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IMPACT OF TINNITUS PERCEPTION ON PSYCHOLOGICAL DISTRESS IN MALE AND FEMALE TINNITUS PATIENTS

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Current study was designed to examine the moderating role of gender between perception of tinnitus and psychological distress among male and female tinnitus patients. Participant consisted of 110 Tinnitus Patients (Male n=70, Female n= 40). Purposive sampling technique was used based on cross-sectional design.Data was collected from various hospitals of Pakistan, through complete otorhinolaryngological (ear) examination. Two scales Depression, Anxiety and Stress Scale (DASS) and Tinnitus Handicap Inventory (THI) were employed to measure perception of tinnitus, stress, anxiety and depression in tinnitus patients. This study results revealed that gender acted as a moderator among perception of tinnitus, depression, anxiety and stress. The results indicated that gender was positively significant predictor for anxiety (β=.45, $p < .01$), depression (β=1.17, $p < .01$) in tinnitus patients.The results suggested that females are more prone to anxiety than males. Depression is also perceived more by female tinnitus patients. Outcomes of the study do serve an understanding of psychological ailments among tinnitus patients. It will further help the clinicians to treat the psychological issues related with the physical illness of tinnitus gender wise.

Keywords. Tinnitus , depression, anxiety, stress, gender

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Nowadays, there is a consensus across researchers that tinnitus is one of the most crucial biological problem which initiates various other psychological problem (Bartels et al., 2010; Minen, Camprodon, Nehme, & Chemali, 2014; Vogel, van de Looij-Jansen, Mieloo, Burdorf, & de Waart, 2014).Tinnitus is defined as the perception of sound in the head or ears, without any external source of sound. It nearly affects 15% of the world population and this frequency increases to 33% in individuals over 60 years of age(Coelho, Sanchez, & Bento, 2004a; Pinto, Sanchez, & Tomita, 2010). Numerous studies have been conducted to find out the relationship of tinnitus on various psychological factors (Bogo et al., 2017; Boi et al., 2012; Li et al., 2014; Marciano et al., 2003; McCormack et al., 2015; Møller, Langguth, DeRidder, & Kleinjung, 2010; Udupi, Uppunda, Mohan, Alex, & Mahendra, 2013; Zöger, Svedlund, & Holgers, 2006).

Studies investigating prevalence of tinnitus have highlighted that indications might start in several diverse places in the auditory system and may have numerous causes, like conductive hearing loss, due to otosclerosis and ear related infections in the middle ear or problems in the cochlea examples include presbycusis, Meniérè's disease, and sudden onset of sensorineural hearing loss (Billue, 1998; Probst, Pryss, Langguth, & Schlee, 2016; Zarenoe, 2012).

Various Researches have also indicated that tinnitus can be there in individuals with normal hearing levels, but differences in the annoyance levels of individuals in these researches is unclear as it varies from individual to individual and is dependent on psychological frame of mind (Epp, Hots, Verhey, & Schaette, 2012; Kiani, Yoganantha, Tan, Meddis, & Schaette, 2013; Mannarelli et al., 2017; Schaette & McAlpine, 2011).

Depression is considered as an emotional disorder that is prevalent in a state of unhappiness, sadness or dejection, which can be either temporary or permanent. Facts given by the Federation for Mental Health (2012), depression is prevalent in about 350 million people within the general population worldwide, around 10% to 25% of people

have an episode of depression serious at a number of times in their lives (Husain, Gulzar, & Aqeel, 2016; Paulino, Prezotto, & Calixto, 2015; Sidrah, Wasif, & Aqeel, 2015).

One of the frequent psychopathologies, clinically diagnosed in tinnitus patients is depression (Udupi et al., 2013).Depressed people display a negative explanatory style than non-depressive people. Depression is associated with a negative, gloomy way of explaining and interpreting failure. If it is untreated, depression has the tendency to assume a chronic course, be recurrent, and over time to be associated with increasing disability (Amin, Wasif, & Aqeel, 2015; Husain et al., 2016; Moussavi et al., 2007; Shaoukat, Wasif, & Aqeel, 2015; Van Gool et al., 2005).

