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Are Younger Adults at Risk of Lifestyle Induced Hearing Loss?

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Abstract

From the previous literature it was observed that modern lifestyle habits among youngsters are risk factors for hearing loss. So, there is a need to investigate the risk of early "Lifestyle Induced Hearing Loss" among younger adults. The present study aimed to investigate the risk of early "Lifestyle Induced Hearing Loss" among younger adults. Lifestyle Induced Hearing Loss Risk Questionnaire (LIHLRQ) was developed and administered among 412 university students in the age range of 17 to 25 years. There are 28 questions in LIHLQ, categorized fewer than three sections i.e, Noise Exposure (NE), Lifestyle and Auditory Health Belief (LAHB) and Ear related Medical History (ERMH). Among a total of 412 participants in the present study, only 1.21% falls under no risk category, whereas 54.61% and 39.56% falls under mild and moderate risk category respectively. The percentage of population falls under high risk was 4.61%. Kruskal Wallis test revealed significant difference across groups ($p<0.05$). Spearman's correlation revealed strong significant correlation between NE and LABH. Similarly, strong significant correlation seen between LABH and ERMH. Results of the present study revealed a significant difference among the four groups with respect to LIHQ score. It can be concluded from the results that the rise in scores across subcategories (i.e. NE, LABH and ERM) corresponds to the significant upward shift in risk for hearing loss. The finding of present study showed an urgent need to educate younger adults at risk of hearing loss. The outcome of present study showed that most of the participants were at risk of hearing loss.

Keywords: Lifestyle; Hearing Loss; Noise

Introduction

Young adults may expose themselves to modern lifestyle habits without any regard to the consequences they may face as adults. Studying and working in noisy environment, playing noisy instruments, living in noisy area, listening to loud music, regularly talking over phone, regular visit of the music concert, regular riding of bike or car are few of the major lifestyle among youngster which can put them at risk of noise induced hearing loss [1]. Smoking, drinking, drug addiction, lack of awareness about hearing protection devices and noise induced hearing loss are the other common risk factors in these populations. Noise induced hearing loss is a noteworthy public and social health problem. Ample of the efforts to reduce the risk of Noise Induced Hearing Loss (NIHL) have focused on adults. Noise induced hearing loss among children and adults has been connected to recreational noise and leisure activities [2,3]. A study done by Mizoue et al. [4] reported that smoking can be a risk factor for high frequency hearing loss, and its combined effect on hearing with exposure to occupational noise is additive. In another study by Curhan et al. [5] concluded that higher body mass index and larger waist circumference due to inappropriate diet chart are associated with increased risk of hearing loss in women. Halevi et al. [6] investigated self-assessment of hearing loss in among professional pop/rock/jazz musicians. The outcome of their study showed that greater musical experience was positively linked to higher hearing thresholds. Marmut et al. [7] reported that chances of tinnitus were 13 times higher among drug addicts compared with non-drug users. From the previous literature it can be concluded that modern lifestyle habits among youngsters are risk factors for hearing loss [2-6]. So, there is a need to investigate the risk of early "Lifestyle Induced Hearing Loss" among younger adults. The present study aimed to investigate the risk of early "Lifestyle Induced Hearing Loss" among younger adults.

Materials and Methods

In the present cross sectional questionnaire based study, Lifestyle Induced Hearing Loss Risk Questionnaire (LIHLRQ) was developed and administered among university students. The objective of present study was to investigate the risk of early "Lifestyle Induced Hearing Loss" among university going students.

Participants

Present study includes 412 university students (205 males and 207 females) in the age range of 17 to 25 years (mean=19.40, SD=1.43). Random sampling method was used to recruit participants. Participants with no complaints or history of any neurological and psychological deficit were included in the study. All the participants were having good socio-economic status with minimum qualification of senior secondary level and proficiency in English language.

Test material

The closed set, Lifestyle Induced Hearing Loss Risk Questionnaire (LIHLRQ) was compiled in English language. The questions were selected from previous studies done by researchers working in similar area [1,2,8]. The questionnaire with 28 questions was categorized into three sections i.e. Noise Exposure (NE), Lifestyle and Auditory Health Belief (LAHB) and Ear Related Medical History (ERMH). NE section had nine questions related to noise exposure and use of hearing protection device. All questions of NE section were having three forced choice responses i.e. yes, no and sometimes. LAHB section was having 11 questions, related to lifestyle and auditory health belief. Similar to NE section, LAHB section also had three forced choice responses i.e. yes, no and sometimes except two questions. ERMH section consisted 8 questions with two forced choice responses i.e. yes and no. Tables 1, 2 and 3 show questions of NE, LAHB and ERMH respectively.

