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3 **Tinnitus related handicap in daily living among Pakistani**
4 **population – a multicenter study**

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12
13 **Abstract**

14 **Objective:** To determine the impact of tinnitus-related handicap on daily living
15 of tinnitus sufferers and factors associated with tinnitus severity.

16 **Methods:** The cross-sectional study was conducted from November 2016 to
17 April 2017at Al-Nafees Medical College Hospital, Islamabad, Capital
18 Development Authority Hospital, Islamabad, Lahore General Hospital, Lahore,
19 Bahawal Victoria Hospital, Bahawalpur; and Wassay Ear Nose Throat Clinic,
20 Muzaffarabad, Pakistan. Tinnitus patients of either gender aged 15-75 years
21 were included. Detailed history was taken and examination was conducted. Data
22 was collected using the Tinnitus Handicap Inventory, and was analysed using
23 SPSS 21.

24 **Results:** of the 152 patients, 87(57.20%) were males. The overall mean age was
25 44.10+16.06 years. Tinnitus was severe in 53(34.87%), while catastrophic
26 severity was noted in 26(17.10%). Cases with hearing loss and male gender
27 suffered significantly more in daily life activities ($p<0.05$). Severity of tinnitus
28 handicap was associated with the type of tinnitus sound ($p<0.05$).

29 **Conclusion:** Gender, hearing loss and type of tinnitus sound were found to be
30 associated with the severity of the condition.

31 **Key Words:** Daily living, Quality of life, Tinnitus, Tinnitus handicap
32 inventory.

33

34 **Introduction**

35 Tinnitus, a phantom auditory sensation, is derived from Latin verb “tinnire”
36 meaning ‘to ring’¹. It is a symptom of some underlying disorder and can be
37 subjective or objective. Subjective tinnitus is commonly referred to as hissing,
38 buzzing, whistling, humming, crickets, blowing wind, running water or with
39 complex tonal characteristics. Its intensity varies from imperceptible to very
40 annoying level affecting the quality of life of the sufferers. The elderly affected
41 by tinnitus suffer concentration difficulty, frustration, despair and may have
42 abnormal behaviour, having significant impact on economy which can also
43 result in huge personal financial losses up to the tune of \$30,000 per annum ².

44 The prevalence of troublesome tinnitus increases with age, being 10-15%
45 among the adult population¹, with a higher prevalence (7.05%) in Europeans
46 and the lowest prevalence (1%) in Asians³. However, in India a prevalence of
47 7% has been reported⁴. The pathophysiological mechanisms of tinnitus are still
48 not well-defined⁴. Though traditionally considered to be of ontological origin, it
49 is now considered to have a neuronal origin ⁵. A number of risk factors are
50 implicated, including reduced hearing, ototoxic medications, head injury,
51 anxiety and depression⁶.

52 Tinnitus is an area requiring further research. With no standardised test for
53 diagnosis or presence of tinnitus, some subjective tests, like tinnitus pitch and
54 loudness matching, are used for evaluation in addition to a detailed history and
55 establishing the hearing status. Researchers and clinicians have developed
56 subjective tests with self-administered questionnaire to measure the impact of
57 tinnitus⁵. Tinnitus handicap inventory (THI) is a common tool used to screen for

58 tinnitus disability / severity and planning management, especially counselling⁷.
59 With limited treatment options, including counselling and cognitive behavioural
60 therapy, the development of new innovations in treatment targeting the brain are
61 being considered⁵.

62 Further research has been recommended by different authors, including
63 categorisation of individual tinnitus sensation and emotional and functional
64 issues that are associated with tinnitus⁸. The current study was planned to
65 determine the impact of tinnitus on daily living of tinnitus sufferers, and factors
66 associated with the severity of tinnitus handicap.

67

68 **Patients and Methods**

69 The cross-sectional study was conducted from November 2016 to April 2017 at
70 Al-Nafees Medical College Hospital, Islamabad, Capital Development
71 Authority (CDA) Hospital, Islamabad, Lahore General Hospital, Lahore,
72 Bahawal Victoria Hospital, Bahawalpur; and Wassay Ear Nose Throat (ENT)
73 Clinic, Muzaffarabad, Pakistan.

74 After approval from the advanced studies and research committee, Isra Institute
75 of Rehabilitation Sciences, Isra University Islamabad, the sample size was
76 calculated using Raosoft online calculator⁹ with 95% confidence level and
77 around 8% margin of error, taking population size as 20,^{3, 10} and 50% response
78 distribution. The sample was raised using non-probability convenience sampling
79 technique.

80 Those included were tinnitus patients of either gender aged 15-75 years.
81 Patients with inflammatory and obstructive lesions of the ear and vertigo and
82 those who could not understand the questions because of language barrier and
83 low intellectual abilities were excluded.

