



ORIGINAL ARTICLE

Frequency of noise induced hearing loss and its association with anxiety in textile mill workers.

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ABSTRACT... Objective: To find out frequency of noise induced hearing loss and its association with anxiety in textile mill workers. **Study Design:** Analytical Cross-sectional study. **Setting:** Master Textile Mill's Spinning and Weaving Units. Pvt. Ltd. Lahore. **Period:** December 2019 to May 2020. **Material & Methods:** An analytical cross-sectional study was conducted on 125 textile mill workers with non-probability purposive sampling having 5 to 10 years working experience in spinning and weaving units of age 25 to 40 years (males). Data was collected by performing Otoscopy, tympanometry and pure tone audiometry in noise-controlled room and BAI, analyzed and evaluated with the help of statistical package for social sciences version 25.00. Pearson chi square was used and P value was equal or less than 5% was taken as significant. **Results:** Total number of 125 (100%) were tested to check their hearing levels by standard pure tone audiometry. Out of 125(100%) 14(11.2 %) were with normal hearing, 28(22.4%) with mild hearing, 36(29%) with mild to moderate hearing, 34(27%) with moderate hearing, 12(10%) with moderately severe hearing and 1(0.8%) with severe hearing levels. Out of 125(100%) 50 (40%) were diagnosed with low level of anxiety, 43(34%) were with moderate level of anxiety and 32(26%) were with severe level of anxiety in all the participants working in the textile mill. **Conclusion:** It is concluded that the mill workers are on the risk of developing hearing loss of different severity levels which also cause anxiety to them.

Key words: Anxiety, Carhart Notch, Noise Induced Hearing Loss, Occupational Noise, Pure Tone Audiometry.

INTRODUCTION

Hearing impairment is a natural ageing as well as the most common reason of disability in the world. Around 1 in 4 adults at 45 years of age have medium or higher hearing loss.¹ 360 million people identified by the World Health Organization suffered from impaired hearing loss, around 5.3% of the population of the planet.² Anxiety is a widespread psychiatric illness affecting 350 million people worldwide. Hearing loss can increase the worsening of health quality of life and damaged hearing, which can lead to social behavior, anxiety, interpersonal vulnerability and conflicts for the affected individuals. Several cross-sectional studies have shown that anxiety in the elderly population triggers hearing loss independently. Some studies have, however, reported contradictory findings.⁴ The clear correlation between hearing loss and anxiety in

adults of all ages in the United States was confirmed by a nationwide survey. Hearing impairment was the 13th most important contributor to the global disease burden in 2002 and is estimated to contribute ninth worldwide and seventh in high-income countries by 2030.⁵ 12.7% of people over the age of 12 are reported to be impacted in the United States alone. Considering the importance of global and national hearing loss, it is important to recognize its social effects.⁶

Hearing damage due to workplace noise sensitivity leads to a crippling handicap that is nearly 100% preventable. The second most frequent source of sensorineural Hearing loss is a noise-induced loss of hearing. Excess noises pose a global health hazard to the workplace, including noise caused hearing loss (NIHL), with significant social and physiologic consequences.⁷

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Excessive noise is an omnipresent occupational risk with many negative effects, including high blood pressure reduction, sleep discomfort, irritation and stress, tinnitus, NIHL, and transient threshold increase.⁸ Among these, NIHL's most significant health impact is caused by permanent damage to sensitive inner ear hearing systems. NIHL normally requires the frequency (pitch) spectrum human voices and thus interferes with the words spoken.⁹ Sharp forces from any sound affect the stereocilia of the cochlea basil membrane's hair cells, and can cause cell death by excessive forces.¹⁰ Avoiding noise exposure avoids additional damage. Hearing loss for adults was described as 15th gravest health problem in the world," with profound consequences ranging from social division and individual stigmatization to severe national economic burdens.¹¹ An estimated 120 million to 360 million people worldwide have been affected by hearing loss.¹² Noise is the pervasive cause of all industrial toxins which affect all industries in all countries of the world and cause severe hearing problems. The major preventable cause of irreversible hearing loss is excessive noise exposure.¹³