Procedure

University students were approached by two qualified audiologist of the study and were requested to participate in the study. Oral

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S. No.	Noise exposure	Yes	No	Sometimes
1	Do you regularly study/work in noisy environment			
2	Do you regularly play/work on a noisy instrument			
3	Do you live in noisy area			
4	Do you regularly listen to loud music on earphones/TV/headphone			
5	Do you regularly talk over phone (more than 3 hours in a day)			
6	Do you regularly visit musical concert/pub			
7	Do you regularly ride a bike/car			
8	Do you regularly attend dance/musical band			
9	Have you ever used the Hearing protection device (HPDs)			

Table 1: Questions related to noise exposure.

S. No.	Lifestyle and auditory health belief	Yes	No	Sometimes
10	Do you smoke			
11	Do you consume alcohol			
12	Do you consume illicit drugs			
13	Do you practice swimming			
14	Do you speak very softly			
15	Do you speak loudly			
16	Do you have trouble hearing when speak softly			
17	Do you have trouble hearing on the telephone			
18	Do you have trouble hearing in cafeteria/ restaurant/group			
19	Are you aware of the harmful effect of noise on hearing			NA
20	Have you ever got your hearing checkup done			NA

Table 2: Questions related to lifestyle and auditory health belief.

S. No.	Ear related medical history	Yes	No
21	Do you have family history of hearing loss		
22	Have you felt ringing sensation in your ear's		
23	Have you felt ear fullness/blocking		
24	Have you felt dizzy while travelling		
25	Do you have history of ear discharge		
26	Do you have history of significant head injury		
27	Do you have history of migraine		
28	Have you consumed antibiotic medicines for longer period		

Table 3: Questions related to ear related medical history.

consent was taken from all the participants. Demographic information was collected from all the participants before administration of LIHRQ. Each participant was given a LIHLRQ in hard copy format. The questionnaire was administered under the close supervision of two audiologists. Participants were given 15-20 minutes of time duration to fill in all sections of LIHRQ.

Scoring and categorization

Grouping of participants was done into four categories based on their total LIHLRQ scores (cumulative scores of NE, LAHB and ERMH). The four categories were no Risk (score in the range of 0-6), mild risk (score in the range of 7-16), moderate risk (score in the range of 17-26) and high risk (score in the range of 27 and above). For each "yes" response, a score of '2' was assigned except for question number 9, 19 and 20 for which 0 is given for "yes" response. For "sometime" response a score of '1' was assigned except for question number 19 and 20 where "sometime" response option was not applicable. For every "no" response a score of 0 was given except for question number 9, 19 and 20 for which 2 is given for "no" response. The minimum and maximum score for present questionnaire was 0 and 56 respectively.

A scale is designed and implemented in this study to categorize all the participants into four predefined groups. Group 1-No Risk: Consisted of participants with final score ranging from 0-6 (as three questions, Questions 9, 19 and 20 in the LIHLQ are related to knowledge/belief about NIHL, hearing protection devices and previous hearing evaluation. Rawool and Colligon-wayne [1] have reported no significant associations between hearing behavior and knowledge/beliefs about hearing loss. Group 2-Mild risk, consisted of participants with final score in the range of 7 to 16. Group 3-Moderate risk, had participants whose final score was falling in the range of 17-26 and finally Group 4-High risk, consisted of participants having final score in the range of 27 and above.

Results

The aim of the present study was to develop an Index of Lifestyle Induced Risk for Hearing Loss and to assess the efficacy of the same among University students. This was done in order to develop a tool to assess the risk for early acquired hearing loss among university students. The objective was also to classify the participants into groups and comparing the risk score between the groups of participants based upon LIHLQ. There are 28 questions in LIHLQ, categorized under three sections i.e., Noise Exposure (NE), Lifestyle and Auditory Health Belief (LAHB) and Ear Related Medical History (ERMH). The noise exposure section contains 9 questions, LAHB section has 11 questions and ERM section has 8 questions.

This LIHQ was administered on college students (n=412) of a private University in Haryana. Based on the total individual risk scores obtained, participants were divided among four categories highlighting their risk for developing hearing loss, Group 1=No risk (n=05), Group 2=Mild Risk (n=225), Group 3=Moderate Risk (n=163) and Group 4=High risk (n=19).

The data collected were subjected to statistical analysis using Statistical Package for the Social Sciences (SPSS) version 20.0 software. Descriptive statistics to obtain mean and standard deviation values for the scores on three sections of LIHLQ, studied for all groups of participants. Spearman's correlation analysis was carried out to see the correlation among three sections of the LIHLQ. Mann-Whitney U test was carried out to compare the performance of Groups 1, 2, 3, and 4. The results have been described under following sections i.e. ddistribution of participants in four groups, ccomparison of four groups based upon LIHLQ score and correlation among NE, LABH and ERM.

