (2%)	77 (77%)	100

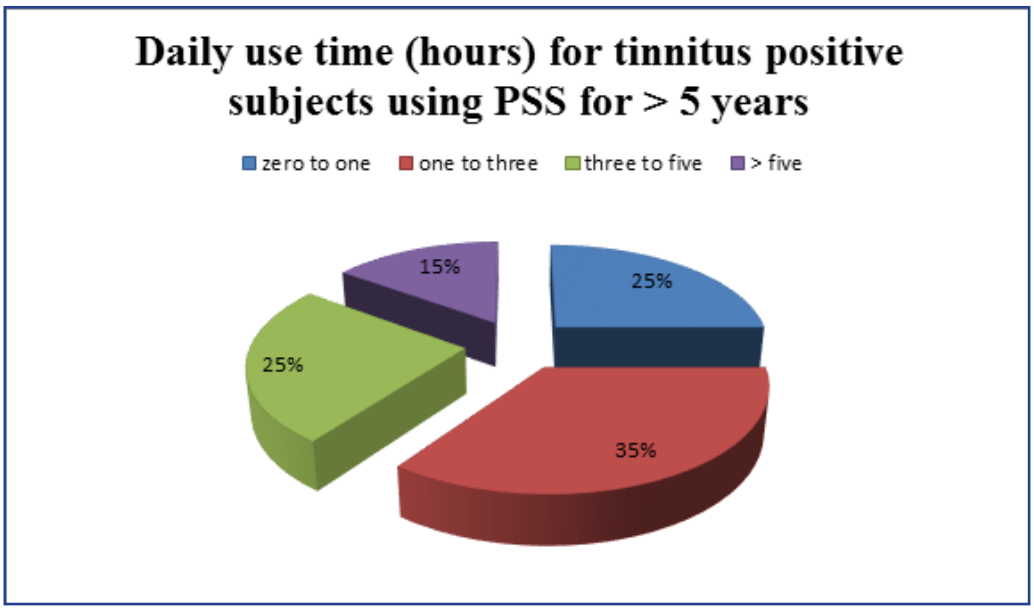

Fig.1. Daily use time (hours) in tinnitus positive patients using PSS > 5 years

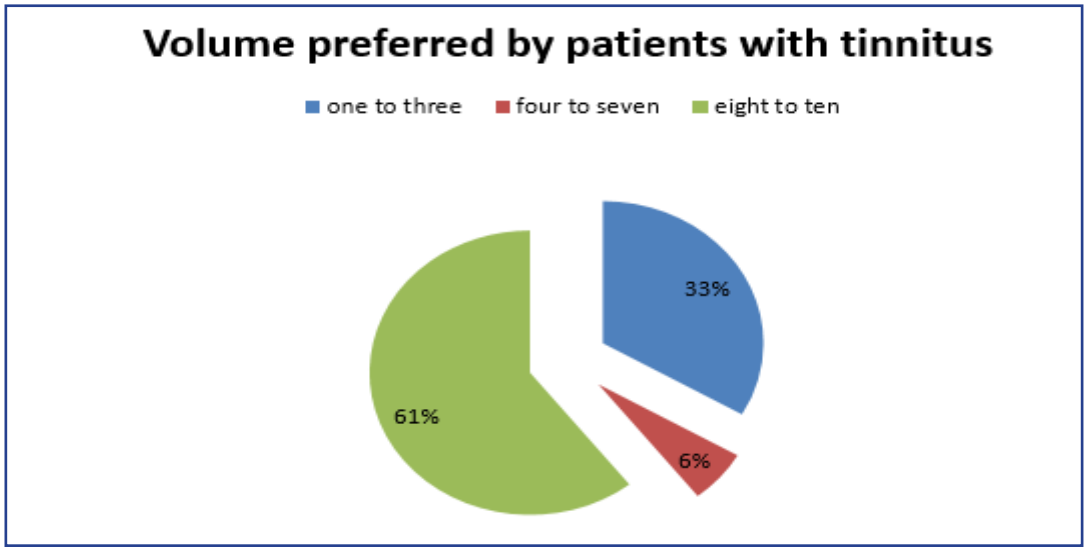

Fig.2. Preferred volume of the sound system in tinnitus positive patients

Tinnitus was found to have statistically significant association with volume in our study with majority having tinnitus listening to higher levels of sound. This association was not established in other similar studies as in the study done on students of Medicine, University of Lagos, Nigeria.[9]

When the severity of tinnitus was asked to be classified as appreciable only in silent environment, continuously present but not affecting the day to day activities or continuously present affecting the day to day activities, all of them felt it as appreciable only in silent environment.

Additionally it was also found that 2% had sensorineural hearing loss, 2% unilateral moderate conductive hearing loss and 11% had bilateral moderate conductive hearing loss. Though there was no statistically significant association, it is estimated that noise induced hearing loss can occur in about 10-30% of

Table VII : Tinnitus and Hearing

			HEARING				TOTAL
			Normal	Bilateral Moderate Conductive hearing loss	Sensorineural hearing loss	Unilateral moderate conductive hearing loss	
TINNITUS	ABSENT	Count (%)	59 (88.1%)	5 (7.5%)	1 (1.5%)	2 (3.0%)	67
	PRESENT	Count (%)	26 78.8%)	6 (18.2%)	1 (3.0%)	0 (0%)	33
TOTAL		Count (%)	85 (85%)	11 (11%)	2 (2.0%)	2 (2%)	100

PSS users after 5 or more years of use, which is due to exposure to the high-intensity noise over a long period of time.[13]

Conclusion

The prevalence of subjective tinnitus in our study is within the limits of global prevalence of tinnitus. No statistically significant associations were found between the presence of subjective tinnitus with the type of ear phone used or duration of use but statistically significant association was seen with the loudness of sound. Further studies in the younger population are, therefore, recommended to fully assess tinnitus.

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