Mosul Journal of Nursing

Online ISSN: 2663-0311 - Print ISSN: 2311-8784
Website: https://mjn.mosuljournals.com

Association Between Self-Reported Hearing Impairment and Diabetes Mellitus

Iman Ali Rasheed AL-KHLAN[1]; Taner Akarsu*[2]

M.Sc. Nursing, Department of Nursing, Institute of Health Sciences, Ankara Karatekin University, Turkey
PhD. Nursing, Department of Nursing, Institute of Health Sciences, Ankara Karatekin University, Turkey

Article information

Article history:
Received on March 08, 2023
Accepted on June 11, 2023
Available online January 12, 2024

Keywords:
hearing loss, self-reported, diabetic patients, handicap

Correspondence:
Dr. Taner Akarsu
asrin_ozani@hotmail.com

Abstract

Background:
Hearing loss is a growing global health problem in the United States of America. It affects about ten to fifteen percent of most adult Americans and about 70 % of persons 70. The burden of diabetes is expected to increase throughout the world as a result of people living longer and adopting healthier lifestyles. To determine the relationship between self-reported hearing impairment and diabetes in Kirkuk, Iraq.

Methods
A cross-sectional study. The study was applied to 40-60-year-old diabetic patients in health centers in the city center of Kirkuk in Iraq between 20 March / March 2022 and 20 / May / 2022. The Hearing Handicap Inventory for Adult (HHIA) data are collected using the 'The Hearing Handicap Inventory for Adults (HHIA).' By the self-report approach.

Results:
The result showed that approximately 55.8% of self-reported hearing impairments in patients with diabetes in Iraq / Kirkuk City were moderate. More than half of the participants demonstrated moderate hearing loss. Age groups and education levels contribute to hearing loss in patients with diabetes.

Conclusions
Scale scores between diagnosis time groups and treatment types were significantly different. I was organizing a diabetes-specific activist group to raise awareness of the risk of hearing loss in the community.

DOI: **10.33899/mjn.2024.182196,** authors, 2024, College of Nursing, University of Mosul.

INTRODUCTION

Hearing impairment, whether related to age or associated with other health conditions, poses a unique set of challenges for affected individuals(Jafari et al., 2019; Sharma et al., 2021). Communication difficulties, social isolation, and decreased quality of life are expected consequences(Weinstein, 2019). Diabetes, on the other hand, is a complex metabolic disorder characterized by high blood sugar levels, with complications ranging from cardiovascular disease to neurological problems (Bisogno et al., 2021). Although the impact of diabetes on various organ systems is well documented, its potential association with hearing impairment requires closer investigation(Wittich & Simcock, 2019). Hearing impairment and diabetes are two prevalent health concerns that significantly impact the quality of life of people worldwide (Baiduc & Helzner, 2019; Li et al., 2020). Both conditions have substantial public health implications and contribute to the global disease burden (Samocha-Bonet et al., 2021). Although extensive research has explored the individual characteristics and consequences of hearing impairment and diabetes, limited attention has been paid to understanding the potential interconnection between these two health issues, particularly in the context of Iraq and, more specifically, Kirkuk City.

Iraq, a country with a rich cultural heritage and a history shaped by various social, economic, and political factors, faces a growing health challenge due to the increasing prevalence of chronic diseases such as diabetes. The increasing incidence of diabetes in Iraq has led researchers to explore its multifaceted implications in various aspects of health. However, the relationship between diabetes and hearing impairment remains a relatively unexplored area globally and within the specific regional context of Kirkuk City.

This study aims to bridge the knowledge gap by investigating the association between self-reported hearing impairment and diabetes in the Kirkuk City population, Iraq. Understanding the potential link between these two prevalent health conditions is crucial for forming public health strategies and improving patient care and overall well-being in this region. By shedding light on this association, we can pave the way for targeted interventions, early detection, and improved management of these health concerns, ultimately contributing to a healthier and more resilient community in Kirkuk City.

Study design and population:

The study used a cross-sectional design and focused on diabetic patients aged 40-60 in health centers within Kirkuk City, Iraq. Data collection took place between 20 March 2022 and 20 May 2022. The research aimed to achieve a population size of 140, with a 95% confidence interval, a 5% error rate (α), and a power of 80% power (1-β). The determination of the sample size, considering ANOVA and independent t-test analyses, resulted in a sample of 104 patients to maintain optimal statistical power. The inclusion criteria for this study included people who expressed a voluntary willingness to participate, were adults between 40 and 60 years of age, had received a diabetes diagnosis at least six months prior, and demonstrated good cognitive function and ease of verbal communication. On the contrary, the exclusion criteria included people who did not participate, those with a cancer diagnosis, people experiencing immobility or physical disabilities, and those with impaired cognitive function that could significantly affect effective communication.

