British Journal of Multidisciplinary and Advanced Studies:
Health and Medical Sciences 4 (5),60-99, 2023
Print ISSN: 2517-276X
Online ISSN: 2517-2778
Website: https://bjmas.org/index.php/bjmas/index
Published by European Centre for Research Training and Development UK

Association of Tinnitus in The Patients with Cervical and Temporomandibular Dysfunction

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doi: https://doi.org/10.37745/bjmas.2022.0326 Published October 14 2023

Citation: Zahra H., Masood A., Um-e-Hani, Shahzad .S.A.B., Abdullah M, Ahmad A., Malik A., Raza H., Maqbool S. (2023) Association of Tinnitus in The Patients with Cervical and Temporomandibular Dysfunction, British Journal of Multidisciplinary and Advanced Studies:Health and Medical Sciences 4 (5),60-99

ABSTRACT: *Tinnitus is a phrase that refers to the conscious experience of an auditory sensation in the absence of a corresponding external stimulation. It is derived from the Latin verb tinnire, which means "to ring.'. In recent few years, it has been found that among 101 causes of tinnitus, cervical and TMJ disorders are one of the leading cause of it. The aim of this study is to evaluate the association and perception of tinnitus among the patients having pain in cervical and TMJ region. This study was cross sectional study and was conducted on the population of the ULTH, Gangaraam hospital. It includes both male and female patients. A survey was sent out through email to 145 patients. Their role was to complete an updated expert revised survey testing their association of tinnitus with cervical or TMJ region pain. Descriptive statistics was applied to conclude results.The mean age of population was 35.53 with the standard deviation ± of 12.176 of data. Out of 145 patients. 93 (64.1%) were males and 52 (35.9%) were females. The study reveals that association of tinnitus with cervical and TMJ pain was more common in males. Females had a low rate of tinnitus with cervical and TMJ painThe study reveals that association of tinnitus with cervical and TMJ pain was more common in males. Females had a low rate of tinnitus with cervical and TMJ pain. The Pearson chi square association is statistically significant (P=0.016).*

KEYWORDS*:* temporomandibular joint, cervical dysfunction, tinnitus

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INTRODUCTION

Tinnitus is an auditory phantom sensation (ear ringing) that occurs when there is no external sound. Research in neuroscience is providing insight into how the brain produces tinnitus after hearing loss, as well as new strategies for treating and preventing it. The neural mechanisms underlying the perception of phantom sound are highlighted by the down regulation of intracortical inhibition brought on by damage to the cochlea or auditory projection pathways. (1)Tinnitus is defined as a sound perceived without stimulus from an external acoustic source(2)

Tinnitus can be a main or subsequent symptom of temporomandibular joint disorders (TMD) that affect the craniocervical area. This knowledge contributes to the development of etiological theories linking tinnitus to temporomandibular problems. The essay also examines several etiologically-based therapy philosophies. The writers draw on the experiences of other healthcare professionals who have worked with various patient demographics in addition to sharing their own.(3)

The ear's job is to turn a physical vibration into a neurological signal that is encoded. One could imagine it as a biological microphone. Similar to a microphone, the ear is stimulated by vibration. Unlike a microphone, however, the nerve impulse generated by the vibration in the ear is processed by the brain's central auditory pathways.(4) Tinnitus-related discomfort occurs against a backdrop of pre-existing medical, psychological, or social susceptibility and can present itself in a range of functional phenomena, such as functional hearing impairments (e. g. hyperacusis), or depressive and anxious episodes.(5)

According to recent data, subjective tinnitus is a prevalent condition among adults, with a point prevalence of over. While there has been significant progress in understanding tinnitus heterogeneity in recent years, the risk factors for tinnitus, as well as the mechanisms of tinnitus development and maintenance, remain poorly understood.(6)

People who have acoustic neuroma, a disorder that is marked by damage to the myelin sheath covering auditory neurons, frequently experience the first ailment. Emphatic activation between nearby nerve fibers is likely to happen in such circumstances. The second situation is characterized by an excessive and spontaneous inflow of potassium (K+) or calcium (Ca2+) ions into the hair cells, which results in transient depolarization of the hair cells. (7)

According to another theory, temporomandibular joints damaged by inflammatory or degenerative conditions may compress the auriculotemporal nerve, causing ear problems in TMD patients. These hypotheses offer potential explanations for why tinnitus occurs in people with TMD.(8) Though additional study is needed to better understand TMDs and somatosensory tinnitus, as well as the pathophysiology behind them, the link between the cervical region and TMJ is widely documented.(9)

Tinnitus affects 10% to 15% of the population and can have a significant impact on quality of life. A subgroup of people with persistent tinnitus can be characterized as cervicogenic somatic tinnitus (CST), which is associated to the somatosensory system of the cervical spine.(10)

Cervicogenic vertigo, also known as cervicalogenic dizziness, is characterized by dizziness brought on by issues with the cervical spine. The diagnosis is made primarily based on patient symptoms and the doctor's clinical judgments, with no laboratory or radiological diagnostic tests.(11)

Cervical spine disorders (CSD) and subjective tinnitus are common problems that doctors run with all the time. Even though the link between tinnitus and CSD has drawn a lot of attention recently, the precise processes behind CSD-induced tinnitus are still not entirely known. Additionally, due to hemodynamic changes in the vertebral arteries and stimulation of the trigeminal nerve, CSD may decrease blood flow in the inner ear. These elements play a part in the intricate connection between CSD and tinnitus.(12)

Various incorporating manual therapies targeting the TMJ and associated muscles, in addition to standard physiotherapy interventions, can lead to improved results in terms of reducing TMD pain intensity, tinnitus severity, and associated handicap. D.(13)

Cervical spine abnormalities and temporomandibular disorders (TMD) are the two most common musculoskeletal conditions linked to tinnitus. The temporomandibular joint, masticatory muscles and other tissues are all involved in the wide variety of musculoskeletal problems that make up TMD. The DC/TMD (Diagnostic Criteria for Temporomandibular Disorders), based on the earlier version, is the most widely used diagnostic standard for TMD.(14)

The objective of this study was to check association of tinnitus in the patients of cervical destabilization and in the patients with temporomandibular joint dysfunction as the frequency of

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tinnitus has been increased in mentioned population of patients but extensiveness of tinnitus has not been found yet in these patients

METHODS

Study design was cross sectional study Data was collected from ULTH.It was completed within 6 months after the approval of synopsis. Sample size was 145 patients. Non probability convenient sampling technique was used. The given questionnaire was used in this study.The questionnaire covers different constructs which was not reported separately in subscale's. A survey was sent out through email to 145 patients. Their role was to complete an updated expert revised survey testing their knowledge and perceptionof concussion.

Inclusion Criteria:

- Temporomandibular joint pain(15)
- Tinnitus (15)
- Cervical pain

Exclusion Criteria:

- Vertigo(16)
- middle ear pathology (16)
- Previous mechanical history of mandibular joint (15)
- Cervical cancer, herniation.
- TMJ cancer

Recent version of SPSS 24 was used to calculate the results. Data was gathered by questionnaire according to inclusion exclusion criteria from the relevant population.

RESULTS

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age of Patients	145	16.00	68.00	35.5310	12.17640
N (listwise)	145				

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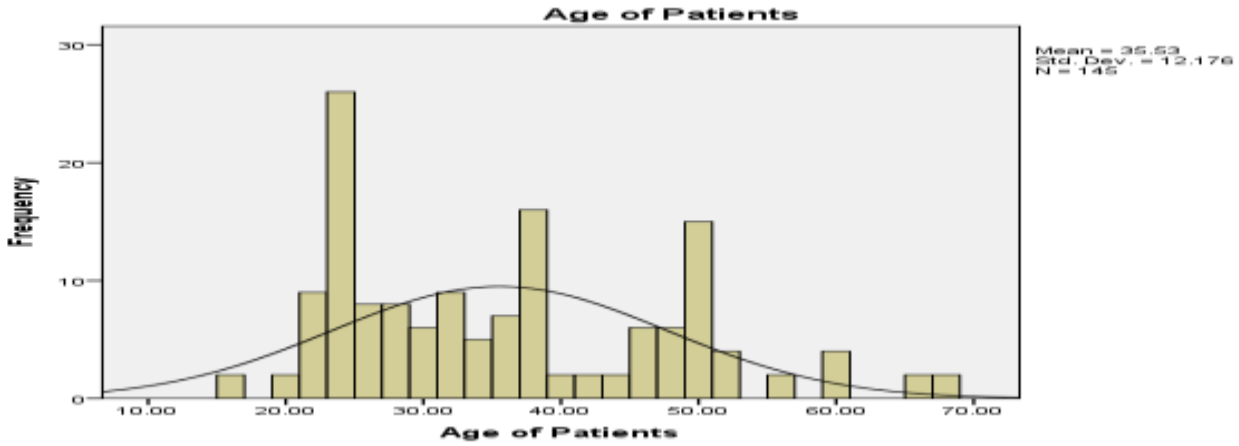

Gender of Patients

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	93	64.1	64.1	64.1
Female	52	35.9	35.9	100.0
Total	145	100.0	100.0	

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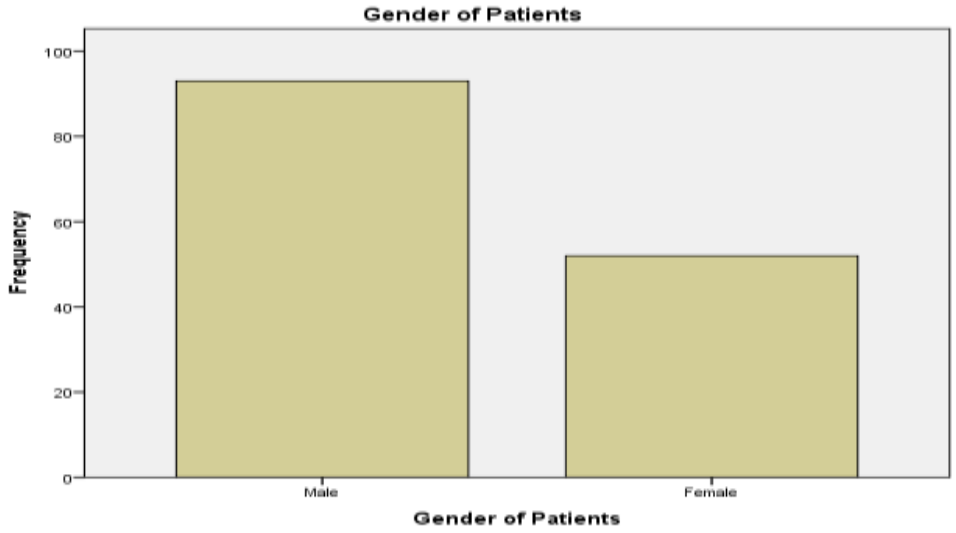

Do you have a neck region pain?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	56	38.6	38.6	38.6
Sometimes	57	39.3	39.3	77.9
yes	32	22.1	22.1	100.0
Total	145	100.0	100.0	