Several studies have also confirmed that environmental and social factors can help in the modification of stressors and their effect on individuals, also presence of social support helps in enabling people to cope in a better way with environment related stressors. It has also been noted that social support might moderate the stress effects at psychological level and its existence gives the individual assistance, support and guidance (Khan et al., 2016; Paulino et al., 2015; Sandler & Lakey, 1982).

Reacting to tinnitus is largely dependent on patients(Berry, Gold, Frederick, Gray, & Staecker, 2002). For some it is the biggest stress in their life while others respond in a neutral way. People might suppose that they are feeling different tinnitus because it is different in every individual patient. But on the other hand researches suggest that this is not true. Instead the evidences reveal that if one person is stressed and other is not is due to differences of ideas and beliefs related to tinnitus (Baker, 2016; Mazurek, Haupt, Olze, & Szczepek, 2012).

Various studies have highlighted that anxiety is like an inherent component of human experience and its core mechanism is to give warning sign that makes us vigilant and prepares us to either fight or flee from a dangerous or hazardous situation. Even though there is a relationship between depression and anxiety, but both are considered as two

diverse or different constructs (Husain et al., 2016; Ribeiro, Honrado, & Leal, 2004; Trevis, McLachlan, & Wilson, 2016).

Anxiety is the very basic psychological emotion of mankind. It serves as an indicator of a potential upcoming danger. Therefore anxiety serves an important physiological function, which is important for our survival. In this context anxiety does not represent any pathological symptoms. But it gains clinical relevance when either there is too much or too little anxiety.

Prior researches have explained the concept "Anxiety Sensitivity", it is a variable that explains an individual's inclination to fear bodily sensations related to anxious arousal (Durai & Searchfield, 2016; Pattyn et al., 2016; Reiss, 1991). However tinnitus severity and anxiety are dependent on individual levels as it varies from individual to individual (S. Erlandsson & Archer, 1994; Jastreboff, 1995; Puel & Guitton, 2007; Zoger, Svedlund, & Holgers, 2001).

Gender differences related to tinnitus have been observed in many studies previously (Dineen, Doyle, & Bench, 1997; Flores, Teixeira, Rosito, Seimetz, & Dall'Igna, 2016; Shargorodsky, Curhan, & Farwell, 2010) specifically, women are more expected to report complaints about tinnitus than men. Consequently, there are many studies on tinnitus that demonstrate a slightly higher occurrence in females (Coles, 1984; Leske, 1981; Nondahl et al., 2007).Prior researches have highlighted that the occurrences were greater in females, (Axelsson S., 1999). Further it was reported that women are more severely disturbed by their tinnitus (Coles, 1984; Leske, 1981; Nondahl et al., 2007; Orenay-Boyacioglu, Coskunoglu, Caki, & Cam, 2016).

In this study focus is on the existence of tinnitus due to which emotional and psychological processes are affected , along with the difficultly to ignore the existence of tinnitus, which includes the ability to divert attention away from these signals of sound being generated. This causes symptoms of depression, anxiety and stress along with other psychotic disorders , therefore it becomes a topic of research interest.

In Pakistan, there are many studies conducted on psychological adjustment and its relationship with other variables like age, gender, culture (Mehmood & Shaukat, 2014) along with other physical rehabilitation procedures (Noor, Gul, Khan, Shahzad, & Aqeel, 2016; Sidrah et al., 2015). However, there is lack of research in the area of how different problems arising from tinnitus are related to psychological maladjustments. Because of the considerable negative outcomes related with depressive symptoms, anxiety and stress it is essential to understand the role of psychological maladjustment and its impact on patients with tinnitus.

Prior researches on tinnitus have not yet investigated the moderating role of gender with tinnitus and psychological adjustments. The rationale of current study, therefore, was to investigate the relationship between gender wise differences on tinnitus severity and psychological adjustments. It evaluates the relationship between gender, psychological adjustment and tinnitus, in order to develop new psychological interventions addressing these differences, so that psychological health of patients is improved. There is incomplete understanding of psychological adjustment and tinnitus, in spite of emerging technologies and theories, still tinnitus is an incurable symptom (Baguley, McFerran, & Hall, 2013; Jiang, 2016; Langguth, Kreuzer, Kleinjung, & De Ridder, 2013; Møller et al., 2010).