84 Data was collected using the THI English version⁷ related to handicap in their
85 daily life because of tinnitus. THI measures subjective severity of the tinnitus
86 handicap using the 25-item tinnitus handicap inventory scale¹¹. For each item

87 on the inventory, the participant responds with “yes” (4 points), “sometimes (2
88 points) or “no” (0 point). These responses are summed up, with the total score
89 ranging 0-100 points. Depending on the total score, the handicap caused by
90 tinnitus was categorised as slight, mild, moderate, severe and catastrophic.

91 Data was analysed using SPSS 21. Qualitative data, like gender, was presented
92 as frequencies and percentages, while age of presentation was expressed as
93 mean+standard deviation (SD). Chi-square test was used to find the associations
94 between categorical variables. $P < 0.05$ was considered statistically significant.

95

96 **Results**

97 Of the 152 patients, 87(57.20%) were males and 65(42.80%) females. The
98 overall mean age was 44.10+16.06 years. Hearing loss was found in
99 106(69.70%) cases (Table 1) And 45(29.6%) of the subjects were housewives
100 (Figure).

101 Severity was higher in males compared to females ($p=0.04$). Association
102 between age and tinnitus handicap score was significant ($p=0.007$). Significant
103 associations of tinnitus were also noted with hearing loss, and tinnitus sound,
104 while it was non-significant with the duration and site of tinnitus (Table 2).
105 More patients perceived tonal tinnitus than non-tonal tinnitus, but the
106 association was non-significant ($p=0.08$).

107

108 **Discussion**

109 A wide range of tinnitus handicap was noted, extending from a handicap score
110 of 0-16 (slight) in 6.58% to 78-100 (catastrophic) in 17.10%, with 51.9% cases
111 having severe to profound tinnitus handicap affecting daily life. Similar wide-
112 ranging results have been reported earlier^{7,12,13}.

113 The current study found that most patients (34.87%) had grade 4 severe degree
114 of tinnitus handicap. This was in line with a Saudi study¹⁴, but in contrast with
115 another study⁷. The possible reason of higher percentage of grade 4 tinnitus

116 handicap in the current study may be that most participants were suffering from
117 hearing loss, which is another additional handicap that affects the quality of life.
118 Some studies have shown higher prevalence in female patients⁴, while others
119 have suggested higher prevalence in male participants¹⁴. The possible reason of
120 higher prevalence in men may be that they are bread-earners exposed to
121 occupational noise more than women. The same was the case in the current
122 study. Another study¹⁵ reported that females were significantly more affected
123 by tinnitus stress, while still others^{7,12,16} reported a statistically non-significant
124 association with gender.

125 As regards age, studies^{12,16} did not find a significant association with THI score.
126 In contrast, a study reported that tinnitus increased with age³. The current also
127 found significant association ($p=0.007$) between age and tinnitus handicap
128 scores.

129 Literature^{4,14} has also reported significant association of tinnitus distress and
130 duration of tinnitus, but in the current study the association was not statistically
131 significant.

132 In the current study, whistling was the commonest tinnitus sound, and there was
133 significant association of tinnitus severity with the type of sound, with the
134 whistling sound having the maximum severity. In contrast, a study reported high
135 frequency of buzzing sound at 38%, followed by hissing sound (32%) and
136 whistling and combination of sounds at 28% each⁴. The significant association
137 of whistling with THI noted in our study could be due to the fact that whistling
138 is a high-pitch sound which is a source of annoyance compared to low-pitch
139 sounds.

140 Different studies also found that cases with more than one tinnitus sounds had
141 more catastrophic effect than a single sound^{4,7,8}. The current study did not find
142 any statistically significant difference in this regard.

143 Tinnitus cases feel depressed, unhappy, tense, irritable, annoyed, distressed and
144 frustrated⁴ and it affects quality of life as well as occupational performance^{12,17}.

145 A study⁷ noted no significant difference in THI score with unilateral or bilateral
146 tinnitus⁷, as was the case in the current study.

147 There was significant association between tinnitus and patients with hearing
148 loss in the current study which is in line with literature^{15,18,19}. In contrast, other
149 studies^{7,16} did not note any difference in THI score for cases with or without
150 hearing loss.

151 A study suggested that tinnitus is sub-auditory perception which increases in
152 silent ambient environment²⁰. We may suppose that having less work and
153 remaining longer time at home where auditory attention may possibly be more
154 relevant for increasing the annoyance of such a perception.

155 Being a self-funded project, the study could collect data only from two cities,
156 and also did not correlate THI with different degrees of hearing loss.