Data Collection Tools:

The demographic information form for the patient consisted of 19 questions that included sociodemographic characteristics, health status, disease details, and drug use. Furthermore, the study used the Hearing Handicap Inventory for Adults (HHIA), a self-assessment scale comprising 25 items with response options of yes, no, or sometimes. The scores were assigned as follows: Yes (4 points), no (0 points), and Sometimes (2 points). The total scores were then classified into three levels: 0-17, indicating no barriers; 18-42, indicating mild to moderate disability; and 43 or more, indicating a significant obstacle. HHIA, validated in Arabic, demonstrated excellent internal consistency and reproducibility in this study.

Statistical analysis:

Statistical analysis was performed using IBM SPSS 26 and Microsoft Office Excel 365. Normality was assessed using the Kolmogorov-Smirnov / Shapiro-Wilk tests. Descriptive statistics are presented as (standard deviation) or (median and min-max). Categorical variables were analyzed using Pearson / Fisher exact chi-square tests. Continuous data was assessed with the t-test or the Mann-Whitney U test based on distribution. Correlation and linear regression analysis were used to explore the relationships between variables. Significance set at $p<0.05$.

Ethical Considerations:

Approval was obtained from the Ethics Committee of Ankiri Karatkin University and the Iraqi Ministry of Health / Environment. Permission was obtained from the directors of Azadi Teaching Hospital, Kiwan Health Center, and Diabetes Housing Health Center. Participants provided their informed consent and were assured of voluntary participation and the right to withdraw at any stage.

RESULTS:

When analyzing the study results, most participants, mainly 50-60 years old with a mean age of 50.56±6.70 years, showed a balanced gender distribution (56.7% male, 43.3% female) and a prevalent marital status of 86.5%. Most of the cohort had children (79.8%) and possessed at least a bachelor's degree (30.77%). The participants showed diversity in occupation, with 25% homemakers, 30.8% officers, and 10.6% workers. Residency predominantly included city/metro areas (42.3%), and 23% of the participants had health insurance coverage. Regarding the history of diabetes mellitus (DM), the study identified a predominant occurrence of Type 1 diabetes (57.7%) with an average duration since diagnosis of 9.63±6.408 years, and insulin needles were the primary treatment method (53.8%). The Adult Hearing Handicap Inventory (HHIA) revealed varying levels of hearing impairment, with mean scores indicating moderate impairment (53.7±16.5), emotional subdimension scores at 26.0±8.5, and situational subdimension scores at

27.7±8.9. In the evaluation of the total HHIA scores, 31.7% reported no handicaps, 51.9% mild-moderate handicaps, and 16.4% severe handicaps. Relationship analyses also indicated significant correlations between self-reported hearing impairment and age, educational level, time since diagnosis, type of treatment, and specific complications ($p<0.05$). These findings underscore the multifaceted nature of hearing impairment within the diabetic population, highlighting the need for customized interventions and comprehensive care strategies.

Table 1: Distribution of the study sample related to the sociodemographic characteristics of patients with diabetes in Iraq/Kirkuk City.

Variable	Group	Frequency	%
	40-49	49	45.19
	50-60	55	54.81
Age	Total	104	%100
	Mean + SD = 50.56 ± 6.70 years		
	Male	59	56.7
Gender	Female	45	43.3
	Total	104	100.0
	Total	104	100.0
	Housewife	26	25.0
	Officer	32	30.8
	Worker	11	10.6
	Retired	15	14.4
Occupation	Self-employed	5	4.8
	Not working	15	14.4
	Total	104	100.0
Type of diabetes	Type 1 diabetes	60	57.7
	Type 2 diabetes	36	34.6
	GDM	8	7.7
	Total	104	100
	6 (months) - 10 years	70	67.3
	11-20 years	26	25.0
	21-30 years	8	7.7
Time since diagnosis	Six months, -30 years	104	100.0
	Mean + SD =9.63 ± 6.408		
Type of treatment	diabetes drugs	48	46.2
	insulin needles	56	53.8
	Total	104	100.0