The recent research was designed to measure the underlying contribution of two theoretically suitable but previously overlooked variables the psychological consequence of tinnitus and distress. Psychological distress is an outcome of tinnitus and demographical variables such as age and gender do play their role in perception of tinnitus. This current study was aimed to investigate the moderating role of gender between perception of tinnitus, psychological adjustments among male and female Pakistani tinnitus patients.

Method

Objectives

To study the moderating role of gender between perception of tinnitus and psychological distress in tinnitus patients.

Hypotheses:

1. Perception of tinnitus is positively related with psychological adjustment in male and female tinnitus patients.
2. Female patients are likely to exhibit more tinnitus complaints as compared to male tinnitus patients.
3. Female patients are prone to more psychological distress as compared to male tinnitus patients.

Research design

In present study purposive sampling technique was employed based on the cross sectional design. The study was conducted in two segments, (1) preliminary study, (2) main study. In preliminary study tinnitus handicap inventory was translated from English to Urdu language. The alpha coefficient of the scale was (α =.93).

Sample

Purposive convenient sample of 110 tinnitus patients was taken from outpatients of E.N.T & Audiology Department of Hearts International Hospital, Rawalpindi (N=75) and Alam Audiology Clinic, Shadman, Lahore (N=35).Gender distribution was 70 Male and 40

Female tinnitus patients, as shown in table-1. Age ranged from 18 to 80 years the average age of patients was 45.89(SD=19.06), the inclusion criteria were patients who were diagnosed with tinnitus. All E.N.T patients had been assessed by a medical doctor for ear related diseases; afterwards complete audiological test (consisting of air-bone measurements, audiometry values, middle-ear pressure, acoustic reflexes, and compliance) was performed to assess the hearing loss and tinnitus symptoms.

Procedure

The administration of a single assessment took approximately 60 to 90 minutes. This included completing medical history, measures including hearing evaluation and filling up of tinnitus questionnaire.

Physiological Instruments

Ear examination was performed using a Welch Allyn™ otoscope (Slawson & Haberstock, 2016). Audiometric and tinnitus assessments were performed via Interacoustic AA-222 Clinical Audiometer. The Transducers used for air conduction thresholds were TDH-39P headphones for audiometry. Bone conduction thresholds were noted by using Type B-71 bone vibrator, placed on the mastoid bone of the test ear. Tympanometry was performed wherever essential for middle ear examination using the Interacoustic Middle Ear Analyzer. Calibration of instruments was in compliance with the international guidelines and had IEC 60645-1/ANSI S.3.6 standards. Audiometric and tinnitus related data were gathered in an approved sound-treated room.

Psychological Instruments

Tinnitus Handicap Inventory (THI). A scale developed by Newman, (1996) was used after translation into urdu. Tinnitus Handicap Inventory is a self reporting scale of tinnitus severity consisting of 25 items having 3 sub-scales: (1) functional, (2) emotional and (3) catastrophic.

The functional subscale has 12 items with a maximum score of 40, this evaluates role limitations in the areas of mental and physical functioning. The Functional items are: 12,14,18,15,4,1,24,20,9,13,2,7.The emotional subscale has 8 items with a maximum score of 40 includes items representing a broad range of affective responses to tinnitus, including anger, frustration, irritability, and depression. The Emotional Items are: 6, 16, 10, 22, 21, 3, 25, 17 .The catastrophic subscale has 5 items with a maximum score of 20 and investigates the most severe reaction to tinnitus such as desperation, loss of hope, inability to cope and fear of a grave disease. The Catastrophic Items are: 11,5,23,8,19

Responses are rated on 3 point likert-type scale ranging from *0(NO)* to *4(Yes)*.Scores of each item is summed with higher scores indicating greater perceived severity. Investigations of the psychometric robustness of the THI have revealed internal consistency of (α= O.93) (Newman, Jacobson, & Spitzer, 1996) and test re-test reliability of total score and subscales ranges from 0.84 to 0.94(Newman, Sandridge, & Jacobson, 1998).

