Original Article

Association of Cigarette Smoking with Hearing Loss in Young Male Adults of Hyderabad, Pakistan

Shakil Ahmed Shaikh, Zulfiqar Ali Laghari, Salma Farrukh Memon, Muhammad Ali Bhatti

ABSTRACT

OBJECTIVE: To evaluate the effects of cigarettes smoking on hearing loss in young adult's aged ≤ 35 years.

METHODOLOGY: This cross-sectional research was carried out in the ENT department of Combined Military Hospital Hyderabad. The hearing loss was assessed by Audiometry, Whisper test, Rinne's test and Webbers test. The young healthy adults with no known history of exposure to extreme noise were included. All the participants which had any type of infections or any otic injury were excluded from study. The audiometry was performed on the audiometer MAICO-MA39 (Berlin Germany) at Combined Military Hospital Hyderabad.

RESULTS: In this study, 148 apparently healthy participants were selected, out of 148, 73 were smokers and 75 were nonsmokers. The age of the participants ranged between 20 to 35 years with the mean age of smokers 28.99±3.731, and nonsmokers 28.00±4.451 non-smokers. The data collected indicate significantly higher prevalence of hearing loss in smokers 49.31%, P < 0.01 than in non-smokers (30.66%). Age of smokers was positively correlated (r = 0.427, P < 0.01) with hearing loss. Frequency of cigarettes smoked per day was positively correlated (r=0.715, P < 0.01) and year of smoking was also positively correlated with hearing loss (r = 0.620). The correlation of frequency of cigarette smoking and duration of smoking with hearing level was extremely significant (P < 0.01).

CONCLUSION: These findings suggest that cigarette smoking is associated with hearing loss in young adults; this study will be helpful in making public health policies.

KEY WORDS: Hearing Loss, Cigarette Smoking

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INTRODUCTION

Hearing loss is the major cause of public health concern, affecting millions irrespective of gender and health around the world[1,2]. The outcome of untreated hearing impairment incorporate decrease wellbeing related personal satisfaction in population, increasing the risk of occupational and non-occupational injuries and hearing ability too[3]. The World Health Organization has assessed that there are around 360 million individuals with hearing loss across the world and hearing loss is the 15th greatest cause of the burden of disease as disability adjusted life years (DALYs) in both genders and all ages[4]. The factors associated with the hearing loss are increasing age[5], occupational noise[6], medication addiction[7], ear infections[8] and cigarette smoking[9].

Smoking is a major factor for a number of complications which include different types of cancers[10], cardiovascular disease[11], respiratory complications[12] gastric and duodenal ulcers[13] hearing impairment[9]. The mechanism of action has not been extensively studied except some studies which suggest cigarette smoking may also affect cochlear blood supply because it causes peripheral vascular changes, such as increased blood viscosity, and reduced available oxygen. These effects were identified in the etiology of cochlear lesions in laboratory animals and humans[14]. The recent statistics showed that the smokers are 70% more likely to develop some forms of hearing impairment than in non-smokers. The latest research demonstrated that the smokers are 70% more prone to build up a few types of hearing loss than in non-smokers. Age itself is a non-modifiable factor causing hearing loss, in older age group however, young adults might suffer hearing loss due to modifiable factors such as cigarette smoking[15]. Hearing loss has not been extensively studied in Pakistan, few studies have been reported from Pakistan indicating noise induced effects on hearing[16-18]. However, the data on effects of cigarette smoking on hearing is scarce, whereas cigarette smoking is common in all age groups particularly young adults[19-21].

The purpose of this study was to assess the hearing loss in smokers and nonsmokers in young healthy

adults residing in different areas of Hyderabad, Pakistan, who were not exposed to extreme noise and did not have any secondary infection.