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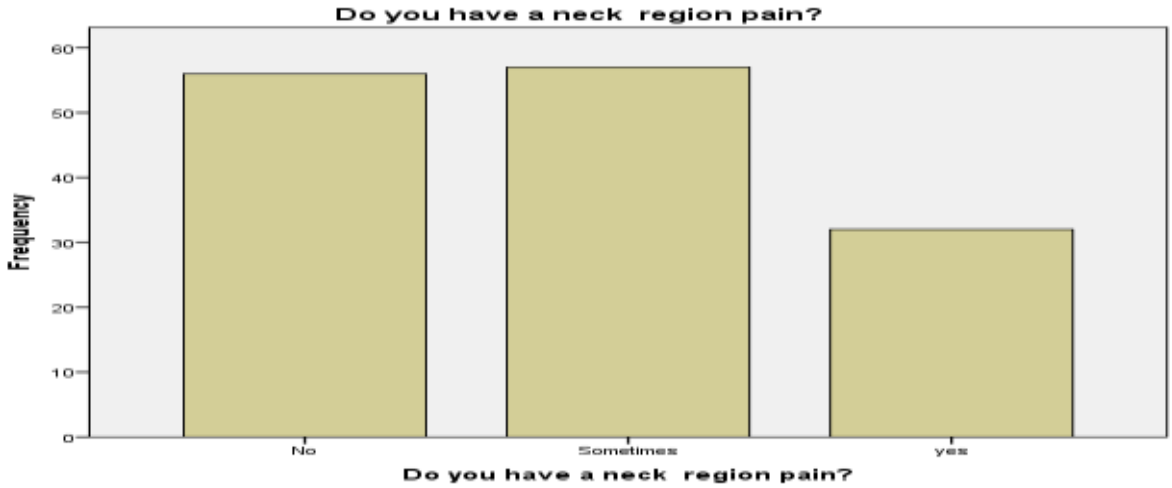

Do you feel any pain or irritability in Jaw?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	89	61.4	61.4	61.4
Sometimes	51	35.2	35.2	96.6
yes	5	3.4	3.4	100.0
Total	145	100.0	100.0	

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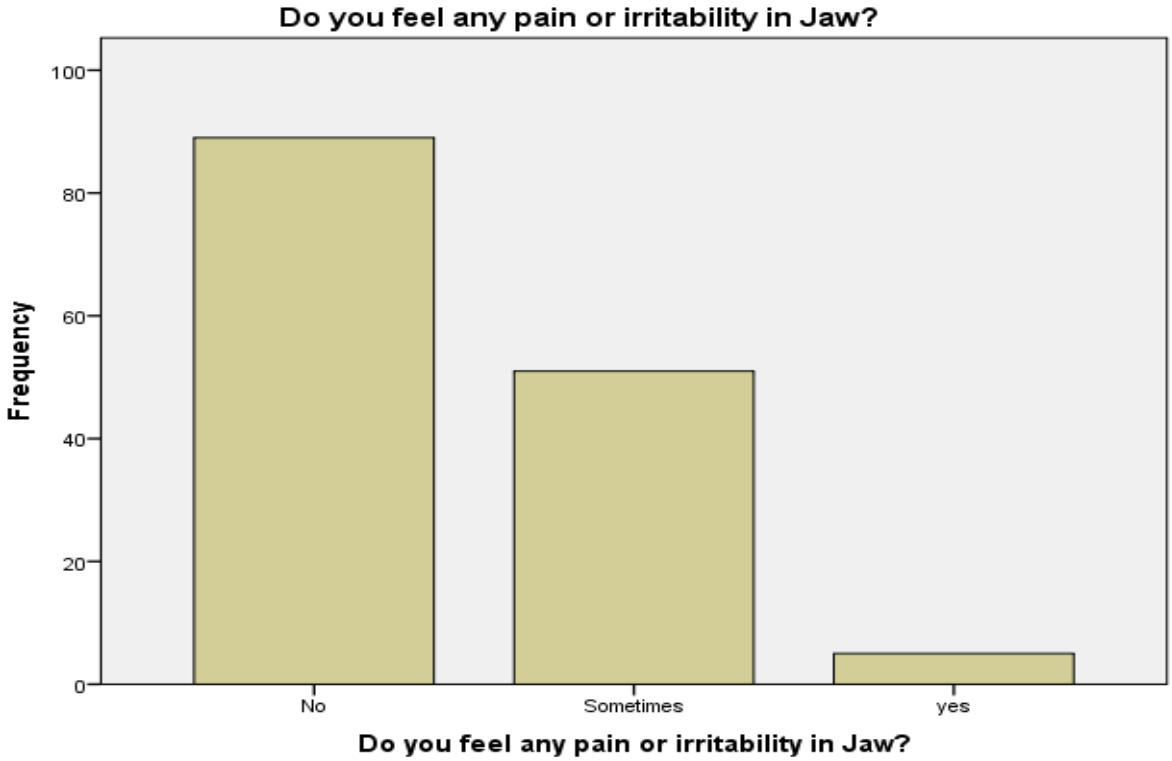

Does your neck / jaw pain cause you to feel tinnitus?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	107	73.8	73.8	73.8
Sometimes	27	18.6	18.6	92.4
Yes	11	7.6	7.6	100.0
Total	145	100.0	100.0	

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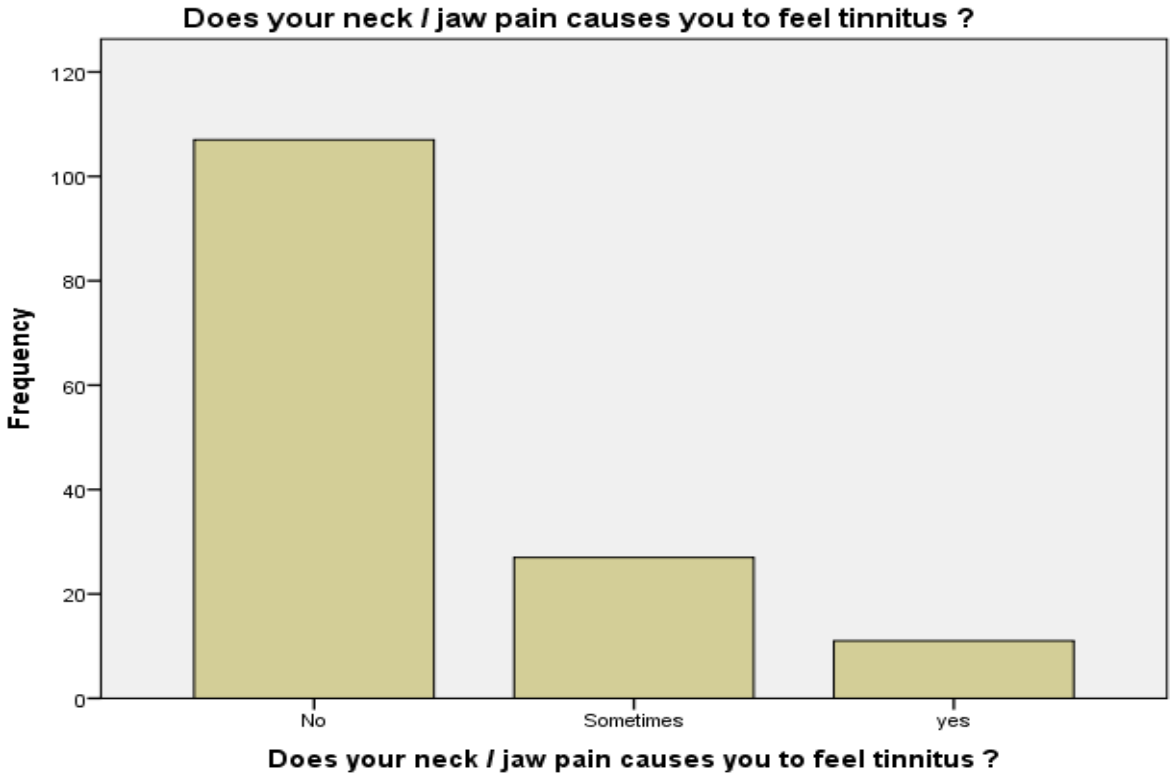

Does your tinnitus aggravate by your neck / jaw disability?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	109	75.2	75.2	75.2
Sometimes	32	22.1	22.1	97.2
yes	4	2.8	2.8	100.0
Total	145	100.0	100.0	

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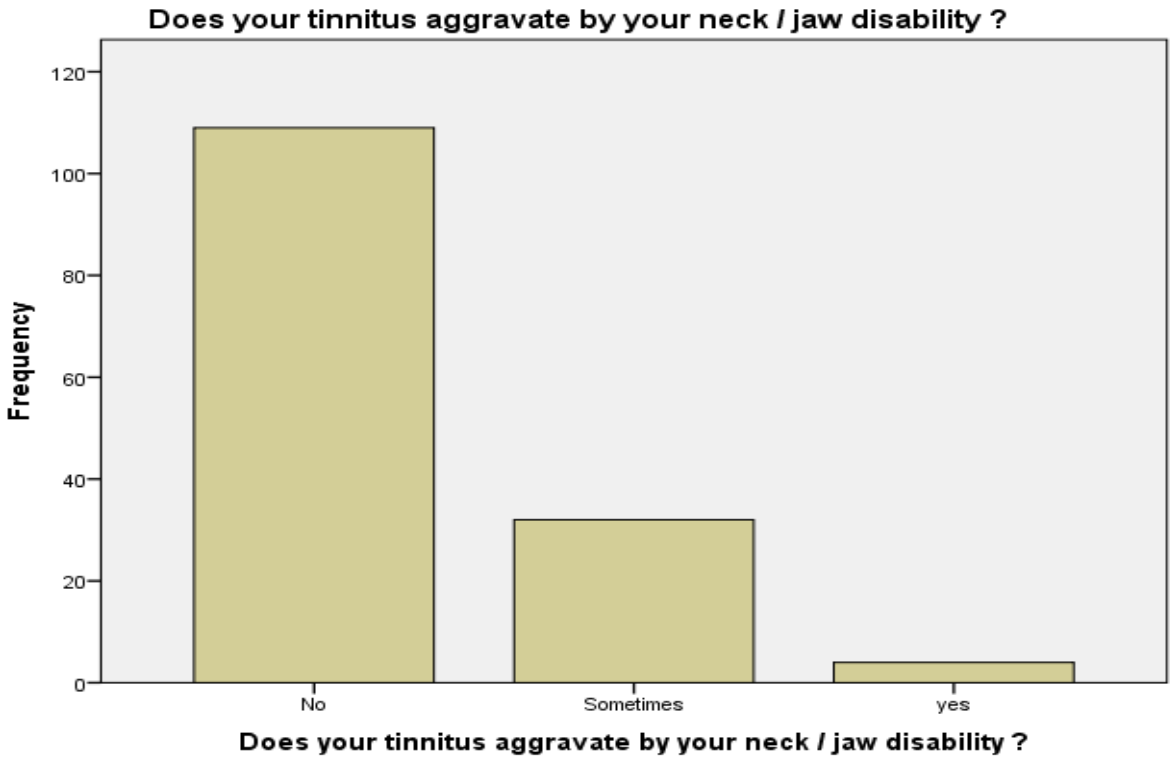

Because of your tinnitus, is it difficult for you to concentrate?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	95	65.5	65.5	65.5
Sometimes	29	20.0	20.0	85.5
yes	21	14.5	14.5	100.0
Total	145	100.0	100.0	

