

## Burdon of music on the hearing of youth of Hyderabad Pakistan

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### Abstract

As the human development took place a phenomena of noise also emerged. Noise emerges from different instrument and machinery. Among these instruments personal listening devices are affecting the hearing of our youth. This research took place to estimate the extent of damage caused by musical noise. The study was performed in the department of Physiology Liaquat university of Health Sciences from January 2019 to May 2019. One hundred and fifty participants were selected. Fifty were control group who were not exposed to 35 hrs per week of music noise exposure and hundred were test group who were exposed to prescribed level of music noise exposure. The participants who were exposed to musical noise, 52% were suffering from hearing loss while 13% were suffering from tinnitus. It was also noted that ratio of hearing loss and tinnitus increased as the intensity and duration of noise increased. It was concluded that there is a strong relationship between noise and hearing loss.

**Keywords:** Burden, Music, Hearing Loss

### Introduction

With the development of human society many mechanical instruments were invented to facilitate mankind but with this a monstrous side effect aroused called noise. Noise is a undesirable, loud and distracting sound, noise is produced by industries, road terrific noises and television and other musical instruments.<sup>8</sup>

In 1976, WHO recognized the noise as a pollutant that damages the environment of our Globe. The urban noise including industrial, road terrific and music noise are polluting our environment.<sup>12, 8, 17</sup>

When sound enters the external auditory canal, it strikes the tympanic membrane, the vibration of which produce vibration in the fluid of cochlea. These vibrations depolarize the inner hair cells, producing nerve signals which are carried by cochlear nerve to brain. Noise actually damages these hair cells producing NIHC.<sup>8</sup>

Noise leads to damaging effect on our body, including altered emotional response, cognitive disorders, sleep impairment, cardiovascular disorders and central nervous system disabilities.<sup>14</sup> Throughout the globe noise is the most prevalent cause of hearing loss.<sup>14</sup>

NIHL is a increased hearing threshold when one is exposed to higher level of noise i.e. more then 75-85dB. About 1.3 billion of peoples are suffering from this

disorder. It is one of the 19<sup>th</sup> major disabilities in North America. In south Asia it is 9<sup>th</sup> in the rank.<sup>10</sup>

NIHL was first recognized in the 18<sup>th</sup> century in the workers exposed to hammer noise working in the metal, gold industries and ship builders. High intensity noise leads to cochlear damage. Noise either leads to temporarily transient shift (TTS) where hearing restores after 2-3 hours or permanent transient shift (PTS), where there is higher threshold for hearing on permanent basis.<sup>15</sup>

About 5.2 million children and young adults and 26 adults in America are suffering from NIHL. It is also called silent epidemic. About 18.8% young adults are exposed to high intensity music and prone to damage their hearing.<sup>11</sup> As the popularity of pop music is increasing the burden of hearing damage, tinnitus and hyperacusis is also mounting. The hearing loss is directly associated with duration of noise exposure.<sup>2</sup>

With the popularity of music NIHL has become a major prevalence in our young population. This depends upon the duration and intensity of noise. NIHL is also accompanied with other symptoms including tinnitus.<sup>2</sup> The younger generation is usually unaware of the damage that recreational music can produce. A better education regarding the hearing protection devices and controlling the intensity and duration of noise can leads to better preservation of hearing.<sup>7</sup> From 1980s the industrial noise has decreased but the social noise has increased. This noise damages the organ of corti. Recreational noise

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damages the hearing more intensely when it is used with headphones.<sup>7</sup>

Peoples who are exposed to pop and rock music are at great risk of suffering from acoustic damage because they are exposed to a wide range of intensity of noise ranging from 85dB to 145dB. Hearing loss usually is at high frequency level i.e. 3 kHz, 4 kHz, 6 kHz and 8 kHz<sup>1</sup>. Personal music players lead to NIHL due to inner hair cell damage and nerve deafness.<sup>13</sup> Musicians are at higher risk of hearing damage. Persistent exposure to noise leads to tinnitus and hyperacusis. Musicians are at higher risk because they are exposed to different type of frequency spectrum and different exposure time.<sup>3</sup> The orchestral music is more prone to cause damage to hearing system<sup>4</sup>.

A single exposure to loud music leads to temporary changes in the hearing but repeated and prolonged exposure leads to permanent changes in hearing.<sup>5</sup> Noise reduces the neurogenesis and cell proliferation in hippocampus<sup>13</sup>.

Hearing threshold reaches a higher level immediately after exposure to high intensity noise.<sup>9</sup>

## Material & method

This study was a retrospective comparative study in the department of physiology in Liaquat University of Medical and Health Sciences. The study was conducted during the period of **From January 2019 to May 2019**. The participants were selected after screening through Using the inclusion and exclusion criteria, questionnaire Performa, otoscopic examination and tuning fork tests, and Audiometric evaluation, the participants were selected.

