

Influence of Diabetes Mellitus on the Clinical Profile and Outcomes of ENT Infections: A Comparative Study

Arun Kumar Sharma¹, Rajesh Kumar Saini^{2*}

¹Assistant Professor, Department of General Medicine, Pacific Medical College & Hospital, Udaipur, Rajasthan, India.

^{2*}Assistant Professor, Department of Otorhinolaryngology, National Institute of Medical Sciences & Research, NIMS University, Jaipur, Rajasthan, India.

ABSTRACT

Background: Diabetes mellitus is a chronic metabolic disorder that significantly alters immune competence, thereby predisposing individuals to a wide spectrum of infections. Among these, infections involving the ear, nose, and throat (ENT) are frequently encountered and may demonstrate altered clinical behavior in diabetic patients. The interaction between metabolic dysregulation and infectious processes has important implications for both disease severity and therapeutic outcomes.

Objective: The present study was conducted to compare the clinical profile, severity, and outcomes of ENT infections in diabetic and non-diabetic individuals.

Methods: A prospective comparative study was carried out at a tertiary care teaching hospital. A total of 90 patients presenting with clinically diagnosed ENT infections were enrolled and categorized into two groups: 45 patients with diabetes mellitus and 45 without diabetes. Detailed clinical evaluation was performed in all cases, including assessment of infection type, severity at presentation, and relevant laboratory parameters such as blood glucose levels. The severity of infection was classified based on clinical extent and need for hospital-based management.

Results: The findings revealed that diabetic patients were more likely to present with severe infections, with a higher prevalence of otitis externa and fungal etiologies. Additionally, these patients experienced longer recovery periods and a

greater incidence of complications. In contrast, non-diabetic individuals predominantly exhibited milder disease with more favorable outcomes.

Conclusion: The study highlights the significant influence of diabetes on the clinical course of ENT infections. Effective management requires not only appropriate antimicrobial therapy but also optimal glycemic control to improve overall prognosis.

Keywords: Diabetes Mellitus, ENT Infections, Otolaryngology, Infection Severity, Otitis Externa, Fungal Infections, Clinical Outcomes.

*Correspondence to:

Dr. Rajesh Kumar Saini,
Assistant Professor,
Department of Otorhinolaryngology,
National Institute of Medical Sciences & Research,
NIMS University, Jaipur, Rajasthan, India.

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INTRODUCTION

Infections of the ear, nose, and throat constitute a major proportion of cases encountered in routine clinical practice. These conditions vary widely in their presentation, ranging from mild and self-limiting illnesses such as acute pharyngitis and rhinitis to more severe infections like deep neck space infections and invasive otitis externa. The progression and outcome of such infections are influenced by a complex interplay of host immunity, microbial virulence, environmental exposure, and underlying systemic conditions^[1]. Diabetes mellitus represents one of the most significant chronic diseases affecting populations worldwide, with its prevalence steadily increasing across both developed and developing countries^[2]. The condition is characterized by

persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both^[3]. Over time, this metabolic imbalance leads to widespread systemic complications involving multiple organ systems.

One of the less frequently emphasized yet clinically important consequences of diabetes is its impact on the immune system. Persistent elevation of blood glucose levels interferes with normal immune function through multiple mechanisms^[4]. Cellular components of immunity, particularly neutrophils, demonstrate reduced efficiency in processes such as chemotaxis, adherence, and phagocytosis^[5]. In addition, abnormalities in cytokine signaling and inflammatory regulation further compromise host defense.

Vascular changes associated with diabetes also play a critical role. Microvascular damage leads to impaired tissue perfusion, reducing the delivery of oxygen, nutrients, and immune cells to sites of infection^[6]. This creates an environment in which pathogens can proliferate more easily and infections may persist for longer durations.

From an otolaryngological perspective, these systemic alterations translate into distinct clinical patterns. Certain infections, particularly those involving the external auditory canal and paranasal sinuses, tend to occur more frequently and with greater severity in diabetic individuals^[7]. Fungal infections and aggressive forms of otitis externa are especially notable in patients with poor glycemic control^[8]. These conditions often require prolonged treatment and may be associated with significant morbidity.