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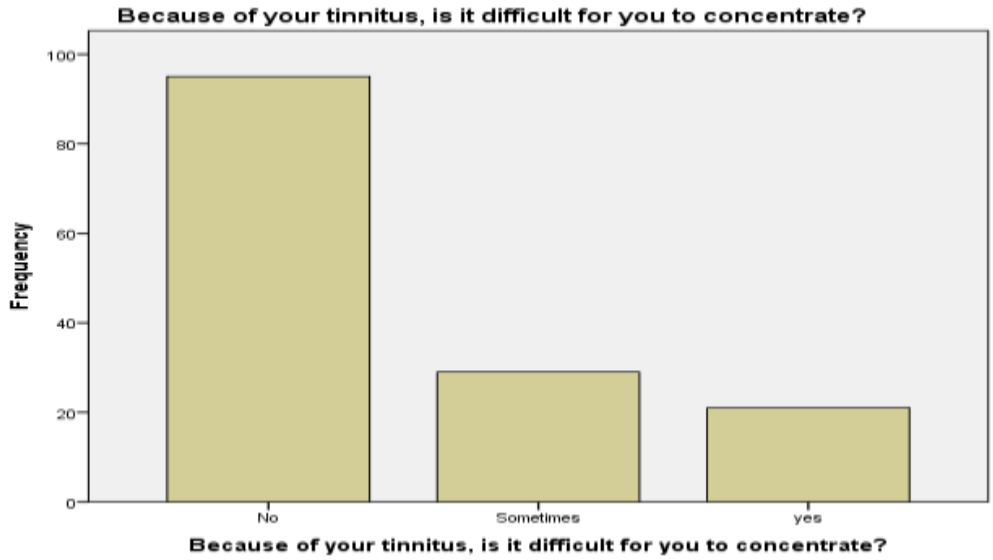

Does the loudness of your tinnitus make it difficult for you to hear people?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	89	61.4	61.4	61.4
Sometimes	33	22.8	22.8	84.1
yes	23	15.9	15.9	100.0
Total	145	100.0	100.0	

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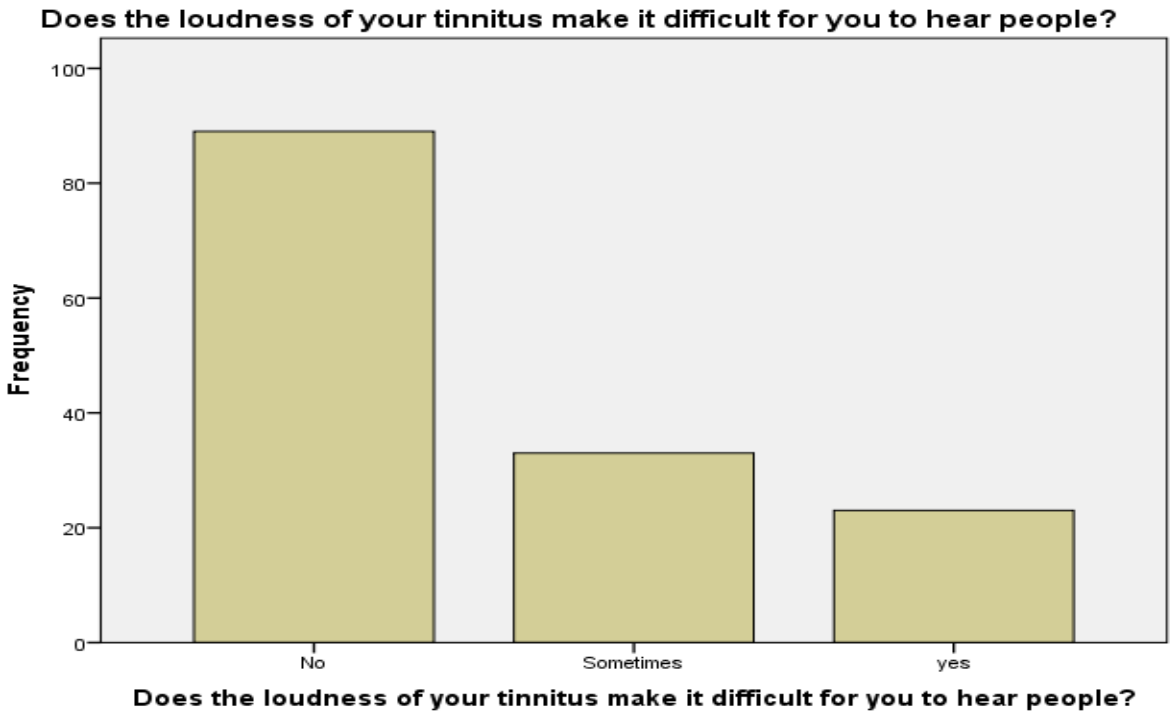

Does your tinnitus make you angry?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	87	60.0	60.0	60.0
Sometimes	23	15.9	15.9	75.9
Yes	35	24.1	24.1	100.0
Total	145	100.0	100.0	

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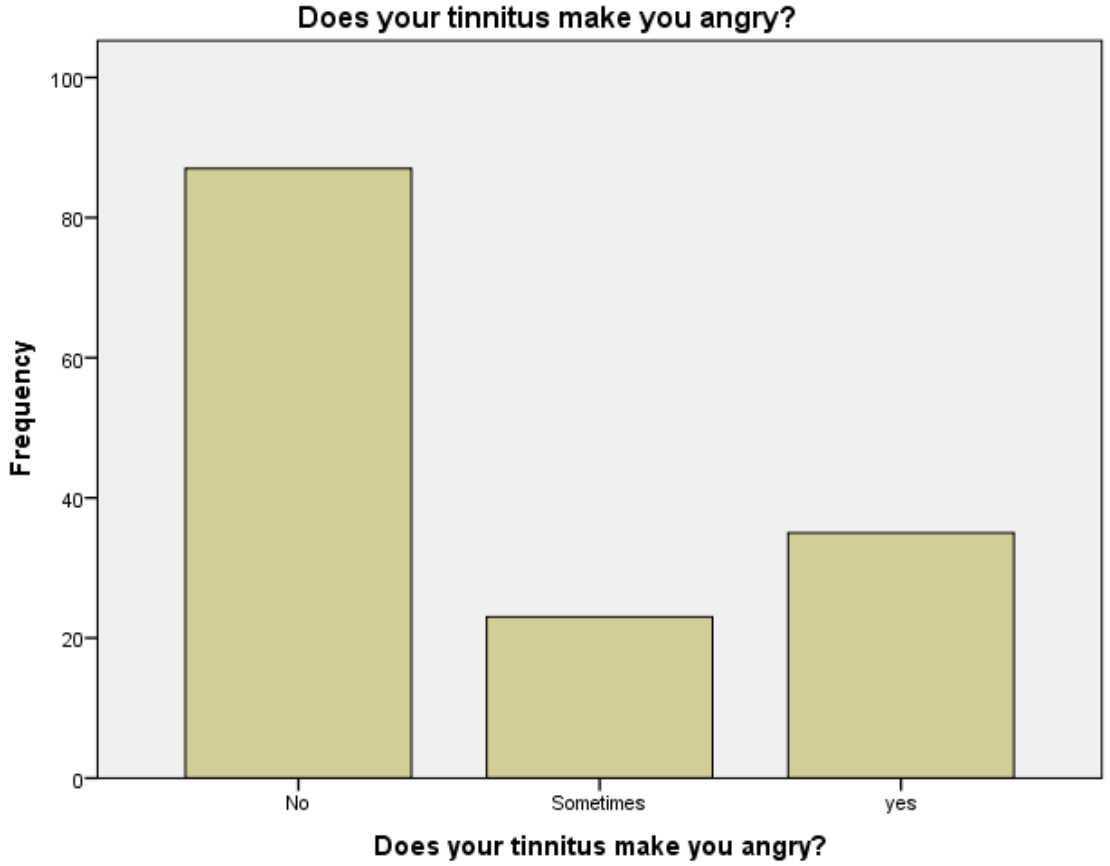

Does you tinnitus make you feel confused?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	84	57.9	57.9	57.9
Sometimes	25	17.2	17.2	75.2
yes	36	24.8	24.8	100.0
Total	145	100.0	100.0	

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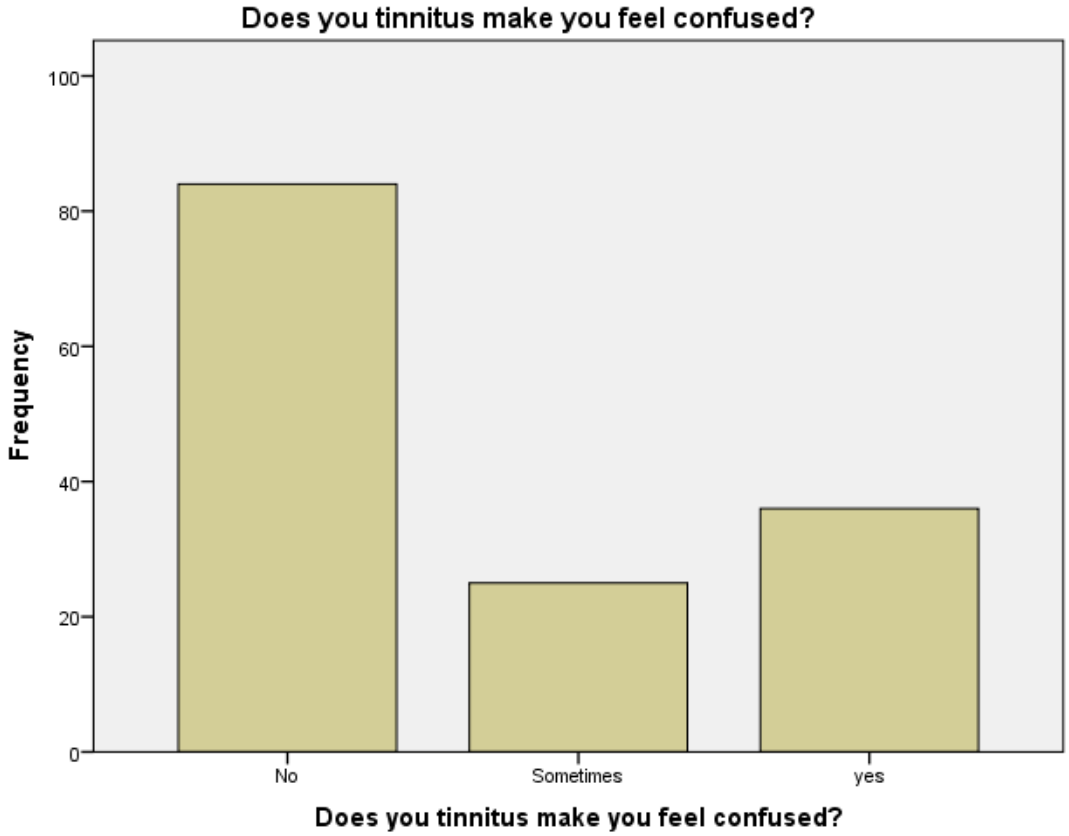

Because of your tinnitus, do you feel desperate?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	95	65.5	65.5	65.5
Sometimes	24	16.6	16.6	82.1
yes	26	17.9	17.9	100.0
Total	145	100.0	100.0	