Test participants up to 40 years age group who were exposed to noise exposure through personal listening devices for 35 hours per week for 2 years. They were not suffering from any ENT problem. They were having unilateral or bilateral sensorineural deafness. The participants were resident of Hyderabad Sindh. Who were less than 15 years of age group or more than 40 year, who were not exposed to noise exposure through personal listening devices, Persons who were diabetics or hypertension, all cases of conductive hearing loss, csom, H/o otic trauma or H/o of ototoxic drug use. All the data regarding history, clinical examination, and test results were incorporated in a specific questioner Performa. Statistical analysis was done on SPSS 16. All the variables were categorical. Study was analyzed for two types of variables, dependent and independent. Descriptive statistic was used to access the frequency of different variables. Chi square test was applied to verify the result and to obtain P value. P value less than 0.005 was concluded as significant.

## Control group

Comprised of 50 volunteers who were employee and students of LUMHs who were not exposed to 35 hours

per week of noise exposure through music with or without headphones.

## Test group

Comprised of 100 volunteers who were employee and students of LUMHs who were exposed to 35 hours per week of noise exposure through music with or without headphones.

## Test procedure

Test participants were invited by social media, publicity by different penaflex and posters. Selected participants were invited in the department where they were scrutinized by questioner, otoscopic examination, tuning fork test and finally audiometric examination.

## Questionnaire examination

Questioner includes all the information regarding participants and the data derived from the research. It include personal bio data, type of noise, duration of noise, intensity of noise, use of hearing protecting devices and the data derived from the research.

## Result

Table 1 showing frequency of age. 47 (31.3%) were between 15-20 years. 53 (35.5%) were between 20-30 years. 50 (33.3%) were between 30-40 years of age group.

Table 2 showing Gender wise distribution of participants. 42(28%) were female while 108 (72% were male).

Table no 3 showing status of participants regarding noise exposure. 50 (33.3%) participants were of control group who were not exposed to noise. 100 (66.7%) were of test group who were exposed to noise.

Table no 4 showing association of noise to hearing loss. The participants who were not exposed to noise were not suffering from hearing loss .The participants who were exposed to noise 52% were suffering from hearing loss. P value was 0.000.

Table no 5 showing association of noise to tinnitus. The participants who were not exposed to noise were not suffering from tinnitus .The participants who were exposed to noise 13(13%) were suffering from tinnitus. P value was 0.004.

Table no 6 showing association of age to hearing loss. 25.5% of participants between 15-20 age groups were suffering from hearing loss. 41.5% participants between age group 20-30 years were suffering from hearing loss. 36% participants between 30-40 years age group were suffering from hearing loss. P value was 0.239 which was not significant.

Table no 7 showing association of gender to hearing loss. 17(40.5%) were suffering from hearing loss while 35 (32.4%) were suffering from hearing loss. The P value was 0.228 which was not significant.

Table no 8 showing association of hearing loss to exposure time. Only 1 (1.7%) participant from the control group was suffering from hearing loss. The participants who were exposed for 2 hours 11(40.7%) were suffering from hearing loss. The participants who were exposed for more than 3 hours 8 (44.4%) were suffering from hearing loss. The participants who were exposed for more than 4 hours 7 (43.8%) were suffering from hearing loss. The participants who were exposed for more than 5 hours 23 (76.7%) were suffering from hearing loss. P value was 0.000.

Table no 9 showing association of hearing loss to exposure time (years). No participant from the group who were exposed for less than 2 hours nobody was suffering

from hearing loss. The participants who were exposed for more than 2 years 7 (25.9%) were suffering from hearing loss. The participants who were exposed for more than 3 years 9 (47.4%) were suffering from hearing loss. The participants who were exposed for more than 4 hours 17 (70.8%) were suffering from hearing loss. The participants who were exposed for more than 5 years 19 (86.4%) were suffering from hearing loss. The P value was 0.000.

Table no 10 showing association of listening pattern and hearing loss. The participants who were using hand free 51 (98.1%) were suffering from hearing loss while only 1 participant was suffering from hearing loss who did not used hand free. P value was 0.000.

**Table 1** Showing frequency of Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15-20 years	47	30.5	31.3	31.3
	20-30 years	53	34.4	35.3	66.7
	30-40 years	50	32.5	33.3	100.0
	Total	150	97.4	100.0	
Missing	System	4	2.6		
Total		154	100.0		

**Table 2** Showing gender wise distribution of participants gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	42	27.3	28.0	28.0
	male	108	70.1	72.0	100.0
	Total	150	97.4	100.0	
Missing	System	4	2.6		
Total		154	100.0		

**Table 3** Showing status of participants regarding noise exposure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not exposed to music noise	50	32.5	33.3	33.3
	exposed to music noise	100	64.9	66.7	100.0
	Total	150	97.4	100.0	
Missing	System	4	2.6		
Total		154	100.0		

**Table 4** Showing association of noise to hearing loss

			hearing loss		Total	P value
			no hearing loss	hearing loss		
status	not exposed to music noise	Count	50	0	50	0.000
		% within status	100.0%	.0%	100.0%	
	exposed to music noise	Count	48	52	100	
		% within status	48.0%	52.0%	100.0%	
Total		Count	98	52	150	
		% within status	65.3%	34.7%	100.0%	