Distribution of participants in four groups

Among a total of 412 participants in the present study, only 1.21% falls under no risk category, whereas 54.61% and 39.56% falls under mild and moderate risk category respectively (Table 4). The percentage of population falls under high risk was 4.61% (Figure 1).

Mean and standard deviation across four groups in three sections

The mean and SD values obtained on NE, LAHB, and ERMH among four groups are depicted in Table 5. Kruskal Wallis test revealed significant difference across groups ($p<0.05$). Mann Whitney U test was done to see any significant difference in scores between the groups i.e., Groups 1,2,3 and 4. Mann Whitney U test showed significant difference

Group	1 (No risk) (n=5)	2 (Mild Risk) (n=225)	3 (Moderate Risk) (n=163)	4 (High Risk) (n=19)
Percentage	1.21%	54.61%	39.56%	4.60%

Table 4: Percentage of population in different groups.

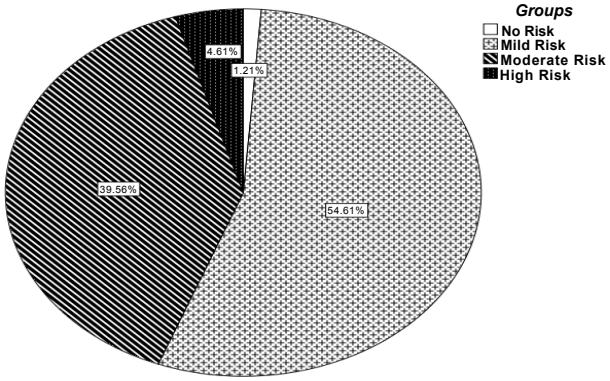

Figure 1: Pie chart depicting percentage of population **in different groups.**

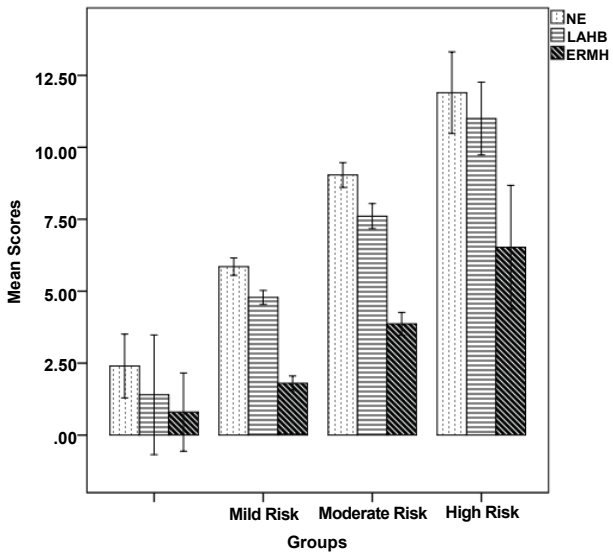

Figure 2: Mean and Standard Deviation (SD) values of scores for four groups of participants.

Groups	Group-1 No Risk (N=05)		Group-2 Mild Risk (N=225)		Group-3 Moderate Risk (N=163)		Group-4 High Risk (N=19)	
LIHLQ sections	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Noise Exposure	2.4	0.89	5.85	2.28	9.03	2.77	11.89	2.94
Lifestyle & Auditory Health Beliefs	1.4	1.67	4.78	1.86	7.6	2.81	11	2.62
Ear related Medical	0.8	1.09	1.8	1.91	3.86	2.55	6.52	4.46

Table 5: Mean and Standard Deviation (SD) Values of scores for four groups of participants.

between Group 1 and 2 for NE [Z=-3.22, p<0.01] and LAHB [Z=-3.20, p<0.01]. Whereas, Mann Whitney U test revealed no significant difference between Group 1 and 2 for ERMH [Z=-1.15, p>0.05]. Similarly, Mann Whitney U test showed significant difference between Group 1 and 3 for NE [Z=-3.75, p<0.01], LAHB [Z=-3.68, p<0.01], ERMH [Z=-2.68, p<0.01]. In a similar way, Mann Whitney U test showed significant difference between Group 1 and 4 for NE [Z=-3.40, p<0.01], LAHB [Z=-3.40, p<0.01] and ERMH [Z=-2.85, p<0.01]. Mann Whitney U test showed significant difference between Group 2 and 3 for NE [Z=-10.79, p<0.001], LAHB [Z=-10.41, p<0.001] and ERMH [Z=-8.07, p<0.001]. Comparison of group 2 and 4 on Mann Whitney U test showed significant difference for NE [Z=-6.55, p<0.001], LAHB [Z=-6.84, p<0.001] and ERMH [Z=-5.23, p<0.001]. Lastly, the result from Mann Whitney U test showed significant difference for NE [Z=-3.83, p<0.01], LAHB [Z=-4.64, p<0.01] and ERMH [Z=-2.61, p<0.01]. Graphical representation of mean scores and SD has also been shown in Figure 2.