Table 2 Adult Hearing Handicap Inventory (HHIA) for patient diabetes

Hearing impairment	No		Sometimes		Yes		Mean
	F	%	F	%	F	%	
Does a hearing problem cause you to use the phone less often than you would like?	19	18.3	44	42.3	41	39.4	2.21
Does a hearing problem make you feel embarrassed when meeting new people?	13	12.5	57	54.8	34	32.7	2.20
Does a hearing problem cause you to avoid groups of people?	23	22.1	43	41.3	38	36.5	2.14
Does a hearing problem make you irritable?	16	15.4	34	32.7	54	51.9	2.37
Does a hearing problem make you feel frustrated when talking to family members?	27	26	42	40.4	35	33.7	2.08
Does a hearing problem cause you difficulty attending a party?	20	19.2	51	49.0	33	31.7	2.13
Does a hearing problem make you feel 'stupid' or 'dumb'?	17	16.3	48	46.2	39	37.5	2.21
Do you have difficulty hearing someone speak in a whisper?	35	33.7	38	36.5	31	29.8	1.96
Do you feel disabled by a hearing problem?	25	24.0	48	46.2	31	29.8	2.06
Does a hearing problem cause difficulties when visiting friends, family, or neighbors?	29	27.9	49	47.1	26	25.0	1.97
Does a hearing problem cause you to attend religious services less often than you would like?	28	26.9	39	37.5	37	35.6	2.28
Does a hearing problem cause you to be nervous?	16	15.4	41	39.4	47	45.2	2.30
Does a hearing problem cause you to visit friends, family, or neighbors less often than you would like?	18	17.3	54	51.9	32	30.8	2.13
Does a hearing problem cause you to have arguments with family members?	21	20.2	57	54.8	26	25.0	2.05
Does a hearing problem cause you difficulty listening to TV or radio?	35	33.7	39	37.5	30	28.8	1.94
Does a hearing problem cause you to shop less often than you would like?	42	40.4	31	29.8	31	29.8	1.89
Does your hearing problem or difficulty bother you at all?	30	28.8	48	46.2	26	25.0	1.96
Does a hearing problem make you want to be alone?	29	27.9	42	40.4	33	31.7	2.04
Does a hearing problem cause you to talk to family members less often than you would like?	20	19.2	55	52.9	29	27.9	2.09
Do you feel that difficulty with your hearing limits or hampers your personal or social life?	27	26.0	46	44.2	31	29.8	2.03
Does a hearing problem cause difficulties in a restaurant with family or friends?	33	31.7	42	40.4	29	27.9	1.96
Does a hearing problem make you feel depressed?	30	28.8	36	34.6	38	36.5	2.08
Does a hearing problem cause you to listen to television or radio less often than you would like?	26	25.0	46	44.2	32	30.8	2.05
Does a hearing problem make you uncomfortable when talking to friends?	32	30.8	39	37.5	33	31.7	2.01
Does a hearing problem make you feel left out when you are?	35	33.7	40	38.5	29	27.8	1.94

Table 3 Distribution of hearing impairments of participants in the study

	F	%
No handicap (0-8)	33	31.7
Mild-moderate (10-24)	54	51.9
Severe (26.40)	17	16.4
Total	104	100.0

Table 4: Relationship between demographic data and self-reported hearing impairment.

Variable	F/t value	p-value
Age	-2.757*	0.007
Gender	0.960	0.386
Occupation	0.271	0.763
Type of diabetes	0.910	0.406
Time since diagnosis	0.255#	0.009
Type of treatment	-2.607**	0.011

Table 5: Relationship between patient diabetes mellitus complications and self-reported hearing impairment.

Variable	t-value	p-value
Double vision	2.043	0.135
Diabetic foot	2.051	0.134
slow healing wound	2.659	0.075
Stroke/angina pectoris	4.665	0.012
Kidney problems	1.599	0.207
Fine nerve damage	0.720	0.489
Gum problems	0.334	0.717
Problems with the husband	7.427	0.001