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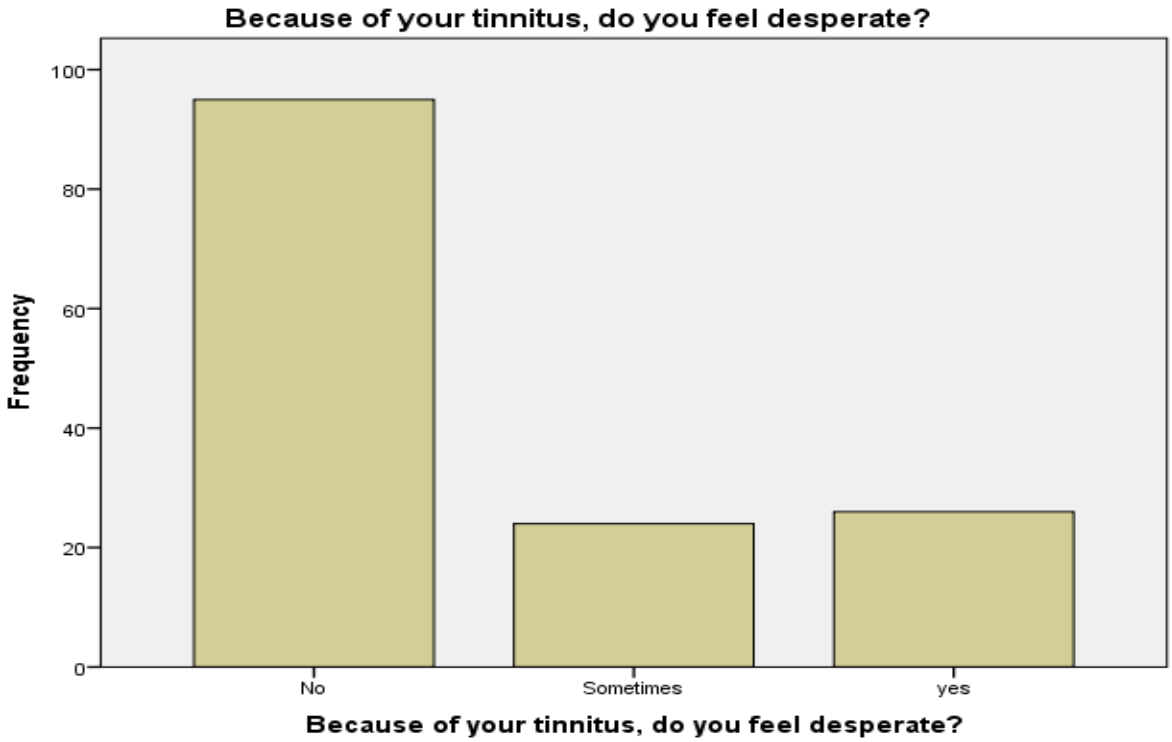

Because of your tinnitus, do you have trouble falling to sleep at night?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	86	59.3	59.3	59.3
Sometimes	32	22.1	22.1	81.4
yes	27	18.6	18.6	100.0
Total	145	100.0	100.0	

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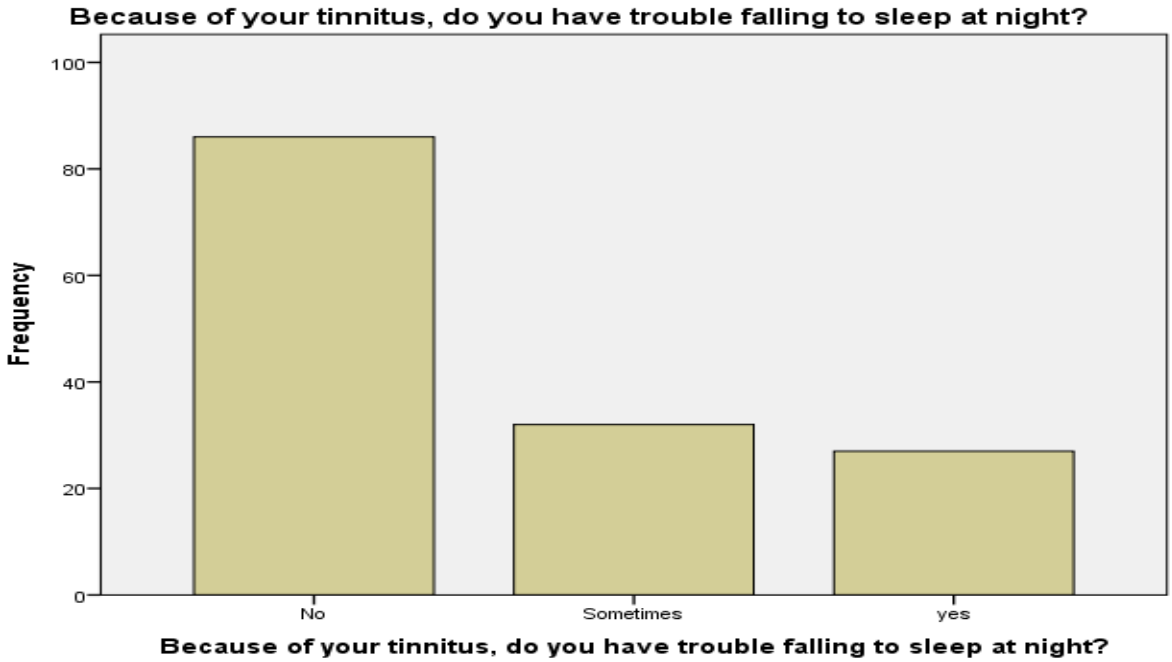

Do you feel as though you cannot escape your tinnitus?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	88	60.7	60.7	60.7
Sometimes	28	19.3	19.3	80.0
yes	29	20.0	20.0	100.0
Total	145	100.0	100.0	

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Do you complain a great deal about your tinnitus?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	91	62.8	62.8	62.8
Sometimes	27	18.6	18.6	81.4
yes	27	18.6	18.6	100.0
Total	145	100.0	100.0	

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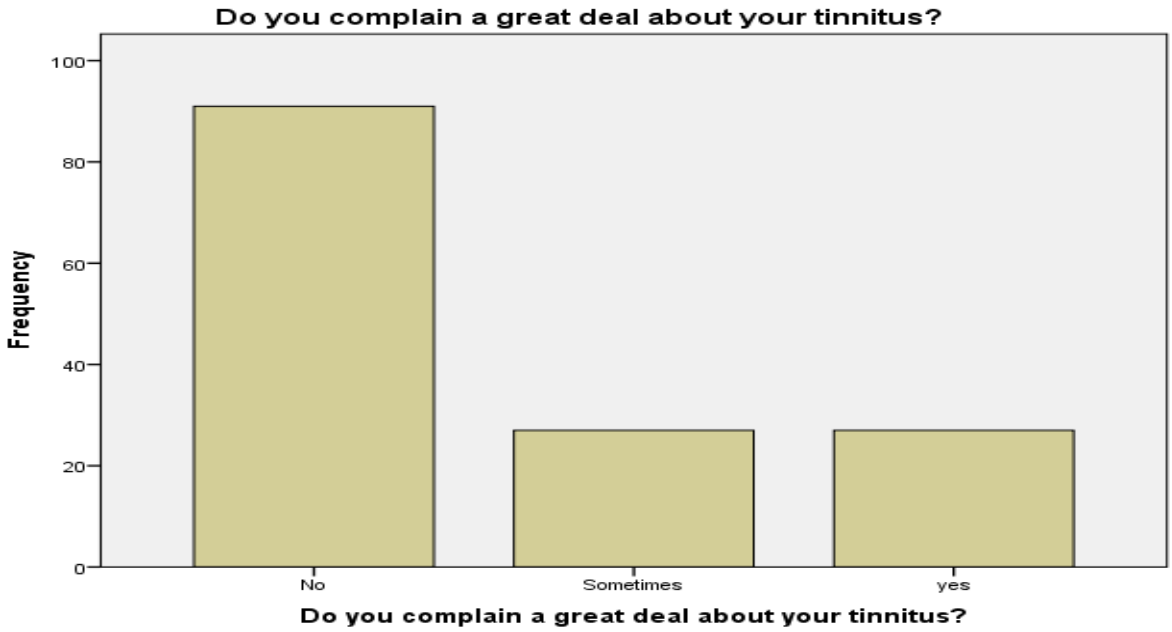

Does your tinnitus interfere with your ability to enjoy your social activities (such as going out to dinner, to the movies)?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	88	60.7	60.7	60.7
Sometimes	34	23.4	23.4	84.1
yes	23	15.9	15.9	100.0
Total	145	100.0	100.0	

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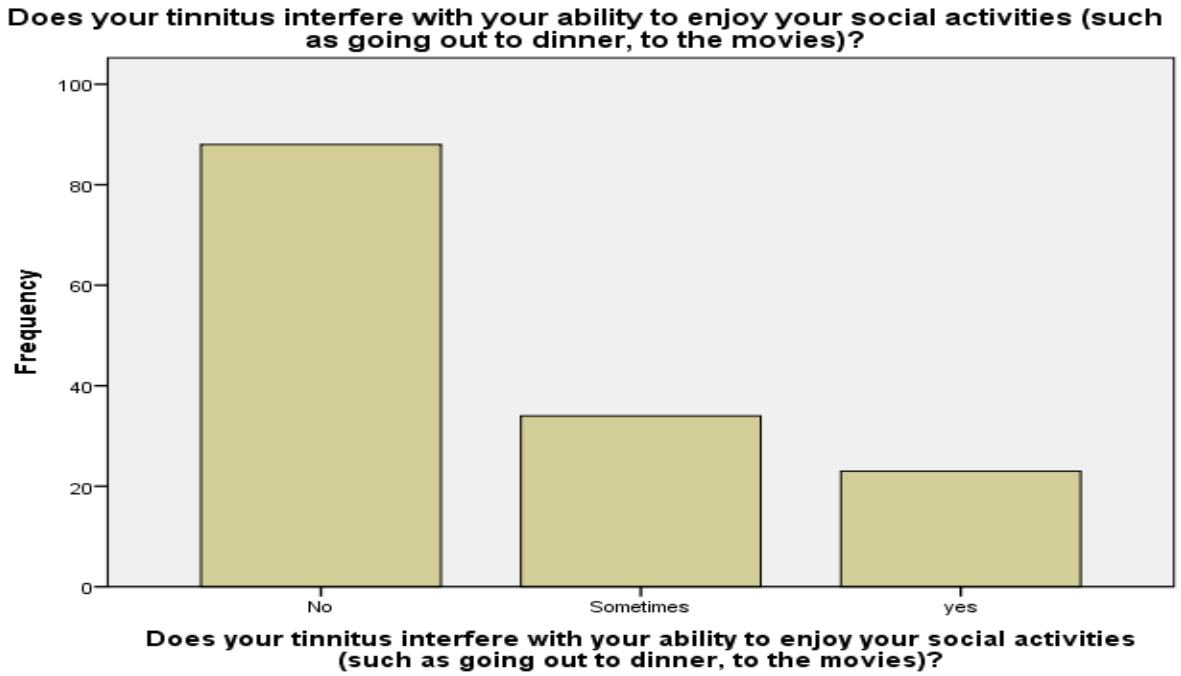

Because of your tinnitus, do you feel frustrated?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	84	57.9	57.9	57.9
Sometimes	28	19.3	19.3	77.2
yes	33	22.8	22.8	100.0
Total	145	100.0	100.0	

