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Frequency and Pattern of Ear, Nose and Throat Diseases in Patients with Diabetes

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Abstract

Diabetes Mellitus has become a prominent public health issue, which has many different complications including ear, nose, and throat (ENT) conditions. The data regarding the prevalence and patterns of ENT conditions among diabetic patients in Pakistan are limited. The study aimed to explore the frequency and pattern of ENT conditions in patients with diabetes and to assess their associations with demographic and clinical parameters. A descriptive cross-sectional study was conducted at a tertiary care hospital. 230 adult diabetic patients, after which demographic and clinical parameters were collected after patients underwent a thorough examination of the ENT structures. Statistical analysis performed for the associations using chi-square tests and logistic regression. The mean age of the sample was 53.2 ± 12.1 years, with 53.9% being male. 84.3% of the sample had Type 2 diabetes, with mean duration of diabetes of 8.7 ± 6.3 years. The frequency of ENT conditions in diabetic patients was 63.5% ($n = 146$). The most prevalent ENT conditions included, otitis externa (32.9%), chronic rhinosinusitis (26.7%), sensorineural hearing loss (19.2%), and oral candidiasis (13.0%). The prevalence of ENT conditions was significantly associated with increasing age ($p = 0.031$), duration of diabetes ($p = 0.018$), and poor glycemic control ($HbA1c \geq 7.0\%$; $p = 0.007$). Multivariate analysis showed, age >60 years (OR: 1.78, 95% CI: 1.13–2.81), duration of diabetes of >10 years (OR: 1.92, 95% CI: 1.11–3.33), and poor glycemic control (OR: 2.12, 95% CI: 1.27–3.54) were all independently associated with ENT conditions. The study found the recent evidence that ENT conditions are nearly 63% prevalent among diabetic patients in Karachi, Pakistan, and are more frequent among older patients and patients with longer duration of diabetes and poor glycemic control. Therefore, it is essential that ENT conditions be routinely identified and integrated into the diabetes care model to reduce the morbidity that occurs among diabetic patients.

Keywords: Diabetes mellitus; ENT diseases; Otitis externa; Chronic rhinosinusitis; Hearing loss; Glycemic control; Prevalence

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder that affects millions of people worldwide and is an important public health issue because of its incredibly quickly increasing prevalence and unique complications (American Diabetes Association (ADA), 2023). Diabetes has many systemic effects, but the consequences of diabetes on the ear, nose, and throat (ENT) region have received increasing attention in the last few years. The pathophysiological mechanisms related to diabetes (i.e. microvascular alterations, immune compromise, neuropathy) put patients at risk for a multitude of ENT diseases with significant morbidity (Shrestha et al., 2022).

Research has shown that diabetes patients are at a greater chance for both infectious and non-infectious ENT conditions than individuals without diabetes. These conditions may involve chronic rhinosinusitis, otitis externa, hearing impairment and oral candidiasis (Lai et al., 2022; Jayakumar et al., 2021). For example, chronic otitis media and sudden sensorineural hearing loss have been reported more often in diabetic adults than the general population, possibly due to diabetic microangiopathy affecting the auditory system (Kakarlapudi et al., 2020). In addition, diabetic patients are also more susceptible to often life-threatening ENT infections, such as malignant otitis externa, which occurs primarily in immunocompromised individuals (Eren et al., 2023).

There are several reasons diabetes continues to increase the prevalence of ENT disorders. Hyperglycemia and the resultant diabetes have two key factors that impair immunity. One, hyperglycemia directly impairs neutrophil function and secondly, it causes impaired wound healing and subsequent overgrowth of pathogenic organisms - particularly in the upper respiratory tract (Tomioka et al., 2022). Diabetic neuropathy (e.g. loss of sensation) also likely matters because if the sensory perception in the area is impaired, infections might go unnoticed and possible neglected as well. Progressively hypertrophy of the external influence of hyperglycemia and diabetes leads to excessive cerumen production. Furthermore, hearing loss by individuals with diabetes is usually bilateral and progressive, which may have both peripheral and central consequences (Gupta et al., 2021).