Depression Anxiety and Stress Scale (DASS). This scale was developed by Lovibond (1995) and its Urdu version was translated by Zafar and Khalily (2014). It comprises of 42 items which are further divided in three extensive subscales:

(1) Depression (2) Anxiety (3) Stress. All the items are categorically scored.

Depression Items are 3,5,10,13,16,17,21,24,26,31,34,37,38 and 42.Anxiety scale items are 2,4,7,9,15,19,20,23,25,28,30,36,40 and 41 and Stress scale items include 1,6,8,11,12,14,18,22,27,29,32,33,35 and 39.

The participants in the study were asked to use a 4-point scale in order to find out the different conditions, they had over the past week. The scores obtained from each subscale were summed according to their relevance and their total was used to measure the symptoms of each emotional state and physical arousal during past week, which were scored on a 0 to 3 scale where 0 is (*did not apply to me at all)* and 3 is(*applied to me very much, or most of the time)*. The internal reliability of translated version is α=.83 for overall DASS and for subscales it is: for Depression α=.63, Anxiety α=.60, and Stress α= .60.

Results

Table 1

Gender wise Correlation matrix between THI, DASS (N=110)

			Male				
Variable	M	S.D	1	2	3	4	5
1.THI-U	60.85	21.87	-	.63**	.59**	.66**	.54**
2.DASS	40.69	24.65		-	.97**	.95**	.94**
3.Depression	12.28	8.79			-	.89**	.87**
4.Anxiety	13.38	8.82				-	.83**
5.Stress	15.01	8.25					-
			Female				
1.THI-U	82.13	10.10	-	.64**	.55**	.60**	.53**
2.DASS	63.30	19.70		-	.97**	.95**	.97**
3.Depression	20.42	7.1			-	.87**	.92**
4.Anxiety	21.22	6.36				-	.87**
5.Stress	21.65	7.05					-

Note: Significant results are reported in this Table, THI: Tinnitus Handicap Inventory, DASS: Depression Anxiety and Stress Scale, DASS_Dep: Depression Scale, DASS_ANX: Anxiety Scale, DASS_ Stress: Stress Scale

The results revealed that in male tinnitus patients perception of tinnitus was positively correlated with depression($r=.59$, $p<0.001$), Anxiety($r=.66$, $p< 0.001$) and stress($r=.54$, $p<0.001$).In female tinnitus patients perception of tinnitus was also positively correlated with depression ($r=.64$, $p<0.001$), anxiety ($r=.55$, $p<0.001$) and stress ($r=.53$, $p<0.001$).The results support the hypothesis of the study. Various previous researches have

reported that perception of tinnitus is strongly correlated with the presence of depression, anxiety and stress it may be assumed that bothersome tinnitus occurs more often in females than males (S. I. Erlandsson & Holgers, 2001; Holgers, Zöger, & Svedlund, 2005; Lockwood, Salvi, & Burkard, 2002; Nicolas-Puel et al., 2001; Nondahl et al., 2007; Pinto et al., 2010).Present study also reveals that female tinnitus patients are more bothered about their impairment and therefore scored high on depression, anxiety and stress.

Table 2

Mean Difference between male and female tinnitus patients on THI, Hearing Loss, Depression, Anxiety and Stress

	Male Tinnitus Patients (n=70)		Female Tinnitus Patients (n=40)				95% CI		
Variables	M	S.D	M	S.D	t(df)	p	LL	UL	Cohen's d
Tinnitus	60.86	21.87	82.13	10.10	-6.93(104.4)	0.00	-27.34	-15.19	1.25
THI_F	27.97	10.68	38.45	5.62	-6.73(107.46)	0.00	-13.56	-7.39	1.23
THI_E	20.63	7.49	26.27	3.66	-5.30(105.97)	0.00	-7.76	-3.533	0.96
THI_C	12.26	5.68	17.40	2.76	-6.37(105.87)	0.00	-6.74	-3.54	1.15
Depression	12.29	8.79	20.43	7.09	-4.99(108)	0.00	-11.37	-4.91	1.02
Stress	15.01	8.25	21.65	7.06	-4.26(108)	0.00	-9.72	-3.55	0.86
Anxiety	13.39	8.82	21.23	6.37	-4.93(108)	0.00	-10.99	-4.69	1.02

Note: Significant results are reported in this Table, CI=Confidence Interval, LL=Lower Limit, UL=Upper Limit, THI_F: Tinnitus Functional Scale, THI_E: Tinnitus Emotional Scale, THI_C: Tinnitus Catastrophic Scale.