In the nation, 16 per cent of the affected hearing loss in adults in the different sub-regions is due to workplace noise. In developed countries, the average noise burden differs between 0.2 and 2 percent of GDP. Human cochlea can perceive frequencies from 20 Hz to 20000 Hz, 125 Hz to 8000 Hz on audiometry called speech frequencies. High frequencies than middle and low frequencies have workplace noise consequences. Symmetrical bilateral Noise induced hearing loss (NIHL) is affecting typically the higher frequencies and then the lower frequencies of the noise (0,5k, 1k or 2k Hz). Failure to focus, irritate, tiredness, fatigue, sleep disturbances are other significant health consequences. The key industries that cause excessive noise and expose workers to harmful noise are textiles, printing, slag mills, mining, etc.¹⁴ Most of this condition can be caused by occupational noise exposure. Noise loss is a senso-neuronal hearing disorder, beginning at high frequencies (3000-6000 Hz) and increasing steadily because of the frequency of sound exposure. Although the losses are

typically symmetrical, sources such as arms or sirens may cause asymmetrical loss. The acute impulse noise exposure result is acoustic shock, a related condition. The main cause of hearing issues is the excessive noise tolerance. There is an approximate risk of noise-induced hearing disorders for up to 500 million people worldwide.¹⁵

The main goal of this study is toward establishing the relation among hearing loss caused by noise and anxiety. Noise is a leading cause of hearing damage. The noise-induced hearing loss and association with anxiety exists in unusual local literature and literature. In Pakistan, relatively little attention was paid to hearing loss caused by noise and its effects. In Pakistan, noise psychological problems have always been ignored. The association between anxiety and hearing loss must therefore be acknowledged. This research was therefore designed to fill this literature void and to find local data on noise level and its anxiety relation.

MATERIAL & METHODS

This analytical cross-sectional study was carried out in Master textile mill's spinning and weaving units Pvt. Ltd. Lahore for a period of six months from December 2019 to May 2020. Total 125 workers participated in this study. Non-probability sampling technique was applied. All male workers having 5 to 10 years of working experience between the age range of 25 to 40 years were included in this study. All others cases of co morbidities which can result hearing loss and anxiety were excluded from the study. Otoscope, Tympanometry, Standard Pure tone audiometer and Beck anxiety inventory were used for assessment. Otoscope is an instrument by which we examine the outer and middle ear to rule out any kind of ailment while Tympanometer is an instrument which is used to check the middle ear status i.e middle ear pressure, compliance and ear canal volume. And audiometer is an instrument which is used to determine the degree and type of hearing loss. Data was collected by performing Otoscopy, tympanometry and pure tone audiometry in noise-controlled room, analyzed and evaluated with the help of statistical package for social sciences version 25.00.

Pearson chi square was used and P value was equal or less than 5% was taken as significant. Ethical approval was taken from the Institutional Review Board (IRB-UOL-FAHS/678/2019).

RESULTS

Table-I shows Total number of 125(100%) were tested to check their hearing levels by standard pure tone audiometer. Out of 125 14(11.2 %) were with normal hearing. 28(22.4%) with mild hearing levels, 36(29%) with mild to moderate hearing levels, 34(27%) with moderate hearing levels, 12(10%) with moderately severe hearing levels and 1(0.8%) with severe hearing levels. As results are showing that out of 125(100%) 111(86%) were diagnosed at some level of hearing loss variance in percentage and severity and only 14(11%) of 125(100%) had normal hearing so there is a strong influence of noise in developing noise induced hearing loss in textile mill workers. Out of 125(100%) 50 (40%) were diagnosed with low level of anxiety, 43(34%) were diagnosed with moderate level of anxiety and 32(26%) were diagnosed with severe level of anxiety. All the participants working in the textile mill were facing some level of anxiety variance by the degree and percentage depending upon their degree of hearing loss.

Option	Frequency	Percent
Normal	14	11.2
Mild	28	22.4
Mild-Moderate	36	28.8
Moderate	34	27.2
Moderate-Severe	12	9.6
Severe	1	.8
Total	125	100.0

Table-I. Frequency of degree of hearing loss.

Figure-1 shows that Out of 125(100%) 50 (40%) were diagnosed with low level of anxiety, 43(34%) were diagnosed with moderate level of anxiety and 32(26%) were diagnosed with severe level of anxiety. All the participants working in the textile mill were facing some level of anxiety variance by the degree and percentage depending upon their degree of hearing loss.

Table-II shows that Total sample consisted of

125 individual in whom there were 41 individuals have 5-6 years' working experience majority of the individual (10) were in the moderately severe range (9) individuals were in moderate hearing loss range (8) in mild to moderate range and (8) in mild range and only (5) in normal range and individuals have 7- 8 years working (56) in which majority of individuals (16 + 16) were in mild to moderate and moderately severe range respectively (5+5) in mild and normal range and only (4) in in severe range, (24) Individuals have more than 8 years working experience in whom (6) individuals were in moderate range, (5) in severe range, (2) in mild range and (4+4) in normal and mild to moderate range respectively. Chi square shows there is no correlation in working experience and hearing loss.