In a recent systematic review and meta-analysis by Akinpelu et al. (2022), one of the findings concluded the global prevalence of hearing loss among adults with diabetes was considerably higher level than the prevalence among non-diabetic adults, highlighting the importance of performing regular auditory screening in people who have diabetes. Also, oral manifestations such as xerostomia, periodontitis, and oral candidiasis are potentially more prevalent in diabetic individuals and can affect quality of life and nutritional status (Preshaw et al., 2022). If there is no treatment for these ENT complications, they can lead to serious infections affecting glycemic control which leads to a vicious cycle.

Though an awareness of ENT complications in diabetes has increased, empirical data from low- and middle-income countries, including Pakistan, where conditions are already exacerbating rapidly (Basit et al., 2023), are still seldom. Existing data have focused on studies of high-income countries with little discussion or acknowledgement of the frequency or pattern of ENT in populations with diabetes in South Asia. Such discussions often overlook socio-economic statuses, access to healthcare, culture, and genetics, which contribute to disease patterns and health care in Pakistan.

Purpose of the Study

The purpose of this study is to examine the distribution and occurrence frequency of ENT disorders in patients suffering from diabetes in Pakistan. By identifying the burden and types of ENT pathology in diabetic patients in Pakistan, we hope to provide an evidence base that can be utilized to inform clinical practice in local settings, aid in early recognition of the disease and provision of tailored therapies for patients suffering from diabetes in Pakistan.

Objectives of the study

The main objectives of the study are:

1. To determine the frequency of ENT (ear, nose, and throat) diseases among patients with diabetes.
2. To identify the specific patterns and types of ENT diseases prevalent among diabetic patients.

3. To analyze associations between demographic and clinical factors (such as age, gender, duration of diabetes, and glycemic control) and the occurrence of ENT diseases in diabetic patients.

METHODOLOGY

1. Study Design

This descriptive, cross-sectional study was conducted at the Department of Otorhinolaryngology (ENT) along with the Department of Endocrinology at a tertiary care hospital in Karachi, Pakistan. The time frame of the study was three months, from February 2024 to May 2024.

2. Study Population

The study involved adult patients (≥ 18 years) diagnosed with diabetes mellitus (type 1 and type 2) who presented to the outpatient departments of ENT and Endocrinology during the study period. Adults with a known history of head and neck malignancy, previous ENT surgery, or immunodeficiency from causes other than diabetes were excluded.

3. Sample Size and Sampling Technique

A total of 230 diabetic patients were recruited using a consecutive sampling until the adequate sample size was met. The sample size was determined based on previously reported prevalence rates of ENT diseases in diabetic patients using a 95% confidence interval and 5% margin of error.

4. Data Collection

Data were gathered during a three-month period (February to May 2024) at the selected hospital in Karachi. A structured questionnaire was used to collect demographic data (age, gender), clinical data (type and duration of diabetes, most recent HbA1c, and comorbidities), and self-reported ENT-related symptoms. Each participant had a detailed ENT examination by qualified ENT specialists that included an otoscopic examination, nasal endoscopy, and oral cavity evaluation to determine ENT-related problems, such as otitis externa, otitis media, sinusitis, hearing impairment, and oral infections. For patients with complaints of hearing, pure tone audiometry was used.

5. Data Analysis

The collected data were entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics (means, standard deviations, frequencies and percentages) were used to describe demographic and clinical characteristics, to describe the prevalence and types of ENT diseases. A chi-square test and logistic regression analysis was used to describe the association between demographic/clinical factors and the occurrence of ENT diseases. The level of significance was set at p-value less than 0.05.

6. Ethical Consideration

The study protocol was approved by the Institutional Ethics Review Board at the hospital in Karachi. All participants provided written informed consent before participating in the study. The confidentiality and anonymity of all patient information was maintained throughout the research process.