METHODOLOGY

This cross-sectional research conducted from June 2016 to December 2016 in Hyderabad city of Sindh Pakistan. In this study, we included the participants having history of smoking not less than five years. In this study simple, random technique was used for data collection. The data was gathered through interview by structured questionnaire that include Socio demographic, education standard, medical screening, history of chronic illnesses, cigarette smoking history. Total 200 young adult smokers (n=100) and non-smokers (n=100) were randomly recruited from of Hyderabad city. After filling of interview based questionnaire, participants taking or with history of taking ototoxic medications, erythromycin, amino glycoside, quinoline anti-malarial, macrolide antibiotics, loop diuretics, platinum analog antineoplastics and acetylsalicylic acid, Participants suffering from repeated ear infections and discharge excluded. Subjects suffering from congenital ear deformity and all cases of conductive deafness excluded from research. Subjects with the history of hypertension, diabetes mellitus, participants who are already suffering from deafness and nerve deafness in family and on medication that impair hearing function were excluded from research.

Written and verbal consent was obtained from participants; all the queries of participants were addressed. Whisper test, Rinnie's test, Webbers test performed on all 200 subjects of both groups to exclude disorders e.g. ear trauma, infection, ear discharge, sensorinueral problems, conductive hearing impairment and any congenital deformity. The Audiometry performed on Audiometer MAICO-MA39 (Berlin Germany). The air conduction threshold measured and graph plotted on audiogram.

The collected data was analyzed on SPSS 16.0. Group variances were calculated. The p-value at <0.5 was set as significance level and at <.01 as extremely significant. Pearson chi square test and Pearson correlation, frequencies and percentage were calculated for qualitative and quantitative data.

RESULTS

Total 200 participants were randomly selected, however only 148 finally participated in the study, giving the response rate of 74%. The mean age of smokers was 28.99±3.731 and the mean age of nonsmokers was 28.00±4.451. Out of 148, 49.32% (n=73) were smokers and 50.68% (n=75) were non-smokers. The mean hearing level was higher in smokers (22.71±11.365 dB) than in non-smokers (15.91±7.374 dB).

Out of 73 smokers, 49.31% (n=36) had hearing loss, and 50.59% (n=37) had normal hearing, in non-smokers the hearing loss was 30.67% (n=23) and 59.33% (n=52) had normal hearing. The smokers group had significantly higher prevalence of hearing loss (p <0.01) than non-smoker group. According to Table II, the hearing loss was significantly higher in smokers, who smoked > 10 cigarettes a day that those who smoked ≤10 a day, similarly the smokers who had been smoking cigarettes for more than > 10 years had significantly higher prevalence of hearing loss than those had been smoking the cigarettes for ≤10 years.

According to Table III bivariate correlation analysis shows that Age of non-smoker was positively correlated (r=0.045) with hearing level, however, it was not statistically significant (p > 0.05). However, age of smoker was positively correlated (r =0.475 *P* < 0.01) with hearing level. Strong positive correlation with statistical significance (r =0.715) was found between frequency of cigarettes smoked per day and hearing level. Similarly, the duration of cigarette smoking was also strongly positive correlated (r =0.620) with hearing level. The correlation was statistically highly significant (p < 0.01).

TABLE I: HEARING LOSS IN SMOKERS AND NON-SMOKERS

Variables	Normal n (%) < 20 Db	Hearing Loss n (%) > 20 dB	X^2	p Value
Smokers	37 (50.68)	36 (49.32)	5.37	< 0.01
Non-smokers	52 (69.33)	23 (30.67)		

TABLE II: DISTRIBUTION OF PARTICIPANTS ACCORDING TO FREQUENCY CIGARETTES AND DURATION OF SMOKING

Variables	Normal n (%) < 20 dB	Hearing Loss n (%) > 20 dB	X^2	p Value
Frequency of Cigarettes				
≤ 10	30 (90.91)	3 (9.09)	38.98	< 0.01
>10	7 (17.50)	33 (82.5)		
Duration of Smoking (Years)				
≤ 10	37 (62.71)	22 (37.29)	17.8	< 0.01
>10	0 (00)	14 (100)		