DISCUSSION

This section comprehensively interprets and discusses the study findings in light of the research objectives, drawing support from relevant literature. The age distribution of the participants, with more than half falling within the 50-60 age group, agrees with the study by Soares et al. (2018), where a similar trend was observed(Ponte et al., 2023). However, these results contrast with those of Kim et al. (2017), indicating the need to consider regional variations and demographic differences(Kim et al., 2017). The gender distribution in this study, with more male participants, diverges from the findings of Zhang et al. (2019), (Zhang et al., 2019) but aligns with Kim et al. (2017). The prevalence of hearing impairment in men found in Brazilian research (Sachdeva & Azim, 2018) offers a potential explanation for this gender-based difference(Sachdeva & Azim, 2018). Contrary to the study by Nuesse et al. (2021), which noted a low level of education among diabetes patients, less than one-third of our study had a bachelor's degree(Nuesse et al., 2021). This discrepancy highlights the diverse educational backgrounds within the study population. In particular, the unexpectedly high prevalence of Type 1 diabetes challenges previous assumptions about the prevalence of diabetes in Iraqi societies, deviating from the norm reported by Meneses-Barriviera et al. (2018)(Meneses-Barriviera et al., 2018). In our study, complications of diabetes, including double vision, kidney problems, gum problems, slow-healing wounds, and stroke/angina pectoris, were prevalent, providing new information on the specific complications facing this population. The novel contribution of the study lies in revealing a substantial prevalence of hearing impairment among patients with diabetes. The findings substantiate the need for ongoing research to understand the etiological factors that link diabetes and hearing impairment, promoting the development of targeted preventive measures. The study highlights a significant association between hearing impairment and age, educational level, and specific complications such as stroke/angina pectoris. This is consistent with studies by Lee et al. (2015), Kim et al. (2017), and Spankovich & Yerraguntla (2019), which emphasize the enduring relationship between diabetes and hearing loss, even after accounting for confounders variables (Lee et al., 2015; Spankovich & Yerraguntla, 2019). The study underscores the importance of glycemic control in diabetes, as indicated by the correlation between HbA1c levels and the risk of hearing loss (Kim et al., 2017). Furthermore, the prevalence of mild to moderate hearing impairments in approximately half of the participants requires increased attention at the local and national levels, emphasizing the urgency of targeted interventions and further research. Although the study contradicts some previous findings on the relationship between diabetes and incident hearing loss, it aligns with others, emphasizing the multifactorial nature of risk factors for hearing impairment. The unexpected link between diabetes and hearing loss, particularly in the worst and best ears at all degrees and frequencies, underscores the urgency of comprehensive healthcare strategies. The connection between diabetes and hearing impairment, even after considering confounding factors, implies a complex interplay between various elements. Smoking emerges

as a notable risk factor, aligning with previous studies linking smoking with higher odds of hearing loss(Alizadeh et al., 2022; Gioacchini et al., 2023; Shafiepour et al., 2022). The study's exploration of complications, such as sexual partners as significant contributors to self-reported hearing impairment, adds a unique dimension to the existing literature.

CONCLUSİONS

In conclusion, this study provides valuable information on the intricate relationship between diabetes and hearing impairment, shedding light on demographic variations and unexpected prevalence rates. These findings underscore the need for targeted public health interventions focusing on preventing hearing loss in patients with diabetes. The correlations between education, age, and specific complications highlight the need for nuanced and personalized healthcare approaches. Although the study revealed new associations, it also emphasizes the need for continued research to refine our understanding of the intricate links between diabetes and hearing impairment, ultimately facilitating the development of effective preventive measures and interventions.

This research study, **'Association between self-reported hearing impairment and Diabetes in Iraq / Kirkuk City,' was** conducted by **IMAN AL RASHEED AL-KH L[1] Asst. Prof. Dr. Taner AKARSU[2]** has received ethical approval from the Graduate School of Health Sciences Ethics Committee at **Ankr Karatekin University**.

FUNDING This research did not receive grants from public, commercial, or nonprofit funding agencies.

AUTHOR'S CONTRIBUTIONS

Study the concept, and write and review the final edition by all authors.

DISCLOSURE STATEMENT:

The authors report that they have no conflict of interest.

ACKNOWLEDGMENTS

The authors thank the anonymous referees for their helpful suggestions.

REFERENCES

Alizadeh, Y., Jalali, M. M., & Sehati, A. (2022). Association of different severity of diabetic retinopathy and hearing loss in type 2 diabetes mellitus. American Journal of Otolaryngology, 43(2), 103383.

https://doi.org/10.1016/j.amjoto.2022.103383

Baiduc, R. R. & Helzner, E. P. (2019). Epidemiology of diabetes and hearing loss. Seminars in hearing. https://doi.org/10.1055/s-0039-1697643

Bisogno, A., Scarpa, A., Di Girolamo, S., De Luca, P., Cassandro, C., Viola, P., Ricciardiello, F., Greco, A., De Vincentiis, M. & Ralli, M. (2021). Hearing loss and cognitive impairment: epidemiology, common pathophysiological findings, and treatment considerations. Life, 11(10), 1102.