RESULTS

Table 1 Demographic and Clinical Characteristics of study Participants (N=230)

Variable	n	%	Mean $\pm$ SD
Age (years)			53.2 $\pm$ 12.1
18–40	34	14.8	
41–60	127	55.2	
>60	69	30.0	
Gender			
Male	124	53.9	
Female	106	46.1	
Duration of Diabetes (years)			8.7 $\pm$ 6.3
<5	78	33.9	
5–10	84	36.5	
>10	68	29.6	

Type of Diabetes			
Type 1	36	15.7	
Type 2	194	84.3	
Glycemic Control (HbA1c %)			8.1 ± 1.7
Good (<7.0%)	58	25.2	
Poor (≥7.0%)	172	74.8	

There were 230 diabetic patients that participated in this study with a mean age of 53.2 ± 12.1 years. The range of age categories was 41 - 60 years (55.2% participants), 18 - 40 years (14.8% participants), and older than 60 years (30.0% participants). The majority of the participants were men (53.9% (124) population) and women (46.1% (106) population) participants were readily available men. The mean diabetes duration was 8.7 ± 6.3 years, with the diabetes duration of the participants being less than 5 years (33.9% participants), 5 to 10 years (36.5% participants), and more than 10 years (29.6% participants). Type of diabetes was identified in most of the participants to be type 2 diabetes (84.3%) was reported in comparison to type of diabetes type 1 (15.7%), which is reported in medication records if a patient is receiving commodity type 2 diabetes medication often. The glycemic control, a Glycosylated hemoglobin (HbA1C) value reported to a mean of $8.1 \pm 1.7\%$. A good glycemic control was indicated in 25.2% of patients (HbA1c <7.0%) prior to clinical diagnosis, and poor control (HbA1c ≥7.0%) was indicated by the remainder of the patients (74.8%).

Table 2 Frequency of ENT Diseases among Diabetic Patients

ENT Disease Present	N	%
Yes	146	63.5
No	84	36.5

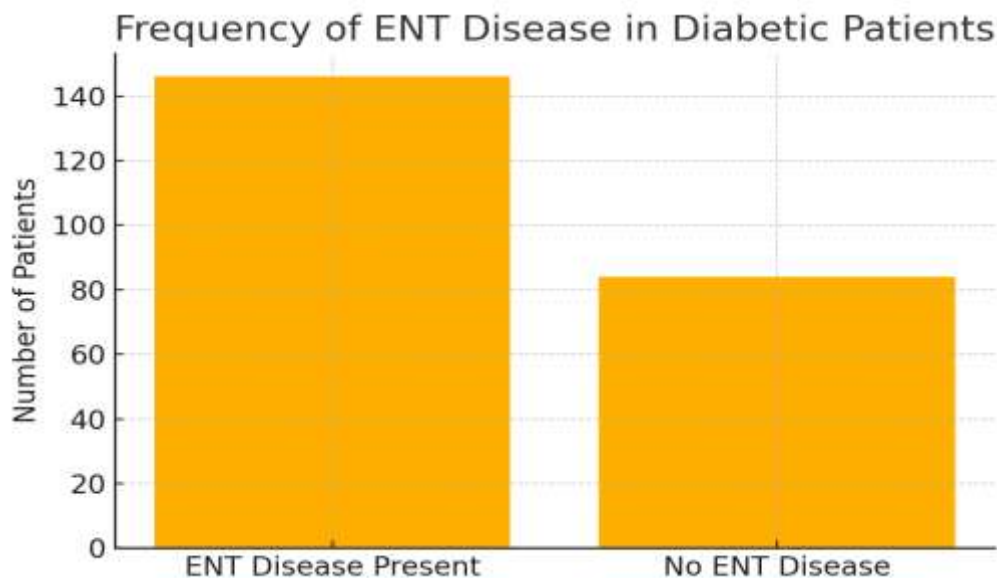


Figure 1 Frequency of ENT Diseases

In Table 2 and figure 1 demonstrated that 146 (63.5%) out of 230 diabetic patients were found to have at least one ENT disease. The remaining 84 patients (36.5%) did not develop any evidence of ENT disease.