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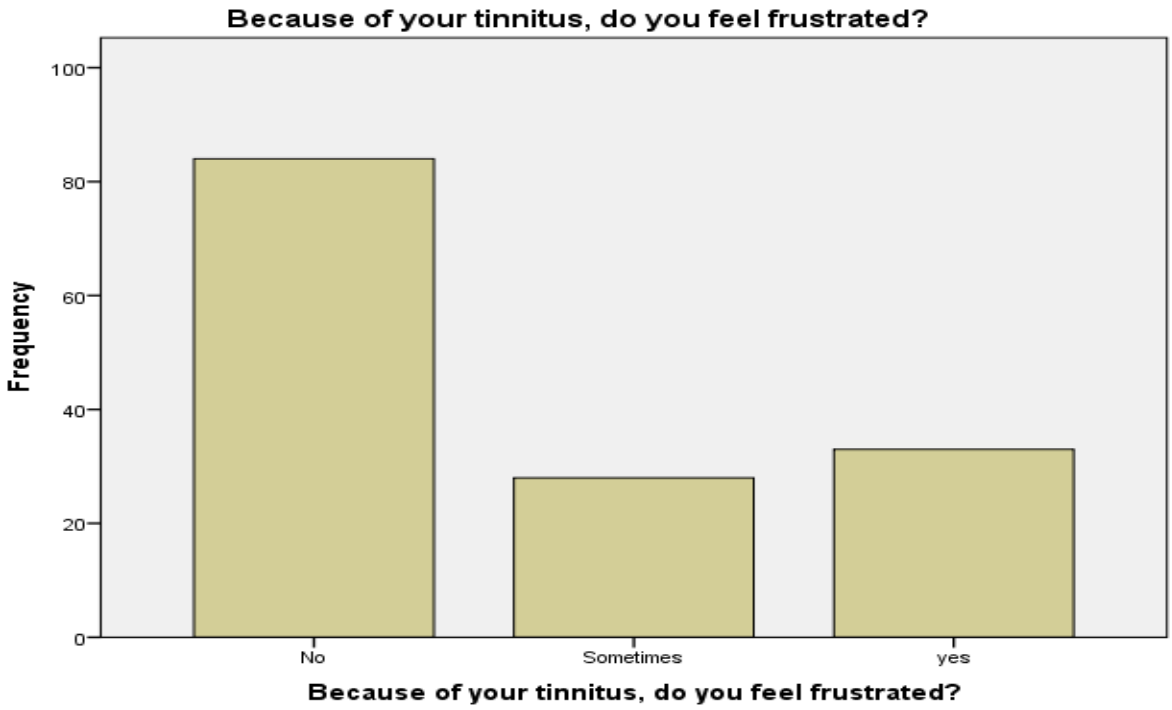

Because of your tinnitus, do you feel that you have a terrible disease?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	87	60.0	60.0	60.0
Sometimes	28	19.3	19.3	79.3
yes	30	20.7	20.7	100.0
Total	145	100.0	100.0	

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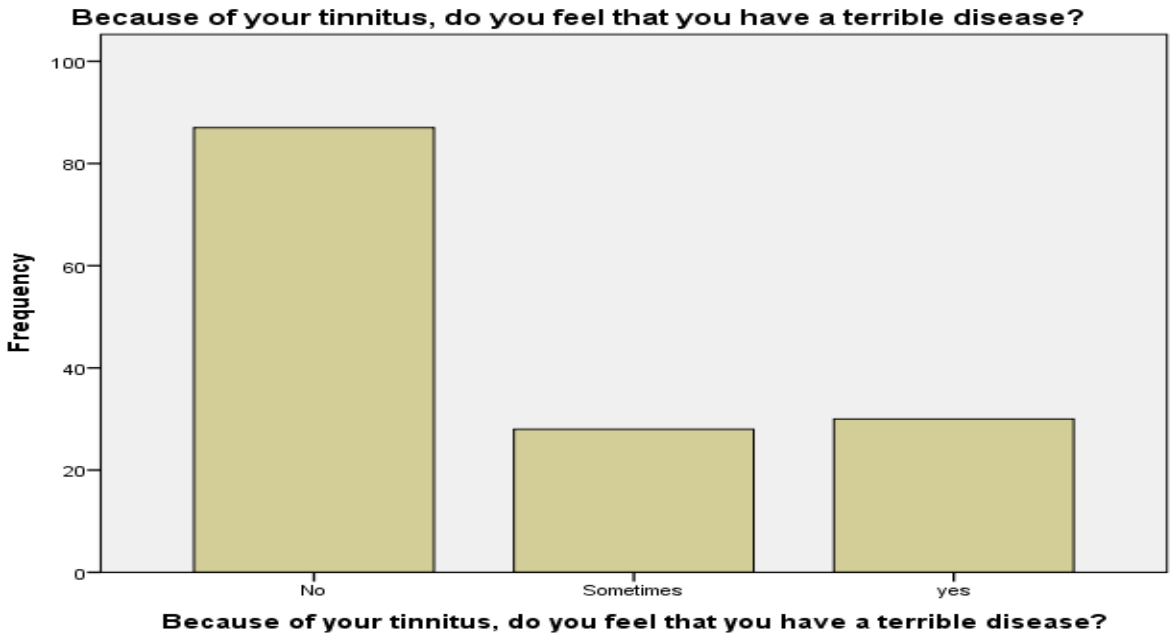

Does your tinnitus make it difficult for you to enjoy life?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	89	61.4	61.4	61.4
Sometimes	28	19.3	19.3	80.7
yes	28	19.3	19.3	100.0
Total	145	100.0	100.0	

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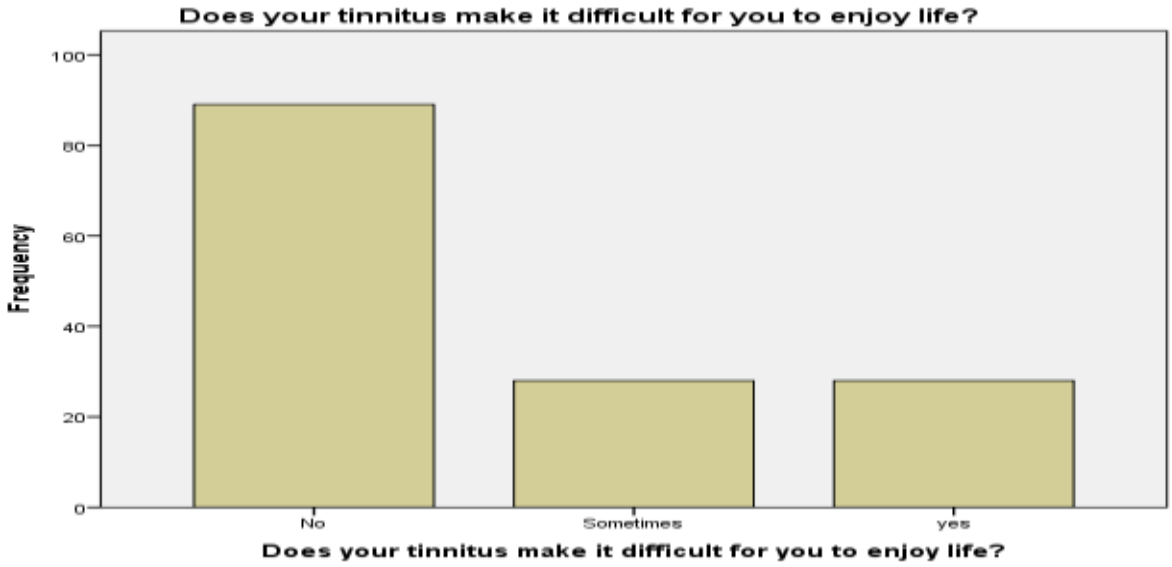

Does your tinnitus interfere with your job or household responsibilities?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	93	64.1	64.1	64.1
Sometimes	26	17.9	17.9	82.1
yes	26	17.9	17.9	100.0
Total	145	100.0	100.0	

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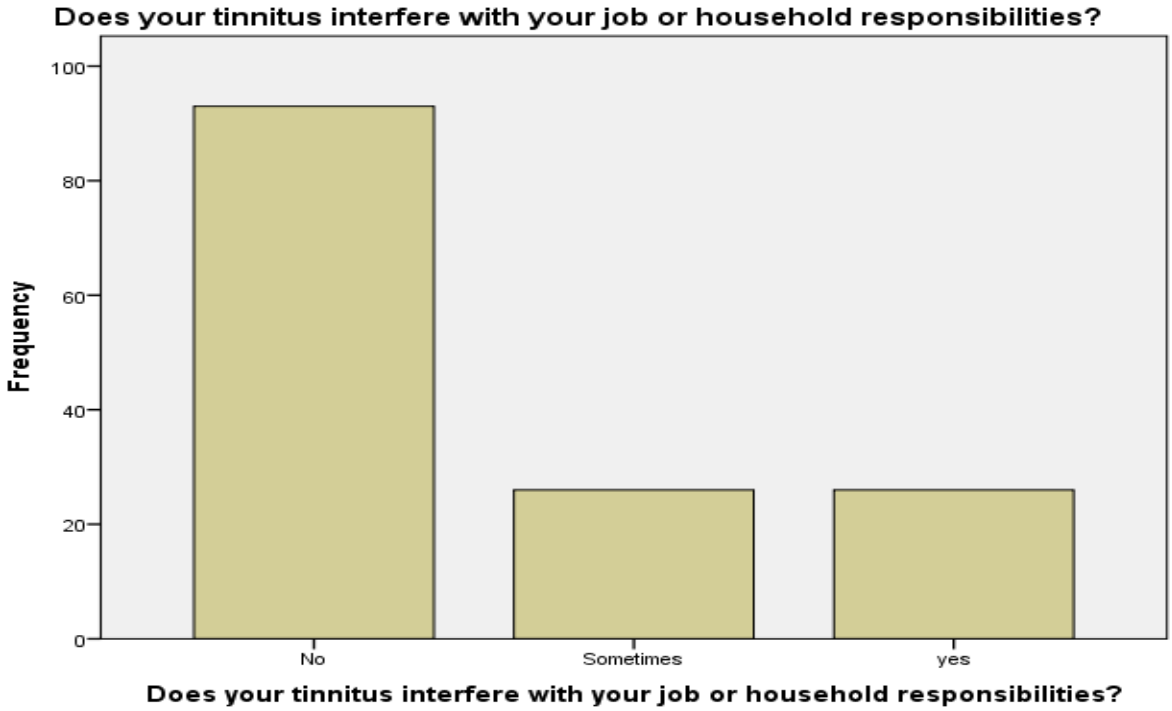

Because of your tinnitus, do you find that you are often irritable?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	86	59.3	59.3	59.3
Sometimes	27	18.6	18.6	77.9
yes	32	22.1	22.1	100.0
Total	145	100.0	100.0	