https://doi.org/10.3390/life11101102

Gioacchini, F. M., Pisani, D., Viola, P., Astorina, A., Scarpa, A., Libonati, F. A., Tulli, M., Re, M., & Chiarella, G. (2023). Diabetes mellitus and hearing loss: a complex relationship. Medicina, 59(2), 269. https://doi.org/10.3390/medicina59020269

Jafari, Z., Kolb, B.E. & Mohajerani, M.H. (2019). Age-related hearing loss and tinnitus, risk of dementia, and auditory amplification outcomes. Aging Research Reviews, 56, 100963. https://doi.org/10.1016/j.arr.2019.100963

Kim, M.B., Zhang, Y., Chang, Y., Ryu, S., Choi, Y., Kwon, M.J., Moon, I. J., Deal, J. A., Lin, F.R. & Guallar, E. (2017). Diabetes mellitus and the incidence of hearing loss: A cohort study. International Journal of Epidemiology, 46(2), 717–726.https://doi.org/10.1093/ije/dyw243

Lee, J. S., Choi, H. G., Jang, J. H., Sim, S., Hong, S. K., Lee, HJ, Park, B., & Kim, HJ (2015). Analysis of predisposing factors to hearing loss in adults. Journal of Korean Medical Science, 30(8), 1175-1182.

https://doi.org/10.3346/jkms.2015.30.8.1175

Li, Y., Liu, B., Li, J., Xin, L., & Zhou, Q. (2020). Early detection of hearing impairment in patients

with type 2 diabetes. Acta otolaryngologica, 140 (2), 133-139.

https://doi.org/10.1080/00016489.2019.1680863

Meneses-Barriviera, C. L., Bazoni, J. A., Doi, M. Y. & Marchiori, L. L. d. M. (2018). Probable association of hearing loss, hypertension, and diabetes mellitus in the elderly. International Archives of Otorhinolaryngology, 22(04), 337-341. https://doi.org/10.1055/s-0037-1606644

Nuesse, T., Schlueter, A., Lemke, U. & Holube, I. (2021). Self-reported hearing disability in adults 55 to 81 is modulated by hearing abilities, frailty, mental health, and willingness to use hearing aids. International Journal of Audiology, 60 (sup2), 71-79.

https://doi.org/10.1080/14992027.2020.1858237

Ponte, E V., Belleze, L., Burch, M. O., Soares, L. A. T., Pandini, V. C. M., Prestes, R. Bertolino, J. R., & Mamoni, R. L. (2023). Association between COPD and hearing loss with impaired speech recognition: a cross-sectional study. https://doi.org/10.22541/au.169890128.86446448/v1

Sachdeva, K. & Azim, S. (2018). Sensorineural hearing loss and type II diabetes mellitus. Int J Otorhinolaryngol Head Neck Surg, 4(2), 499-507.https://doi.org/10.18203/issn.2454-5929.ijohns20180714

Samocha-Bonet, D., Wu, B., & Ryugo, D. K. (2021). Diabetes mellitus and hearing loss: A review. Aging Research Reviews, 71, 101423. https://doi.org/10.1016/j.arr.2021.101423

Shafiepour, M., Bamdad, Z. & Radman, M. (2022). Prevalence of hearing loss among patients with type 2 diabetes. Journal of Medicine and Life, 15(6), 772. https://doi.org/10.25122/jml-2021-0300

Sharma, R. K., Chern, A. & Golub, J.S. (2021). Age-related hearing loss and the development of cognitive impairment and late-life depression: a brief overview. Seminars in Hearing,

https://doi.org/10.1055/s-0041-1725997

Spankovich, C. & Yerraguntla, K. (2019). Evaluation and treatment of patients with diabetes and hearing loss. Seminars in Hearing, https://doi.org/10.1055/s-0039-1697644

Weinstein, B.E. (2019). The cost of age-related hearing loss: treat or not to treat? Speech, Language, and Hearing, 22(1), 9-15.

https://doi.org/10.1080/2050571X.2018.1533622

Wittich, W. & Simcock, P. (2019). Aging and combined vision and hearing loss. The Routledge Handbook of Visual Impairment London: Routledge, 438-456.

https://doi.org/10.4324/9781315111353-27

Zhang, Y., Jiang, Q., Wu, X., Xie, S., Feng, Y. & Sun, H. (2019). The influence of metabolic syndrome on the prognosis of sudden idiopathic sensorineural hearing loss. Otology & Neurotology, 40(8), 994–997.

https://doi.org/10.1097/MAO.0000000000002352