Table 3 Types of ENT Disease Observed in Diabetic patients (n= 146)

ENT Disease	n	% (of those with ENT disease)
Otitis externa	48	32.9
Chronic rhinosinusitis	39	26.7
Hearing loss (sensorineural)	28	19.2
Oral candidiasis	19	13.0

Otitis media	9	6.2
Others (pharyngitis, etc.)	3	2.0

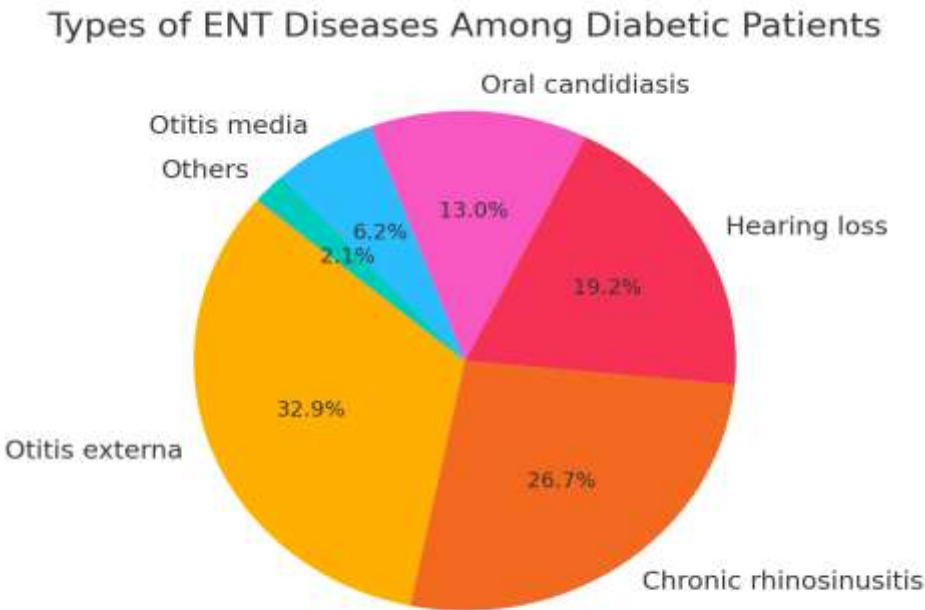


Figure 2 Types of ENT Diseases

Table 3 and figure 2 demonstrated that otitis externa was the most common ENT disease found in 146 diabetic patients, occurring in 32.9% of cases. Following that was chronic rhinosinusitis, identified in 26.7% of patients, and sensorineural hearing loss, which occurred in 19.2% of cases. Oral candidiasis was seen in 13.0% of cases, and otitis media was noted in 6.6%. Other ENT related illnesses such as pharyngitis and related diseases constituted 2.0% of cases.

Table 4 Association between Demographic/Clinical Factors and ENT Disease Occurrence

Variable	ENT Disease Present (%)	ENT Disease Absent (%)	pvalue
Age (years)			
18–40	16 (47.1)	18 (52.9)	0.031*
41–60	81 (63.8)	46 (36.2)	
>60	49 (71.0)	20 (29.0)	
Gender			0.156
Male	81 (65.3)	43 (34.7)	
Female	65 (61.3)	41 (38.7)	
Duration of Diabetes			0.018*
<5 years	39 (50.0)	39 (50.0)	
5–10 years	57 (67.9)	27 (32.1)	
>10 years	50 (73.5)	18 (26.5)	
Glycemic Control			0.007*
Good (<7.0%)	29 (50.0)	29 (50.0)	
Poor (≥7.0%)	117 (68.0)	55 (32.0)	