**Table 5** Showing association of noise to tinnitus

			Tinnitus		Total
			yes	no	
status	not exposed to music noise	Count	0	50	50
		% within status	.0%	100.0%	100.0%
	exposed to music noise	Count	13	87	100
		% within status	13.0%	87.0%	100.0%
Total		Count	13	137	150
		% within status	8.7%	91.3%	100.0%

**Table 6** Showing association of age to hearing loss.

			hearing loss		Total	P value
			no hearing loss	hearing loss		
Age	15-20 years	Count	35	12	47	.239
		% within Age	74.5%	25.5%	100.0%	
	20-30 years	Count	31	22	53	
		% within Age	58.5%	41.5%	100.0%	
	30-40 years	Count	32	18	50	
		% within Age	64.0%	36.0%	100.0%	
Total		Count	98	52	150	
		% within Age	65.3%	34.7%	100.0%	

**Table 7** Showing association of gender to hearing loss

			hearing loss		Total	P value
			no hearing loss	hearing loss		
gender	female	Count	25	17	42	.228
		% within gender	59.5%	40.5%	100.0%	
	male	Count	73	35	108	
		% within gender	67.6%	32.4%	100.0%	
Total		Count	98	52	150	
		% within gender	65.3%	34.7%	100.0%	

**Table 8** Showing association of hearing loss to exposure time

			hearing loss		Total	P value
			no hearing loss	hearing loss		
exposure time	not exposed	Count	58	1	59	0.000
		% within exposure time	98.3%	1.7%	100.0%	
	more than 2 hours	Count	16	11	27	
		% within exposure time	59.3%	40.7%	100.0%	
	more than 3 hours	Count	10	8	18	
		% within exposure time	55.6%	44.4%	100.0%	
	more the 4 hours	Count	7	9	16	
		% within exposure time	43.8%	56.2%	100.0%	
	more than 5 hours	Count	7	23	30	
		% within exposure time	23.3%	76.7%	100.0%	
Total		Count	98	52		
		% within exposure time	65.3%	34.7%		

**Table 9** Showing association of hearing loss to exposure time in years

			hearing loss		Total	
			no hearing loss	hearing loss		
year exposure time	less than 2 years	Count	58	0	58	
		% within year exposure time	100.0%	.0%	100.0%	
	more than 2 years	Count	20	7	27	
		% within year exposure time	74.1%	25.9%	100.0%	
	more than 3 years	Count	10	9	19	
		% within year exposure time	52.6%	47.4%	100.0%	
	more than 4 years	Count	7	17	24	
		% within year exposure time	29.2%	70.8%	100.0%	
	more than 5 years	Count	3	19	22	
		% within year exposure time	13.6%	86.4%	100.0%	
	Total	Count	98	52	150	P value 0.000
		% within year exposure time	65.3%	34.7%	100.0%	

**Table 10** Showing association of listening pattern and hearing loss Cross tabulation

			hearing loss		Total	P value
			no hearing loss	hearing loss		
listening pattern	with hand free	Count	1	51	52	0.000
		% within listening pattern	1.9%	98.1%	100.0%	
	without hand free	Count	97	1	98	
		% within listening pattern	99.0%	1.0%	100.0%	
Total	Count	98	52	150		
	% within listening pattern	65.3%	34.7%	100.0%		

**Discussion**

As the popularity of personal listening devices are increasing, young population of Hyderabad district (Pakistan) are putting their hearing at risk. This threat is increasing day after day because they are not aware of the threat they are facing. This study was conducted to produce awareness among the young population. The result of the study was compared to studies conducted worldwide.

This study revealed that participants who were exposed to noise were suffering from hearing loss (52%). The result was similar to result derived by Hannah Keppler *et al* in 2015. A study conducted by Adam Dudarewicz in 2015 revealed that there was a strong association between music noise and hearing loss which was quite similar to the present study. In a study conducted by Jenica Su-ern Yong in 2015 derived a similar result. Another study conducted by A. Di Stadio in 2017 showed that 80-90% participants were suffering from hearing loss that were exposed to music noise. This higher ratio of hearing loss is most probably because that study was conducted on orchestra musician where they are exposed to very high tone and multiple frequency of music. This study revealed that tinnitus is associated with

hearing loss in participants who were exposed to music noise for longer time period. This result was quite similar to result derived by Débora Lüders *et al* in 2016. In a study conducted by Debora Luders 2016 concluded 19.8% participants were suffering from tinnitus which was a bit higher than the present study which discovered 13% tinnitus in participants. This difference was because the participants of Debora study were exposed to higher intensity of noise. The present study revealed that extend of exposure was directly proportional to hearing loss which was quite similar to study conducted by Dana N in 2015 and Hannah Keppler in 2015.

**Conclusion**

The present study concluded that music noise damages the hearing of youth when they exposed them to higher level of noise for a prolonged time. Age and gender has no close association with hearing loss. Increased intensity of noise and prolonged exposure has a close association with the hearing loss. Tinnitus is a second disorder that complicates hearing loss. Tinnitus usually occurs after prolonged exposure both in term of intensity and extends of exposure.

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