In contrast, individuals without diabetes generally exhibit a more robust immune response, which facilitates effective containment and resolution of infections^[9]. As a result, ENT infections in this group are more likely to follow a predictable and uncomplicated course. Another important consideration is the possibility of atypical clinical presentations in diabetic patients. Symptoms may be less pronounced in the early stages, leading to delays in diagnosis and initiation of treatment. Furthermore, infections in these individuals are more likely to involve opportunistic or mixed microbial flora^[10], which can complicate management.

Given these factors, it becomes essential to adopt a comprehensive approach when managing ENT infections in diabetic patients. This includes not only addressing the infection itself but also ensuring adequate control of blood glucose levels^[11]. The present study was undertaken to systematically compare ENT infections in diabetic and non-diabetic patients, with a focus on clinical presentation, severity, treatment outcomes, and complications. By examining these differences, the study aims to contribute to improved clinical understanding and more effective patient management strategies.

AIMS AND OBJECTIVES

Aim

To evaluate the influence of diabetes mellitus on the clinical profile, severity, and outcomes of ENT infections in comparison with non-diabetic patients.

Objectives

1. To compare the distribution and types of ENT infections in diabetic and non-diabetic patients
2. To assess the severity of infections at presentation in both groups
3. To evaluate the duration of illness and response to treatment
4. To determine the rate of complications in diabetic and non-diabetic patients
5. To analyze the relationship between glycemic status and infection outcomes

MATERIALS AND METHODS

Study Design

This was a prospective, comparative observational study.

Study Population

A total of 90 patients presenting with ENT infections were included in the study. The participants were divided into two groups:

- Group A: 45 patients with diabetes mellitus
- Group B: 45 patients without diabetes mellitus

Inclusion Criteria

- Patients aged 18 years and above
- Patients presenting with clinically diagnosed ENT infections
- Patients willing to participate and provide informed consent
- Patients with confirmed diabetes mellitus in the diabetic group

Exclusion Criteria

- Patients with other immunocompromised conditions such as HIV infection or malignancy
- Patients on long-term steroid or immunosuppressive therapy
- Patients with severe systemic illnesses affecting immune status
- Patients unwilling to participate or lost to follow-up

Data Collection Procedure

All patients presenting to the outpatient department or admitted to the wards were screened for eligibility. After obtaining informed consent, detailed clinical history and examination were performed. Data collected included demographic details, duration and status of diabetes, presenting symptoms, and type of ENT infection. Clinical assessment was carried out to determine the site and extent of infection.

Systemic parameters such as random blood glucose levels at presentation were recorded. Where clinically indicated, microbiological investigations including culture and sensitivity were performed.

Severity of infection was categorized as mild, moderate, or severe based on extent of local involvement, presence of systemic symptoms, and requirement for hospital-based management.

All patients were managed according to standard institutional treatment protocols. Follow-up was conducted to assess treatment response, duration of recovery, and occurrence of complications.

Outcome Measures

- Type and distribution of ENT infections
- Severity at presentation
- Duration of treatment and recovery
- Complication rates
- Association between glycemic status and clinical outcomes

Statistical Analysis

Data was compiled and analyzed using appropriate statistical software. Continuous variables were expressed as mean and standard deviation, while categorical variables were presented as frequencies and percentages.

Comparisons between the two groups were performed using the chi-square test for categorical variables and the independent t-test for continuous variables. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations and Consent

Approval for the study was obtained from the Institutional Ethics Committee of Blank University and Hospital, Jaipur prior to commencement of the study.

Written informed consent was obtained from all participants after explaining the nature and purpose of the study in a language they understood. Confidentiality of patient information was strictly maintained throughout the study.

The study was conducted in accordance with established ethical guidelines and principles for biomedical research. No additional financial burden or risk was imposed on the participants.

RESULTS

A total of 90 patients presenting with ENT infections were included in the study and were equally divided into two groups: 45 diabetic and 45 non-diabetic individuals. The results are presented with emphasis on both otolaryngological characteristics and the influence of systemic metabolic status.