Table 4 shows that there were several significant relationships between demographic and clinical factors and the occurrence of ENT diseases in diabetic patients. The rate of disease increased with age: 47.1% in those 18–40 years; 63.8% in 41–60 years; and 71.0% in those over 60 years ($p = 0.031$). The occurrence of disease did not differ by gender: 65.3% of males and 61.3% of females ($p = 0.156$). Duration of

diabetes was significantly related to disease prevalence ($p = 0.018$). While only 50.0% of participant with diabetes for less than 5 years had ENT disease, 67.9% of participants with diabetes for 5-10 years had ENT disease and 73.5% of those with diabetes for more than 10 years had ENT disease. There was a strong association with glycemic control: 68.0% of those with poor glycemic control ($HbA1c \geq 7.0$) had ENT diseases compared to 50.0% with good glycemic control ($HbA1c < 7.0$) ($p = 0.007$). These findings suggest that older age, more time with diabetes, and poor glycemic control are significantly related to a higher frequency of ENT diseases in diabetic patients.

DISCUSSION

In this study, we aimed to investigate the frequency and patterns of ENT diseases among diabetic patients in the Karachi, Pakistan, and examine the relationships with key demographic and clinical characteristics. Findings reveal a significant burden of ENT diseases in this group, and nearly two-thirds (63.5%) of diabetic patients, had one or more ENT disorders. This data indicates the importance of considering the common and potentially serious disease risks of ENT manifestations, as we manage diabetes. The frequency of ENT diseases is comparable to presented in other international previous studies, such as Jayakumar et al. (2021) where the same prevalence of ENT disorders was reported in diabetic patients in India, and Akinpelu et al. (2022) finding higher levels of hearing loss in adults globally. The high prevalence of ENT diseases in this population in Pakistan also supports the need for a regular enduring checkup for ENT diseases, and this is perhaps best done in the primary care and endocrinology settings. Otitis externa (32.9%), chronic rhinosinusitis (26.7%) and sensorineural hearing loss (19.2%) were the most common disease conditions seen within this population of diabetic patients. These findings are in keeping with earlier findings in the literature that diabetic patients are predisposed to the development of external ear infections and chronic sinonasal inflammation (Lai et al., 2022; Eren et al., 2023). The enhanced rate of hearing loss is also reported in international meta-analyses that indicate the negative effects of microangiopathy and neuropathy on hearing (Gupta et al., 2021; Akinpelu et al., 2022). Oral candidiasis (13.0%) and otitis media (6.2%) were seen as well, reflecting an immunocompromised state, and impaired mucosal barriers due to chronic hyperglycemia (Preshaw et al., 2022).

The study also found that older age, longer duration of diabetes, and poor glycemic control are all significantly associated with ENT morbidity. Patients over 60 years of age and patients with diabetes for ≥ 10 years were most affected. These reports support previous evidence that advancing age and chronicity of diabetes increase the risk of infections and degenerative changes in the ENT region (Shrestha et al., 2022; Tomioka et al., 2022). Similarly, poor glycemic control ($HbA1c \geq 7.0\%$) was a strong predictor of ENT morbidity, and evidence shows that hyperglycemia may impair immune cell function, delay healing, or permit colonization of pathogenic organisms (Preshaw et al., 2022).

Notably, we did not find any significant relationship between gender and the prevalence of ENT diseases in this study. These findings are consistent with some studies, and inconsistent with other studies that showed there may be a slightly greater risk of male sex for ENT disease due to lifestyle or occupational exposures (Jayakumar et al., 2021). The differences in previous literature may be attributed to differences in patient population characteristics, health-seeking behavior, and exposure risk.