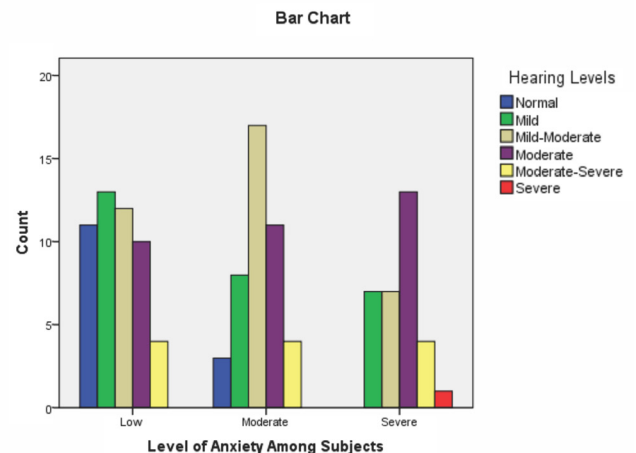


Figure-1

Table-III shows that 125 individual in whom there were 42 individuals have 5-6 years' working experience majority of the individual (19) were in the moderate level of anxiety (16) individuals were in low level of anxiety (7) in severe range and (59) individuals have 7- 8 years working experience in which majority of individuals (29) were in low level of anxiety (17) individuals have severe level of anxiety and (5) individuals have low level of anxiety, (24) Individuals have more than 8 years working experience in whom (42) individuals were in moderate level of anxiety, (32) have severe level of anxiety and (50) individuals have low level of anxiety. Chi square results shows there is strong correlation in working experience and level of anxiety as the level of significance is

0.026.

Table-IV shows to determine the association between anxiety and noise induced hearing loss in textile mill workers Pearson Chi square was used. P value was calculated as .039 which is less than 5% which shows that results are significant. Out of 50 individuals with low level of anxiety 11(78.6%) have normal hearing level, 13(46.4%) mild degree, 12(33.3%) mild to moderate, 10(29.4%) moderate, 4(33.3%) moderately severe hearing level. Out of 43 Individuals having moderate level of anxiety 3(21.4%) have normal hearing, 8(28.6%) mild hearing level, 17(47.2%) in mild to moderate range, 11(32.4%) in moderate range, 4(33.3%) moderately severe hearing level range and out of 32 individual having severe level of anxiety 7(25.0%) individuals have mild hearing

loss, 7(19.4%) mild to moderate range, 13 (38%) in moderate hearing level range, 4 (33.3%) in moderately severe range and only 1 in severe hearing loss range.

DISCUSSION

An analytical cross-sectional study was conducted on a group of 125 textile mill workers. They were evaluated clinically, audio logically and interviewed personally to fill Beck Anxiety Inventory developed by Beck in 1988 in a journal of consulting and clinical psychology, 56,893-897. To our knowledge this scale was moderately correlated with the revised Hamilton rating scale (0.51) and mildly correlated with the Hamilton Depression scale.

Experience of the mill workers	Hearing Loss in Both Ears						P-Value
	Normal	Mild	Mild-Moderate	Moderate	Moderate-Severe	Severe	
5-6 years	5	8	8	9	10	2	.324
7-8 years	5	5	16	13	16	4	
more than 8 years	4	2	4	6	3	5	
Total	14	15	28	28	29	11	

Table-II. Experience of the mill workers * Hearing Loss in Both Ears Cross tabulation.

Experience of the mill workers	Level of Anxiety Among Subjects				P-Value
	.00	Low	Moderate	Severe	
5-6 years	0	16	19	7	0.026
7-8 years	0	29	13	17	
more than 8 years	1	5	10	8	
Total	1	50	42	32	

Table-III. Experience of the mill workers * Level of anxiety among subjects cross tabulation.

Level of Anxiety Among Subjects		Hearing Levels						Total	P-Value
		Normal	Mild	Mild-Moderate	Moderate	Moderate-Severe	Severe		
Low	Count	11	13	12	10	4	0	50	0.039
	Hearing Levels	78.6%	46.4%	33.3%	29.4%	33.3%	.0%	40.0%	
Moderate	Count	3	8	17	11	4	0	43	
	Hearing Levels	21.4%	28.6%	47.2%	32.4%	33.3%	.0%	34.4%	
Severe	Count	0	7	7	13	4	1	32	
	Hearing Levels	.0%	25.0%	19.4%	38.2%	33.3%	100.0%	25.6%	

Table-IV. Level of anxiety among subjects *Hearing Levels.