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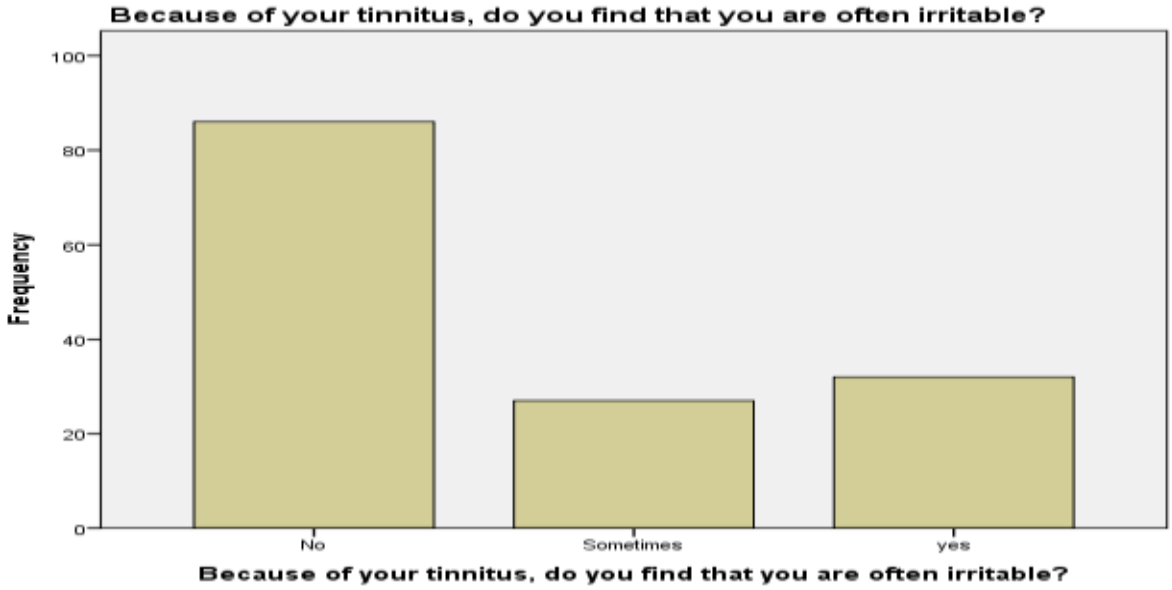

Because of your tinnitus, is it difficult for you to read?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	88	60.7	60.7	60.7
Sometimes	34	23.4	23.4	84.1
yes	23	15.9	15.9	100.0
Total	145	100.0	100.0	

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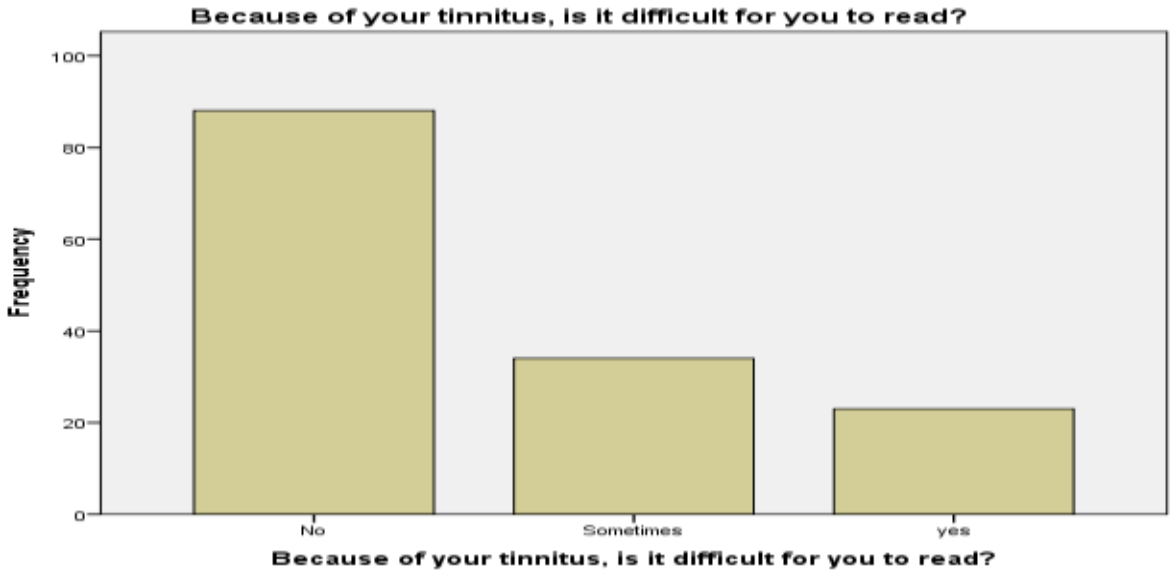

Does your tinnitus make you upset?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	91	62.8	62.8	62.8
Sometimes	22	15.2	15.2	77.9
yes	32	22.1	22.1	100.0
Total	145	100.0	100.0	

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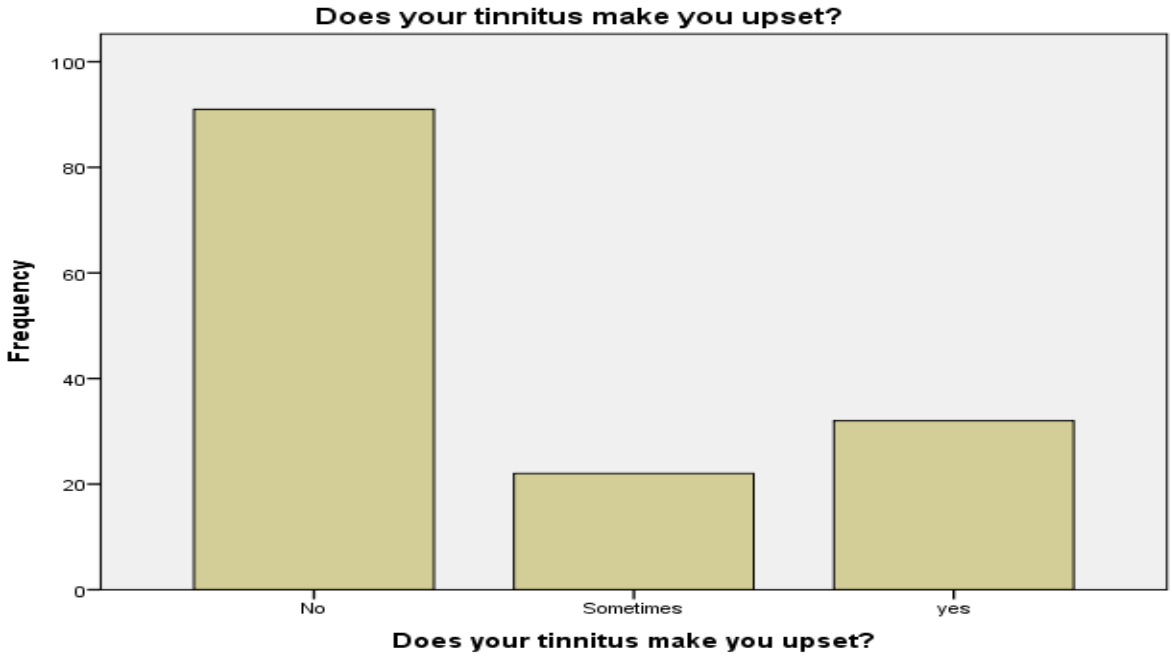

Do you feel that your tinnitus problem has placed stress on your relationships with members of your family and friends?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	98	67.6	67.6	67.6
Sometimes	17	11.7	11.7	79.3
yes	30	20.7	20.7	100.0
Total	145	100.0	100.0	

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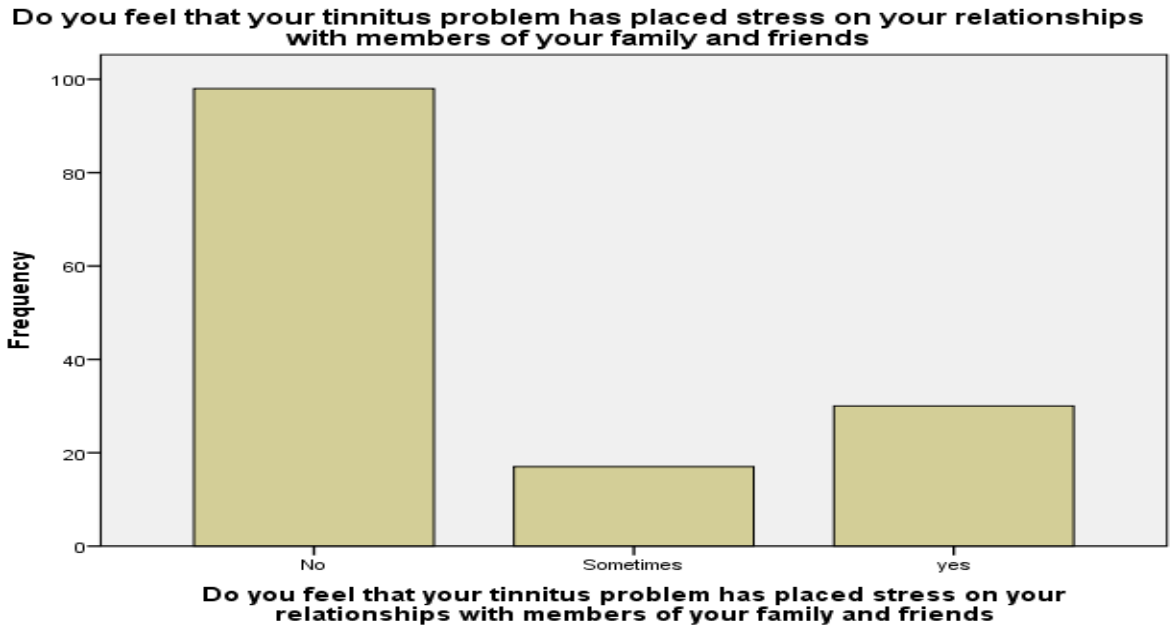

Do you find it difficult to focus your attention away from your tinnitus and on other things?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	91	62.8	62.8	62.8
Sometimes	20	13.8	13.8	76.6
yes	34	23.4	23.4	100.0
Total	145	100.0	100.0	

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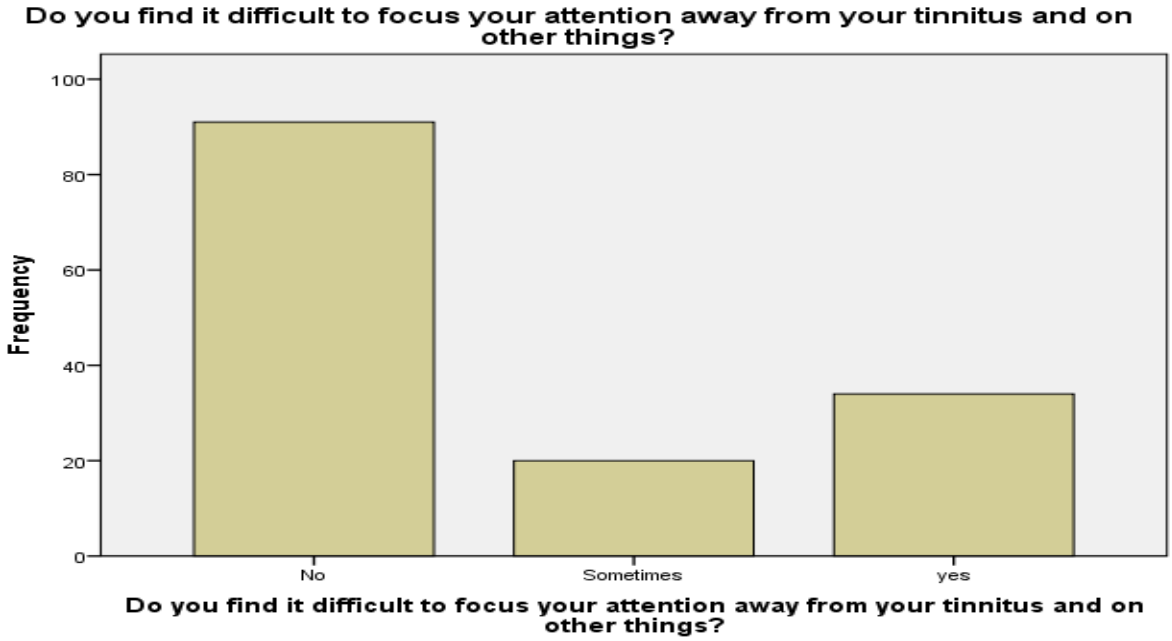