TABLE III: THE BIVARIATE CORRELATION ANALYSIS BETWEEN THE AGE OF SMOKERS AND NONSMOKERS, FREQUENCY OF CIGARETTES AND DURATION OF SMOKING AND HEARING LEVEL

Variables	Pearson Correlation	p value
Age of Smokers	r = 0.427	<0.01
Age of Non-smokers	r = 0.045	>0.05
Frequency of Cigarette Smoking	r = 0.715	< 0.01
Duration of Smoking	r = 0.620	< 0.01

DISCUSSION

Hearing loss is considered to be major health concern, because more than 360 million of the world population is affected with hearing loss[22]. Hearing loss causes limited meaningful communications and social interactions in society that ultimately leads to reduced quality of life and reduce physical and cognitive impairment. In Public health, it is known that hearing loss is related to depression, diabetes, and dementia. Several studies have been published mainly focusing on synergistic effects of factors such as age and noise along with cigarettes smoking on hearing level. Smoking as an independent factor has not been extensively studied.

Consistent results indicate association of cigarette smoking and hearing impairment in this study. However, mechanism of action of cigarette smoking on hearing loss is not clear, so it is considered that cigarette smoking causes vasoconstriction of blood vessels which decreases blood supply to organ of corti and increases carboxyhaemoblobin that results in damage of hair cells.

The findings in this study suggest that smokers had higher prevalence of hearing loss than nonsmokers; similar findings had been reported from other studies[4,23,24]. The data we present here shows the lesser prevalence of hearing loss than other studies, which reported the hearing loss at 65.7% [23]. The lesser prevalence in our study might be due the fact that our study included the young healthy adults aged ≤ 35 years old, who had no known history of noise exposure and secondary ear infection. Although young age group was also reported to have hearing loss even at lesser cigarette smoking[25].

Our study also suggest that hearing can be affected in the young healthy nonsmoker adults at ≤ 35 years of age, this is in agreement with previous study which reported that hearing was affected as early as 35 years of age[26] and with each decade passed the age might affect hearing level in nonsmokers[23]. Strong positive correlation was found in our study between age of smokers and hearing level. Our results are in agreement with previous studies, which reported that combined effects of age and smoking might severely affect the hearing abilities[14,24,25,27,28]. The hearing loss in the young adults is alarming since it might affect the future life of these adults.

We report here that the frequency of cigarette smoking might cause the increase prevalence of hearing loss, several other studies also reported the higher frequency of cigarette smoking as the leading cause of hearing loss[4,23,24,29,30], however the difference between the sub groups have been found non-significant in the study carried out in Bangladesh population[27], similarly we have also shown that as the frequency of cigarette smoking increases the hearing loss increase. In addition to the frequency of cigarettes smoking, we also report that duration of smoking as the factor for hearing loss as has been reported in other studies[23,31-33]. It was reported, that 100% of the smokers who smoked for more than 20 years have hearing loss, similarly, we also report here that those who smoker for more than 10 years have hearing loss. Several other studies also reported the similar results[4,27,34]. This suggests that hearing can be affected with both frequency and duration of cigarette smoking. The mechanism of action of effects of cigarette smoking on hearing impairment has not been properly understood and needs further investigation in the future.

CONCLUSION

Evidence suggests that hearing loss is associated with number of cigarettes smoked per day and duration of cigarettes smoking per day in young male adults. However, cigarette smoking has a weak association in this age group of study.

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AUTHOR AFFILIATION:

Dr. Shakil Ahmed Shaikh
Department of Physiology
CMH Hyderabad, Sindh-Pakistan.

Dr. Zulfiqar Ali Laghari
Professor, Department of Physiology
University of Sindh Jamshoro, Sindh-Pakistan.

Dr. Salma Farrukh Memon *(Corresponding Author)*
Associate Professor, Department of Physiology
Liaquat University of Medical and Health Sciences
Jamshoro, Sindh-Pakistan.
Email: memon_salma@hotmail.com

Dr. Muhammad Ali Bhatti
Combined Military Hospital Hyderabad, Sindh-Pakistan.