In a previous study which was titled as “Moderate Effects of Hearing Loss in Mental Health and Subjective well-being”.¹⁶ The purpose of the study was to estimate effects of hearing loss on symptoms of anxiety, depression, self-esteem and subjective well-being. In this study a normal population sample of 50398 subjects of age 20 to 101 years in nord-trondelag completed audiometric tests and questionnaire. The association between hearing loss and mental health was assessed with multiple linear regression analysis controlling for social background variables. Results shows effect of hearing loss were mostly significant but moderate in strength. Effects were stronger among young 20 to 44 years and middle age 45 to 64 years than among older 65 plus years. Loss of high and middle frequency of hearing had no effects on mental health measures if low frequency hearing was not also impaired the strongest observed effects was a change of 0.1 SD in mental health per 10dB hearing loss. It was concluded that hearing loss is associated with substantially reduced mental health rating among some young and middle age persons but usually does not affects mental health much among older persons.¹⁷

This study shows an association of mental health (anxiety, depression and stress) with hearing impairment. Present study also based on the purpose to find out the frequency of noise induced hearing loss in textile mill workers and to find out correlation between severity levels of anxiety (a substantial part of mental health) with severity levels of noise induced hearing loss.¹⁸ In this study the severity of hearing loss increases from normal hearing to profound hearing loss and it is significantly correlated with the severity of anxiety starting from low, to severe considering P value less than 5. Textile mill workers of age 25 to 40 years working in noisy environment have more exposure to noise due to work environment which can lead to develop noise induced hearing loss of different severity levels assessed by Audiological evaluation along with the hearing loss they also develop some level of anxiety (low to severe) which affects them in terms of anxiety symptoms like Numbness, Hotness, fear, anger, which were assessed by interviewing them by Beck anxiety

inventory which shows a significant correlation between developing hearing impairment ranging from normal to profound level of Noise induced hearing and levels of anxiety as shown in Table-I,III in results.¹⁹ Present study advocated the previous study titled as “Moderate Effects of Hearing Loss in Mental Health and Subjective well-being” that there is an association between Mental health and hearing impairment and it also justify the objectives that there is greater frequency of noise induced hearing loss in textile mill workers and there is significant correlation between Noise induced hearing loss and anxiety in textile mill workers.²⁰

The study conducted that noise is a genuine word related to health risk in the material production line which was contemplated. The significant hazard factors for NIHL were the term and the degree of noise introduction. This relationship is like that saw in past investigations in Thailand and Egypt The higher disorder levels in the weaving and spinning areas, reflected in higher disorders of NIHL among laborers in those segments, have likewise been reported by past investigations in different nations. Despite the fact that the rejection measures are the equivalent with different examinations and permit equivalence of discoveries, they can possibly cause underestimation of the NIHL level. The “solid laborer impact” could likewise be associated with causing underestimation of the NIHL level since there is no efficient wellbeing administrations for word related medical issues in the manufacturing plant. This implies laborers experiencing serious hearing misfortune may have left the production line, leaving moderately solid specialists in the industrial facility. In which case, the NIHL gauge from a cross-sectional study would think little of the genuine greatness of the issue. This proposes the real NIHL level could be higher than what was seen in this examination. Weavers and spinners in the production line were presented to average degrees of disorder over 85 dB(A), as far as possible worth set by numerous mechanical nations in Europe and Joined States (17) just as in some African nations, including Zimbabwe (19) and Kenya (20). The noise level of about 100 dB (A) in the weaving segment is practically identical

to the 99.5 dB (A) level estimated in weaving areas of material factories in Asmara (9), 102.5 dB (A) in Hong Kong (18), 101.3 dB(A) in Thailand (17), 100 dB(A) in Egypt (16,21), and 99-102 dB(A) in a jute weaving factory in the UK (22).²¹

Based on the study findings, application of hearing conservation program through expansion and enforcement of regulations to identify and monitor occupational risk groups, and restriction of importation of equipment which emits dangerous levels of noise are recommended.²² In addition, engineering modifications of buildings and machinery to reduce noise levels, and promotion of safety and health programmes, including promotion of workers' awareness on self-protective measures, such as the use of personal protective device (PPD), should be considered.^{23,24}

CONCLUSION

The findings of the study support my argument by statistical data. The mill workers are on the risk of developing hearing loss of different severity levels which also cause anxiety to them. It can highly affect their interpersonal, social, and professional life.






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3	Tahira Ashraf	Discussion.	
4	Waris Ali	Data Collection.	
5	Ambreen Sadaf	Statistical Analysis.	
6	Taimoor Hassan	Statistical Analysis, Final Editing & review.	