Do you feel that you have 0 control over your tinnitus?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	90	62.1	62.1	62.1
Sometimes	19	13.1	13.1	75.2
yes	36	24.8	24.8	100.0
Total	145	100.0	100.0	

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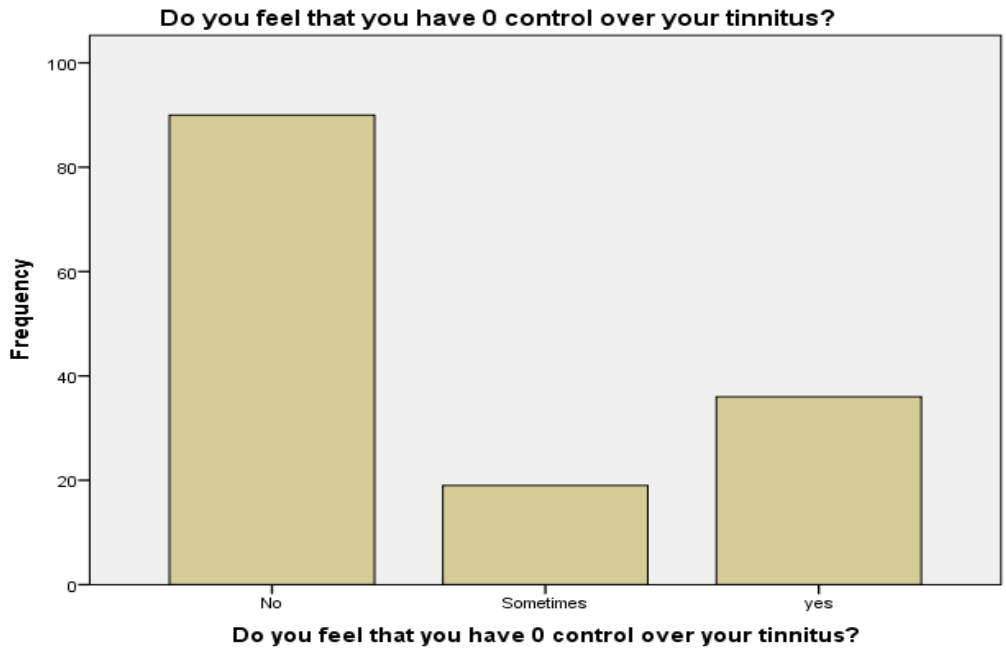

Because of your tinnitus, do you often feel tired?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	89	61.4	61.4	61.4
Sometimes	21	14.5	14.5	75.9
yes	35	24.1	24.1	100.0
Total	145	100.0	100.0	

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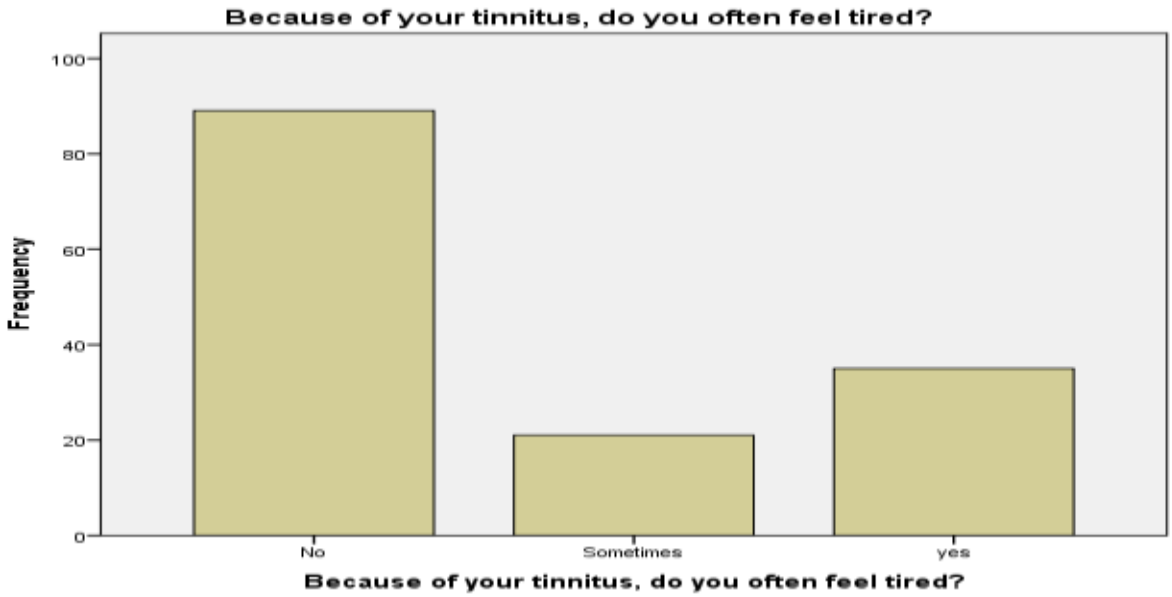

Because of your tinnitus, do you feel depressed?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	95	65.5	65.5	65.5
Sometimes	17	11.7	11.7	77.2
yes	33	22.8	22.8	100.0
Total	145	100.0	100.0	

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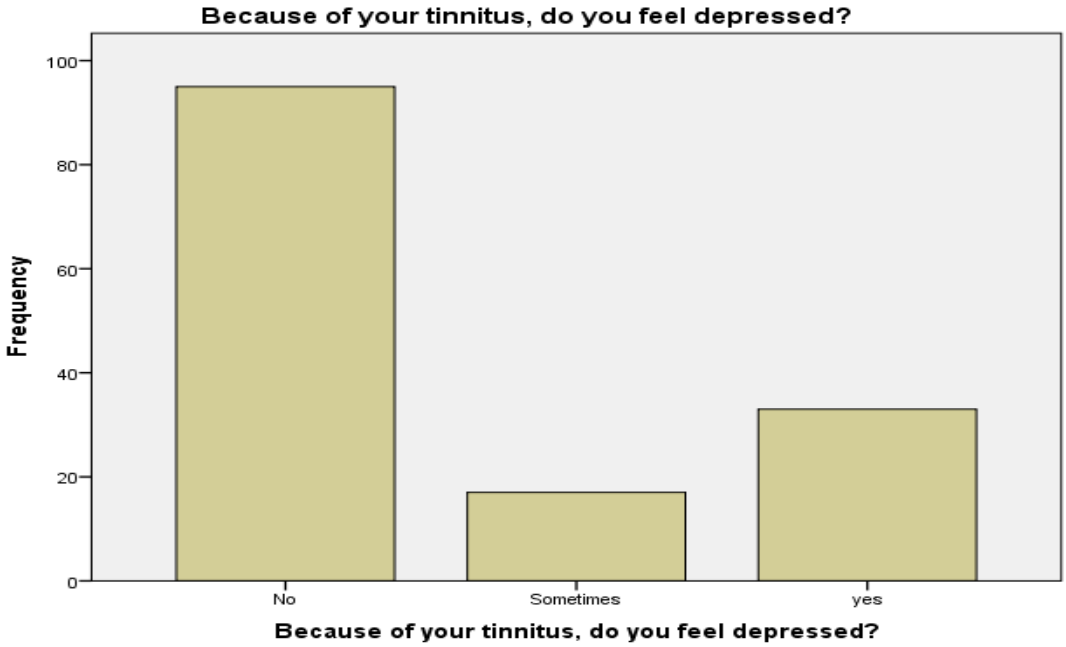

Does your tinnitus make you feel anxious

	Frequency	Percent	Valid Percent	Cumulative Percent
No	91	62.8	62.8	62.8
Sometimes	22	15.2	15.2	77.9
yes	32	22.1	22.1	100.0
Total	145	100.0	100.0	

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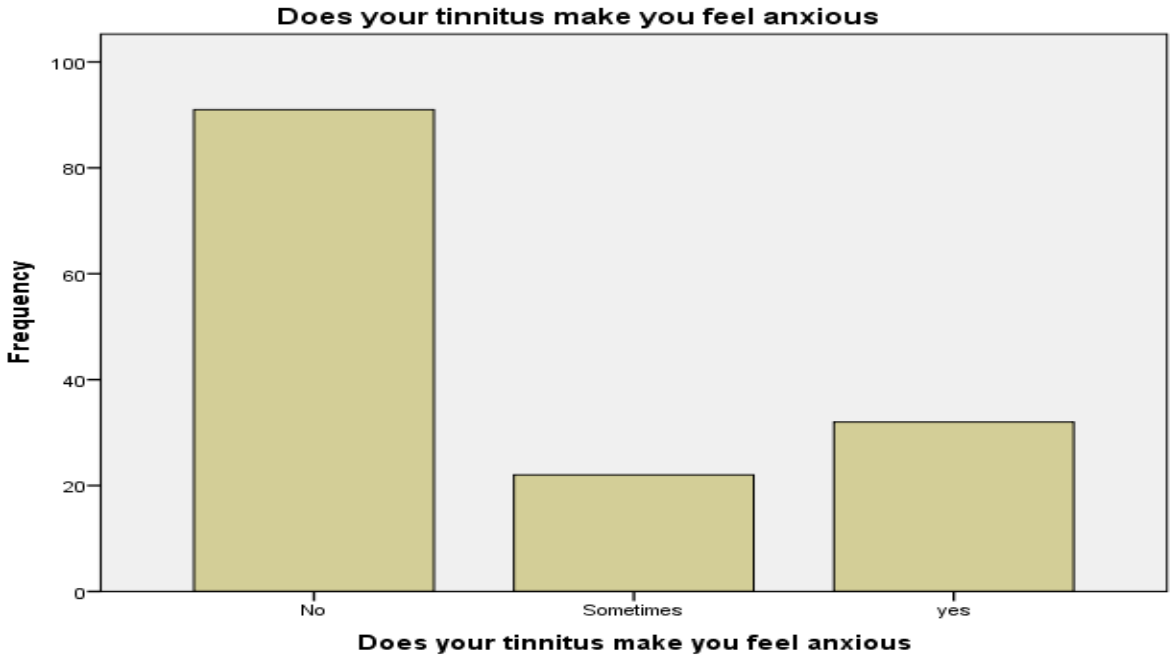

Do you feel that you can 0 longer cope with your tinnitus?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	93	64.1	64.1	64.1
Sometimes	26	17.9	17.9	82.1
yes	26	17.9	17.9	100.0
Total	145	100.0	100.0	