In order to test how the perceived negative emotional symptoms (e.g., anxiety, depression and stress) moderate the relationship between gender and tinnitus, independent

sample t-test was performed. Dependent variable was psychological distress. The analysis showed significant effects of the tinnitus on the dependent variable ($p > 0.10$). However, there was a statistically significant interaction between anxiety, stress and depression. Interestingly, as it can be seen in table 3, it is especially in patients with tinnitus complaints that the impact of the stress anxiety and depression is felt; study also reveals that female patients were more predisposed to tinnitus along with stress, depression, and anxiety as compared to male tinnitus patients.

Table 3

Moderating Role of Gender between Tinnitus and Depression among tinnitus patients

DV	IV	B	S.E.	*B*	ΔR^2	ΔF
Depression	Tinnitus	.629	.137	1.462***	.308	48.092***
	Gender	8.427	2.098	.449***	.035	
	Tinnitus*Gender	.393	.119	1.170***	.061	
	Constant	-37.457	10.602			

****p* < .000. ***p* < .01. **p* < .05

The result revealed in table-4, that tinnitus was positively significant predictor for depression (β=1.46, $p < .01$) in tinnitus patients. Results also demonstrate that Gender was positively significant predictor for depression (β=.45, $p < .01$) in tinnitus patients. The results further revealed that interaction between Gender was positive significant predictor for depression (β=1.17, $p < .01$) among tinnitus patients. Our results revealed that Gender is

a significant moderator between tinnitus and depression in tinnitus patients. The statistical analysis further supports the objective of the study.

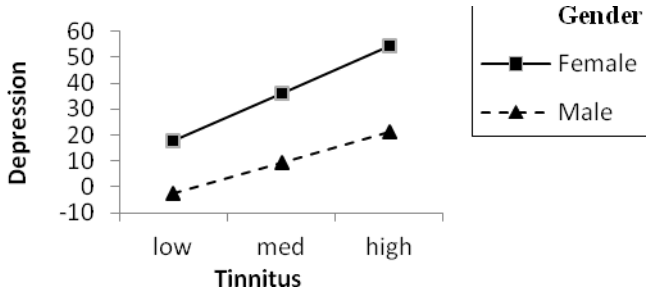

Figure 1. Moderating role of Gender between tinnitus and depression among tinnitus patients.

A significant slope in Figure 1 shows that tinnitus patients were more predisposed to have depression with increase in perception of tinnitus. A comparison in male, female tinnitus patients reveal that depression increases when patients start facing tinnitus related problems, while male tinnitus patients had lower depression than female tinnitus patients.

Table 4

Moderating role of gender in tinnitus and anxiety

DV	IV	B	S.E.	*B*	ΔR^2	ΔF
Anxiety	Tinnitus	.568	.127	1.354***	.038	7.420**
	Gender	6.253	1.945	.342 ***		
	Tinnitus*Gender	.301	.111	.922 **		
	Constant	-29.736	9.833			

***$p < .000$. **$p < .01$. *$p < .05$

The result revealed that Tinnitus was positively significant predictor for anxiety (β=1.35, $p < .01$) in tinnitus patients. Prior studies have established that the health-related quality of life such as pain, emotion and energy is affected to a higher degree in female tinnitus patients (S. I. Erlandsson & Holgers, 2001; McCormack et al., 2015; Seydel, Haupt, Olze, Szczepek, & Mazurek, 2013; Stouffer & Tyler, 1990; Vanneste, Joos, & De Ridder, 2012). The results further revealed that interaction between Gender was positively significant predictor for anxiety (β=.922, $p < .01$) among tinnitus patients.