157

158 **Conclusion**

159 Gender, hearing loss and type of tinnitus sound were significantly associated
160 with the severity of tinnitus.

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162 **Disclaimer:** The text is based on an M.Phil. thesis.

163 **Conflict of interest:** None.

164 **Source of Funding:** None.

165

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 223 **Table 1: Demographic Data (n=152)**

Demographic Variable		Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	87	57.2	57.2	57.2
	Female	65	42.8	42.8	100.0
Age Group	15-20	11	7.2	7.2	7.2
	21-30	19	12.5	12.5	19.7
	31-40	43	28.3	28.3	48.0
	41-50	28	18.4	18.4	66.4
	51-60	23	15.1	15.1	81.6

	61-70	21	13.8	13.8	95.4
	>70	7	4.6	4.6	100.0
Area	Islamabad	59	38.8	38.8	38.8
	Rawalpindi	24	15.8	15.8	54.6
	Lahore	29	19.1	19.1	73.7
	Bahawalpur	20	13.2	13.2	86.8
	Kashmir	20	13.2	13.2	100.0
Education	Uneducated	27	17.8	17.8	17.8
	Primary	18	11.8	11.8	29.6
	Matric	35	23.0	23.0	52.6
	Intermediate	29	19.1	19.1	71.7
	Under graduate	18	11.8	11.8	83.6
	Post graduate	25	16.4	16.4	100.0
Co-morbids/ Psychological disorders	Yes	26	17.1	17.1	17.1
	No	126	82.9	82.9	100.0
ENT Surgery	Yes	8	5.3	5.3	5.3
	No	144	94.7	94.7	100.0
Hearing	Normal Hearing	46	30.3	30.3	30.3
	Hearing loss	106	69.7	69.7	100.0

224 ENT: Ear, Nose and Throat.

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228 **Table 2: Age, Gender and Tinnitus Characteristics * Tinnitus Severity and**
 229 **Chi Square. Cross Tabulation (n=152)**

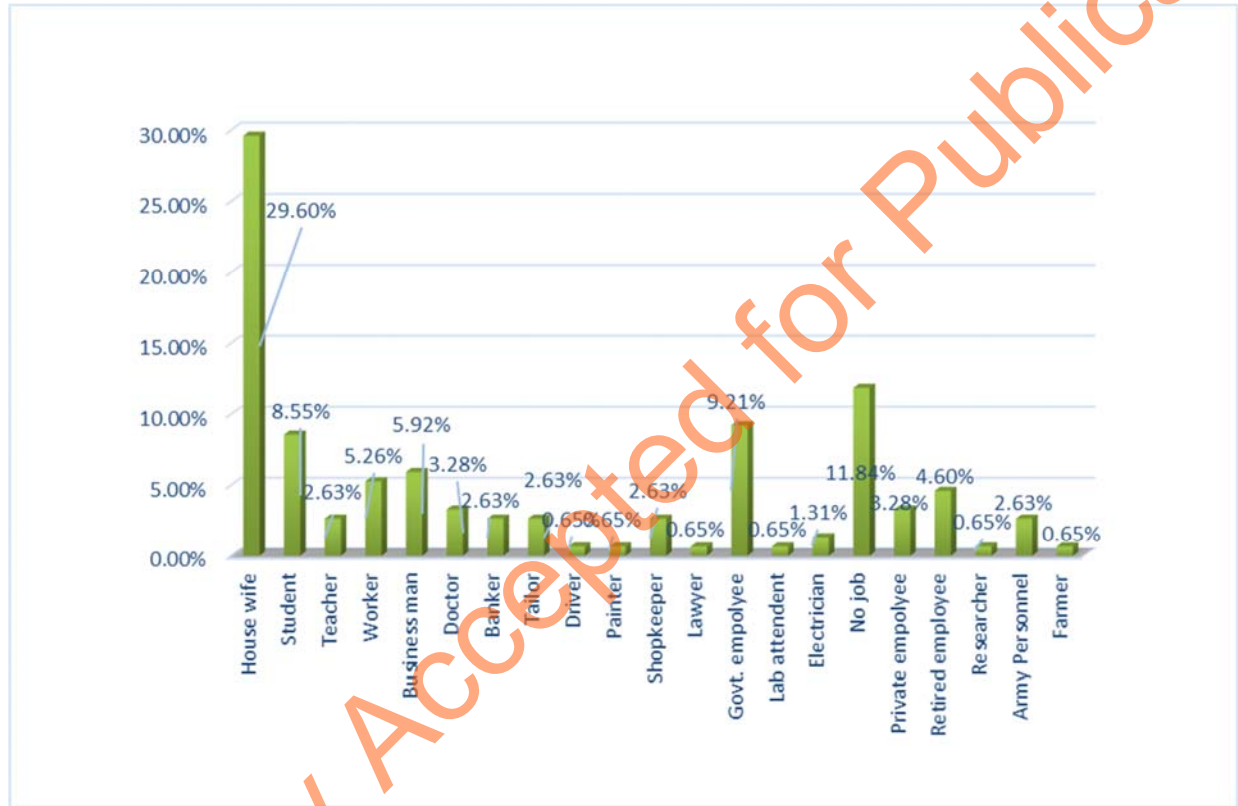
Variable		Tinnitus handicap inventory (THI) Category					Total N (%)	P valu e	r Val ue
		Slight (0-16) N (%)	Mild (18-36) N (%)	Moder ate (38-56) N (%)	Severe (58-76) N (%)	Catastro phic (78-100) N (%)			
Participants (Frequency/ Percentage)		10(6.58 %)	25(16.45 %)	38(25 %)	53(34.8 7%)	26(17.10 %)			
Gender	Male	8(9.2%)	12(13.8 %)	19(21. 8%)	37(42.5 %)	11(12.7 %)	87(100.0 %)	0.04	9.59