The high burden of ENT diseases in the urban Pakistani context suggests there is an opportunity for enhanced multidisciplinary approaches to diabetes care. Regular screening for ENT symptoms, early referral to otolaryngologists, and aggressive control of glycemia could potentially reduce morbidity and improve quality of life for diabetes patients. Likewise, these findings emphasize the need for patient education about the potential consequences of their diabetes, such as ENT complications, and the importance of prompt medical attention for symptoms which intersect diabetes with ENT evaluation.

Strength and Limitations

This study is one of the few that looked at the patterns of ENT disease in diabetic patients in Pakistan, which highlights the valuable local data which is made available. The study had a relatively large sample size, and all clinical assessments were done with standards, which contributes to the reliability of the results. Nonetheless, the cross-sectional design does not permit cause-effect conclusions, and the study took place in a single tertiary care center in Karachi, which will affect whether the results can be generalizable to other settings.

CONCLUSION

In conclusion, this study highlights a high burden of ENT diseases amongst diabetic patients in Karachi. The most common ENT diseases were otitis externa, chronic rhinosinusitis, and hearing loss. Risk factors jointly associated with ENT diseases in diabetic patients included older age, diabetes of longer duration, and poorer glycemic control. The presence of these diseases signals the importance of working in ENT evaluation routinely and strict metabolic control as part of a holistic management plan for diabetes in Pakistan.

REFERENCES

1. Akinpelu, O. V., MujicaMota, M., & Daniel, S. J. (2022). Is type 2 diabetes mellitus associated with alterations in hearing? A systematic review and metaanalysis. *Laryngoscope Investigative Otolaryngology*, 7(3), 786–793. <https://doi.org/10.1002/lio2.830>
2. American Diabetes Association. (2023). Standards of medical care in diabetes—2023. *Diabetes Care*, 46(Suppl. 1), S1–S154. <https://doi.org/10.2337/dc23Sint>
3. Basit, A., Fawwad, A., Siddiqui, S. A., & Baqa, K. (2023). Current status of diabetes in Pakistan: Epidemiology, risk factors, and clinical management. *Journal of the Pakistan Medical Association*, 73(2), 293–298. <https://doi.org/10.47391/JPMA.0123>
4. Eren, F., Koc, A. N., & Karatas, D. (2023). Malignant otitis externa in diabetic patients: Diagnosis and management challenges. *Acta OtoLaryngologica*, 143(5), 489–495. <https://doi.org/10.1080/00016489.2023.2185374>
5. Gupta, S., Sood, S., & Pandey, A. (2021). Sensorineural hearing loss in patients with type 2 diabetes mellitus: A clinical study. *International Journal of Diabetes in Developing Countries*, 41(1), 135–139. <https://doi.org/10.1007/s13410020008562>
6. Jayakumar, R. V., Kiran, M. N., & Prabhu, S. (2021). ENT manifestations in type 2 diabetes mellitus: An observational study. *Indian Journal of Otolaryngology and Head & Neck Surgery*, 73(2), 271–277. <https://doi.org/10.1007/s1207002001938y>
7. Lai, C. Y., Wang, J., Wang, Y. C., & Li, S. P. (2022). The association between diabetes mellitus and chronic rhinosinusitis: A systematic review and metaanalysis. *Diabetes & Metabolic Syndrome*, 16(6), 102578. <https://doi.org/10.1016/j.dsx.2022.102578>
8. Preshaw, P. M., Bissett, S. M., & Gkranias, N. (2022). Oral complications in diabetes. *Diabetologia*, 65(2), 269–278. <https://doi.org/10.1007/s00125021055831>
9. Shrestha, A., Sharma, R., & Sapkota, R. (2022). Ear, nose, and throat complications in diabetes mellitus patients: A review. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 16(3), 102418. <https://doi.org/10.1016/j.dsx.2022.102418>
10. Tomioka, K., Okamoto, N., Kurumatani, N., & Saeki, K. (2022). The association between diabetes mellitus and infections of the upper respiratory tract. *BMC Infectious Diseases*, 22, 765. <https://doi.org/10.1186/s1287902207726y>