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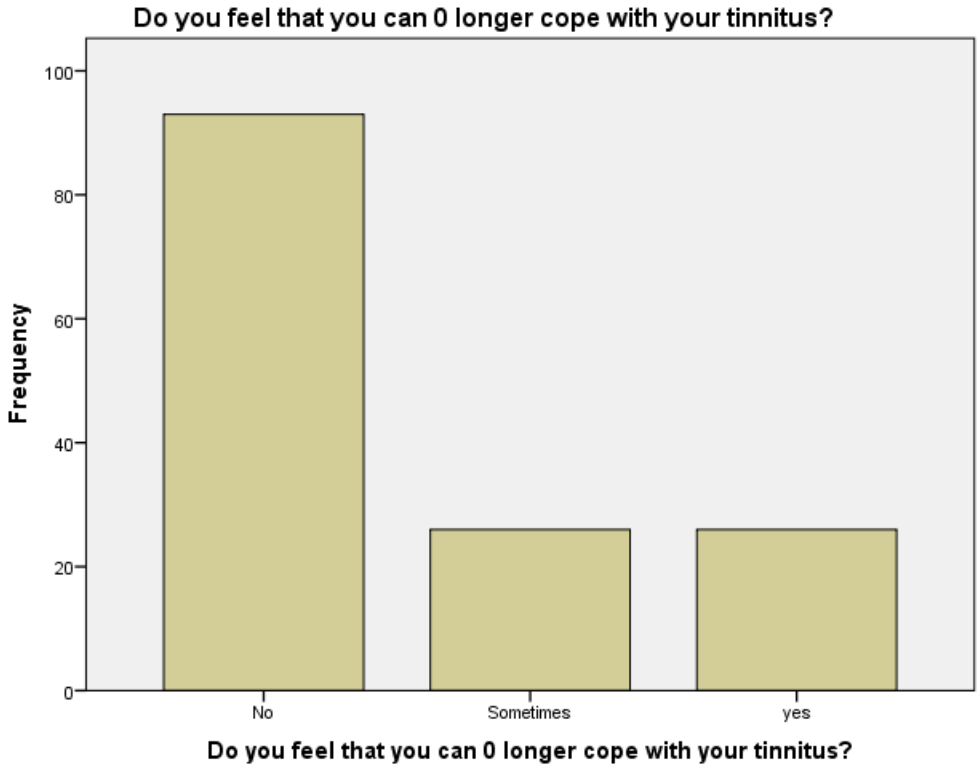

Does your tinnitus get worse when you are under stress?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	92	63.4	63.4	63.4
Sometimes	27	18.6	18.6	82.1
yes	26	17.9	17.9	100.0
Total	145	100.0	100.0	

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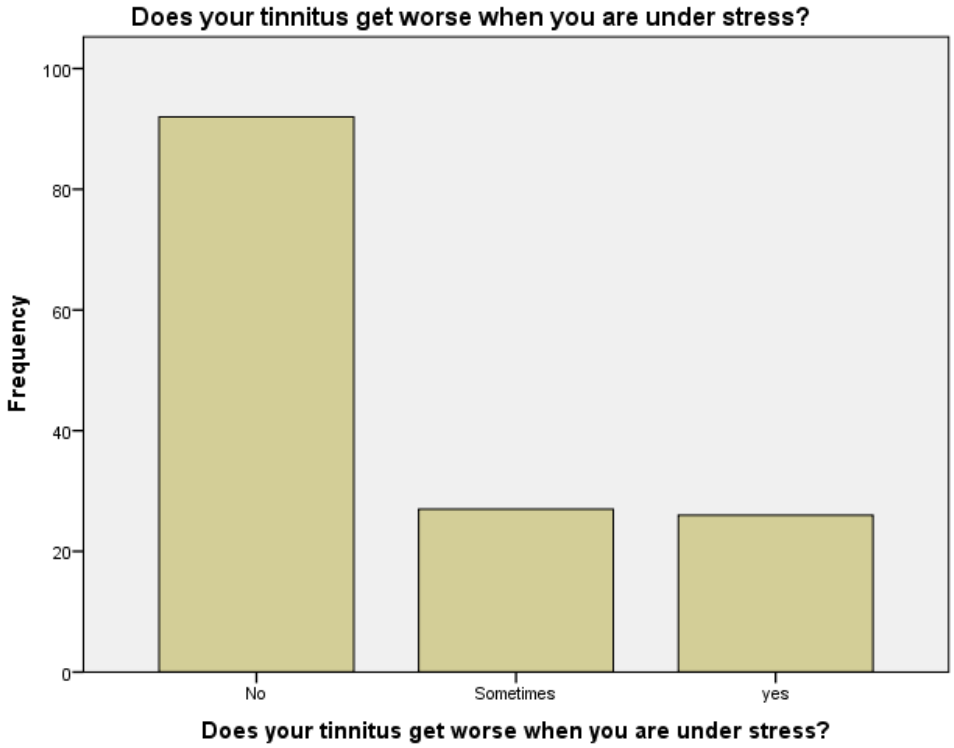

Does your tinnitus make you feel insecure?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	89	61.4	61.4	61.4
Sometimes	23	15.9	15.9	77.2
yes	33	22.8	22.8	100.0
Total	145	100.0	100.0	

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Do you have Jaw pain?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	104	71.7	71.7	71.7
Sometimes	29	20.0	20.0	91.7
yes	12	8.3	8.3	100.0
Total	145	100.0	100.0	

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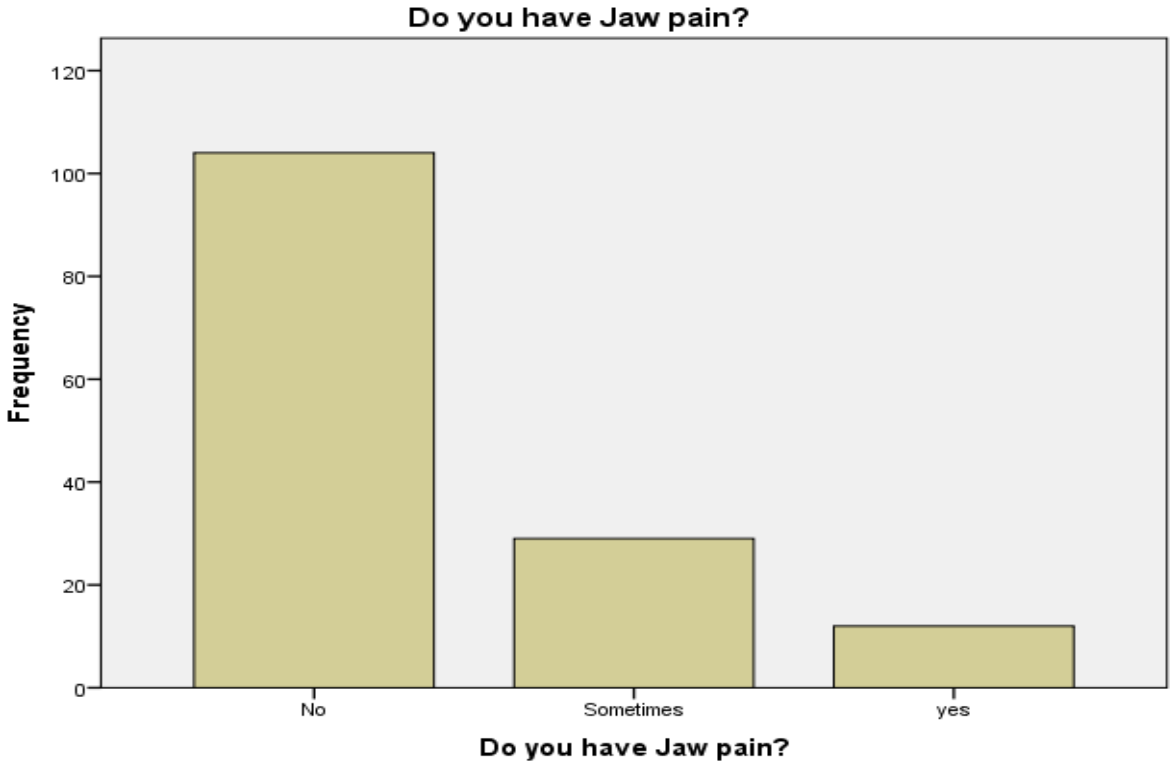

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	65.222[a]	43	.016
Likelihood Ratio	83.606	43	.000
Linear-by-Linear Association	.450	1	.503
N of Valid Cases	145		

a. 82 cells (93.2%) have expected count less than 5. The minimum expected count is .36.

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DISCUSSION

The study with the topic "Association of tinnitus in the patients with cervical and TMJ Disorder" was conducted Patients with cervical (TMD) disorders can present with tinnitus as a primary or secondary complaint. The embryology and functional anatomy of the middle ear, temporomandibular joint, muscles of mastication and associated tendons, ligaments, blood vessels, nerves and lymphatics was found to be helpful in establishing etiologic concepts which relate tinnitus to these temporomandibular disorders. In addition to etiologic concepts, treatment modalities are described. The authors relate their experiences as well as those of others with different patient populations.(17).

The fact that previous studies have also reported an association between tinnitus and cervical and TMJ pain supports the notion that this relationship is not a random occurrence. These findings suggest that there may be shared underlying mechanisms or contributing factors between tinnitus and cervical/TMJ pain, which could explain their co-occurrence in certain individuals. By building upon the existing body of research, the current study contributes to the growing understanding of this association. It confirms and extends the previous findings by specifically exploring the gender differences in the prevalence of tinnitus with cervical and TMJ pain. This novel aspect of the study enhances our knowledge by highlighting potential variations in the manifestation of these symptoms between males and females. It is important to consider the limitations and variations across different studies when interpreting the results collectively. Factors such as differences in sample size, demographic characteristics, study design, and methodology could contribute to discrepancies or variations in findings. Therefore, while the existing studies provide valuable evidence for the association between tinnitus and cervical/TMJ pain, further research is still needed to fully comprehend the underlying mechanisms and establish the causative relationship between these conditions. In summary, the previous studies demonstrating an association between tinnitus and cervical and TMJ pain provide a solid foundation for understanding the relationship between these conditions. The current study's findings, which highlight gender differences in the prevalence of tinnitus with cervical and TMJ pain, add a new perspective to the existing body of knowledge. Future research should continue to explore this association, taking into account the limitations and variations observed across studies, in order to gain a more comprehensive understanding of these complex conditions.22)The given data presents the results of a study on the association between tinnitus and cervical and temporomandibular joint (TMJ) pain in a population sample of 145 patients. The mean age of the population was found to be 35.53, with a standard deviation of ±12.176, indicating a moderate degree of variation in the age distribution.

In terms of gender distribution, the study found that out of the 145 patients, 93 (64.1%) were males and 52 (35.9%) were females. This indicates a higher representation of males in the study population.The study further reveals that there is an association between tinnitus and cervical and TMJ pain, and this association appears to be more common in males. This suggests that males are more likely to experience tinnitus along with cervical and TMJ pain compared to females. On the other hand, females had a lower rate of tinnitus with cervical and TMJ pain, implying that they are less likely to experience these symptoms in combination. These findings suggest a potential gender-based difference in the relationship between tinnitus and cervical and TMJ pain. However, it is important to note that this study provides an association rather than establishing causation. Further research and investigation would be needed to better understand the underlying mechanisms and factors contributing to this association. It is worth mentioning that the study's sample size of 145 patients may not represent the entire population accurately. A larger and more diverse sample would provide more reliable insights into the general population. Additionally, other factors such as comorbidities, lifestyle habits, and individual variations may also influence the association between tinnitus and cervical and TMJ pain and should be considered in future studies.

Overall, this study suggests a higher prevalence of tinnitus with cervical and TMJ pain in males compared to females, highlighting a potential gender-specific pattern. Further research is necessary to delve deeper into the underlying causes and mechanisms of this association and to validate these findings on a larger scale.

Conclusion

The study found that males were more likely to experience tinnitus in conjunction with cervical and TMJ pain. Tinnitus with cervical and TMJ pain was uncommon in women. Pearson's chi square relationship is statistically significant (P=0.016).

Recommendations

Future studies should adjust the current questionnaire by adding more knowledge and perception questions that can be uniformly coded. This study was just limited to Lahore, so it is recommended nationally. Associated of tinnitus with other factors should be study.

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