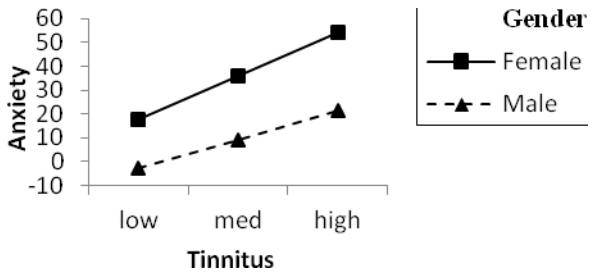

Figure 2. Moderating role of Gender between tinnitus and Anxiety among male and female

A significant slope in Figure 2 shows that tinnitus patients were more predisposed to have anxiety with increase in perception of tinnitus. A comparison in male, female tinnitus patients reveal that anxiety increases when patients start facing tinnitus related problems, while male tinnitus patients had lower anxiety than female tinnitus patients.

Discussion

The aim of this current study was to investigate the relationship among perception of tinnitus, psychological distress and gender. Additionally, the aim of this study was to examine moderating role of gender among perception of tinnitus and psychological distress of patients.

Present study provided evidences supporting hypothesis 1 which states that "Perception of tinnitus is positively related with psychological adjustment in male and female tinnitus patients.". The results revealed in table 2 that perception of tinnitus was positively correlated with depression ($r=.59$, $p < 0.001$), anxiety($r=.66$, $p< 0.001$) and

stress(r=.54, p<0.001) in male tinnitus patients. Female tinnitus patients also had positive correlation with depression (r=.55, p<0.001) and anxiety (r=.60, p<0.001). Numerous prior studies have documented that prevalence of depression, anxiety and stress is slightly higher in females than males (Coelho, Sanchez, & Bento, 2004b; Holgers et al., 2005; Lockwood et al., 2002; Nicolas-Puel et al., 2001; Nondahl et al., 2007; Pinto et al., 2010).

Regarding to hypothesis 2 which states that "Female patients are likely to exhibit more tinnitus complaints along its subscale as compared to male tinnitus patients". The study revealed that female patients were more predisposed to tinnitus complaints as compared to male tinnitus patients. Previous studies findings supported our current research finding that female tend to have more tinnitus complaints than male tinnitus patients (S. I. Erlandsson & Holgers, 2001; Holgers et al., 2005; Lockwood et al., 2002; Nicolas-Puel et al., 2001; Nondahl et al., 2007; Pinto et al., 2010; Seydel et al., 2013).

Hypothesis 3 stated that "Female patients have shown more psychological distress as compared to male tinnitus patients". Further comparison between male, female tinnitus patients revealed that psychological distress increases when patients start facing tinnitus related problems, while male tinnitus patients had lower psychological distress than female tinnitus patients. Prior studies have documented that female tinnitus patients reported higher severity of stress, depression and anxiety as compared to male tinnitus patients (S. I. Erlandsson & Holgers, 2001; Gard & Kring, 2007; Holgers et al., 2005; Koch et al., 2007; Lockwood et al., 2002; Nicolas-Puel et al., 2001; Nondahl et al., 2007; Pinto et al., 2010; Vanneste et al., 2012).

The results of moderation analysis suggest that (table 5and 6) gender was significant moderator among perception of tinnitus and psychological distress in tinnitus Patients, thus supporting our objective.

The strength of current study was that the analyses were conducted on a very homogeneous group in terms of symptoms and severity of tinnitus, stress, anxiety and depression in both male and female tinnitus patients.

Limitations & Recommendations

This study consisted on population from urban cities of Pakistan; therefore findings cannot be generalized on overall population. In future descriptive as well as experimental studies will be beneficial to describe the mechanism of tinnitus across gender in detail. Native tool for measuring gender related problems would be effective in future as it integrates cultural aspects as well.

Conclusion

The findings of this study revealed that strategies and perception of tinnitus varied in accordance with gender. Higher psychological adjustment was predicted by male tinnitus patients. This study will be beneficial for rehabilitation psychologists in clinical settings to devise interventions and therapies according to gender and tinnitus severity for tinnitus patients in Pakistan.

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