Correlation among NE, LABH and ERMH

Spearman's correlation was investigated to check correlation among NE, LABH and ERMH. Spearman's correlation revealed strong significant correlation between NE and LABH (r=0.69, p<0.001). Similarly, strong significant correlation seen between LABH and ERMH (r=0.62, p<0.05). Whereas, no correlation was observed between NE and ERMH (r=0.07, p>0.05).

Discussion

The aim of the present study was to develop an Index for Lifestyle Induced Risk for Hearing loss and to assess the efficacy of the same among University students. This was done in order to develop a tool (LIHLQ) to assess the risk for early acquired hearing loss among university students. The objective was also to classify the participants into four different groups (no risk, mild risk, moderate risk and high risk) and to see the correlation among NE, LABH and ERM.

The outcome of the current study showed that almost half of the total young participants were at mild risk of lifestyle induced hearing loss and approximately 40% of the participants were at moderate risk of lifestyle induced hearing loss. The findings of present study are in consonance with previous literature reported risk of hearing loss due to current lifestyle of youth [2-6]. The outcome of the present study showed younger adults at risk of lifestyle induced hearing loss. A study done by Rabinowitz [9] reported that hearing loss caused by exposure to recreational and occupational noise results in devastating hearing disability that can be preventable. Analyzing the data of 4,083 people aged between 53 and 67, investigators from the University of Antwerp found that smoking and being overweight ranked alongside occupational noise as putting people at risk of hearing loss. According to Goman et al. [10] the number of adults in the United States 20 years or older with hearing loss is expected to gradually increase from 44.11 million in 2020 to 73.50 million by 2060. Curhan et al. [5]

also reported that modern lifestyle eating habit leads to higher body mass index (BMI), larger waist circumference, and lower physical activity have been associated with poorer hearing. Finding of their study provided evidence that maintaining healthy weight and staying physically active, potentially modifiable lifestyle factors, may help reduce the risk of hearing loss. Dewas et al. [11] demonstrated that smokers were more likely to have a hearing loss than non-smokers. They also found that among non-smokers, those who reported passive exposure to tobacco smoke were more expected to have a hearing loss. Researchers concluded that lifestyle factors may lead to the risk of hearing loss among youth. Another study done by Curhan et al. [12] reported that higher consumption of fatty acid can cause hearing loss on women. Russo et al. [13] reported hearing loss in youth playing orchestra. Recently, Olsen et al. [14] reported that college musicians exhibit greater declines in hearing than the general population and are at risk because they rehearse and perform daily in loud environments.

Noise induced hearing loss is a noteworthy public and social health problem. Ample of the efforts to reduce the risk of Noise Induced Hearing Loss (NIHL) have focused on adults. Acquaintance to loud music, among adolescent, is a major area of concern. Nowadays, youth expose themselves to loud music for longer duration of time and they are not aware of harmful consequences. Noise induced hearing loss among children and adults has been connected to recreational noise and leisure activities [2,3]. A study done by Lee et al. reported that continuous use of ear phones for 3 to 4 hours can cause 10 dBHL increase in the hearing threshold [15]. Regular use of portable entertainment player such as cell phone, can damage hearing [16]. Nowadays in society, adolescent use earphone not only for listening to music but also for abolishing the environmental unwanted noise and to make themselves indulge in listening music to avoid surrounding cocktail noise. Listening to loud music for longer duration of time with portable entertainment player not only cause hearing loss but also to ear infection, dizziness, fatigue ear, ear pain and tinnitus [3].

Present study showed significant difference between group 1 (no risk) and 2 (mild risk) for NE and LAHB which reveals that lifestyle of population under no risk is significantly different from the population under mild risk. The outcome of the present study showed no significant difference between group 1 (no risk) and 2 (mild risk) for ERMH. Similarly, significant differences seen between population under no risk and population under moderate risk. The finding of the present study showed significant difference between population under mild and moderate risk in all three components i.e. NE, LAHB and ERMH. Spearman's correlation revealed strong significant correlation between NE and LABH which shows that population under high noise exposure also has poor lifestyle and poor auditory health belief. Correlation between the score of the questionnaire and audio logical finding was not done can be the major limitation of the present study. The questionnaire used in the present study need validation in future studies.

Conclusion

Results of the present study revealed a significant difference among the four groups with respect to LIHQ score. It can be concluded from the results that the rise in scores across subcategories (i.e. NE, LABH and ERM) corresponds to the significant upward shift in risk for hearing loss. The finding of present study showed an urgent need to educate younger adults at risk of hearing loss. The outcome of present study showed that most of the participants were at risk of hearing loss.

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