	Female	2(3.1%)	13(20.0%)	19(29.2%)	16(24.6%)	15(23.1%)	65(100.0%)		
Age (Years)	≤ 20	3(27.3%)	5(45.5%)	0(0.0%)	3(27.3%)	0(0.0%)	11(100.0%)	0.007	22.27
	21 to 40	4(6.3%)	13(20.6%)	13(20.6%)	19(30.2%)	14(22.2%)	63(100.0%)		
	41 to 60	3(6.0%)	5(10.0%)	16(32.0%)	19(38.0%)	7(14.0%)	50(100.0%)		
	Above 60	0(0.0%)	2(7.1%)	9(32.1%)	12(42.9%)	5(17.9%)	28(100.0%)		
Hearing Status	Normal	8(17.4%)	13(28.3%)	11(23.9%)	9(19.6%)	5(10.9%)	46(100.0%)	0.001	23.27
	Loss	2(1.9%)	12(11.3%)	27(25.5%)	44(41.5%)	21(19.8%)	106(100.0%)		
Type of tinnitus sounds	Insect	4(19.0%)	6(28.6%)	5(23.8%)	6(28.6%)	0(0.0%)	21(100.0%)	0.03	32.62
	Whistling	1(1.6%)	11(17.7%)	17(27.4%)	19(30.6%)	14(22.6%)	62(100.0%)		
	Machine	4(13.3%)	1(3.3%)	10(33.3%)	10(33.3%)	5(16.7%)	30(100.0%)		
	Ocean roar	1(10.0%)	3(30.0%)	3(30.0%)	2(20.0%)	1(10.0%)	10(100.0%)		
	Wind blow	0(0.0%)	4(14.8%)	3(11.1%)	15(55.6%)	5(18.5%)	27(100.0%)		
	Others	0(0.0%)	0(0.0%)	0(0.0%)	1(50.0%)	1(50.0%)	2(100.0%)		
No. of tinnitus sounds	Tonal	5(5.4%)	13(14.0%)	19(20.4%)	35(37.6%)	21(22.6%)	93(100.0%)	0.08	8.14
	Non tonal	5(8.5%)	12(20.3%)	19(32.2%)	18(30.5%)	5(8.5%)	59(100.0%)		
Duration of tinnitus	< 1 month	5(17.9%)	9(32.1%)	5(17.9%)	6(21.4%)	3(10.7%)	28(100.0%)	0.06	19.94
	1 month to 1 year	2(3.0%)	11(16.7%)	17(25.8%)	22(33.3%)	14(21.2%)	66(100.0%)		
	1 to < 5	2(4.5%)	3(6.8%)	12(27.3%)	21(47.7%)	6(13.6%)	44(100.0%)		
	>5 years	1(7.1%)	2(14.3%)	4(28.6%)	4(28.6%)	3(21.4%)	14(100.0%)		
Site of tinnitus	Right ear	5(8.8%)	10(17.5%)	16(28.1%)	16(28.1%)	10(17.5%)	57(100.0%)	0.59	10.21

Left ear	4(8.7%)	5(10.9%)	11(23.9%)	19(41.3%)	7(15.2%)	46(100.0%)		
Both ears	1(2.2%)	9(19.6%)	9(19.6%)	18(39.1%)	9(19.6%)	46(100.0%)		
In Head	0(0.0%)	1(33.3%)	2(66.7%)	0(0.0%)	0(0.0%)	3(100.0%)		

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Figure: Occupation of the study population (n=152)