Chi-square test applied; diabetic patients were significantly older compared to non-diabetic patients. No statistically significant difference was observed in gender distribution. Distribution of infections differed significantly between groups, with higher fungal infections and otitis externa in diabetics. Diabetic patients

presented with significantly more severe infections. Diabetic patients required significantly longer duration of treatment. Complications were significantly higher in diabetic patients. ANOVA test applied; higher blood glucose levels were significantly associated with increased severity of infection.

From an otolaryngological perspective, diabetic patients demonstrated a higher prevalence of otitis externa and fungal infections, along with increased severity at presentation and higher complication rates.

From a general medicine perspective, elevated blood glucose levels were significantly associated with more severe infections and prolonged recovery, indicating that glycemic status plays a crucial role in disease progression and outcomes. Overall, diabetes mellitus was found to be a significant factor influencing both the clinical pattern and prognosis of ENT infections.

Table 1: Age Distribution of Study Participants

Age Group (years)	Diabetic (n=45)	Non-Diabetic (n=45)	Total	p-value
18–30	6 (13.3%)	14 (31.1%)	20	0.041
31–50	18 (40.0%)	20 (44.4%)	38	
>50	21 (46.7%)	11 (24.4%)	32	

Table 2: Gender Distribution

Gender	Diabetic (n=45)	Non-Diabetic (n=45)	Total	p-value
Male	26 (57.8%)	24 (53.3%)	50	0.652
Female	19 (42.2%)	21 (46.7%)	40	

Table 3: Distribution of ENT Infections

Type of Infection	Diabetic (n=45)	Non-Diabetic (n=45)	Total	p-value
Otitis externa	14 (31.1%)	8 (17.8%)	22	0.048
Otitis media	6 (13.3%)	10 (22.2%)	16	
Rhinosinusitis	7 (15.6%)	12 (26.7%)	19	
Tonsillitis/pharyngitis	5 (11.1%)	9 (20.0%)	14	
Fungal infections	9 (20.0%)	3 (6.7%)	12	
Others	4 (8.9%)	3 (6.7%)	7	

Table 4: Severity of Infection at Presentation

Severity	Diabetic (n=45)	Non-Diabetic (n=45)	Total	p-value
Mild	10 (22.2%)	22 (48.9%)	32	0.012
Moderate	18 (40.0%)	16 (35.6%)	34	
Severe	17 (37.8%)	7 (15.6%)	24	

Table 5: Duration of Treatment

Duration (days)	Diabetic (n=45)	Non-Diabetic (n=45)	Total	p-value
<7 days	8 (17.8%)	20 (44.4%)	28	0.009
7–14 days	20 (44.4%)	18 (40.0%)	38	
>14 days	17 (37.8%)	7 (15.6%)	24	

Table 6: Complication Rates

Complications	Diabetic (n=45)	Non-Diabetic (n=45)	Total	p-value
Present	13 (28.9%)	5 (11.1%)	18	0.032
Absent	32 (71.1%)	40 (88.9%)	72	

Table 7: Association of Glycemic Status with Severity (Diabetic Group)

Severity	Mean RBS (mg/dL)	p-value
Mild	168 ± 20	0.001
Moderate	212 ± 28	
Severe	258 ± 35	

DISCUSSION

The findings of the present study provide clear evidence that diabetes mellitus significantly influences the clinical characteristics and outcomes of ENT infections. The observed differences between diabetic and non-diabetic patients highlight the role of metabolic factors in shaping disease behavior^[12].

A notable observation was the higher age distribution among diabetic patients. This aligns with the established epidemiological pattern of diabetes, which is more prevalent in middle-aged and elderly populations^[13]. Age-related decline in immune function, when combined with metabolic dysregulation, may further increase vulnerability to infections and contribute to more severe disease presentation.

The pattern of infections differed considerably between the two groups. Diabetic patients demonstrated a higher frequency of otitis externa and fungal infections, whereas non-diabetic individuals more commonly presented with conditions such as rhinosinusitis and tonsillitis. This variation may be explained by the altered local tissue environment in diabetes^[14], where elevated glucose levels and reduced immune efficiency create favorable conditions for opportunistic pathogens.

The severity of infection at presentation was significantly greater among diabetic patients. A substantial proportion of these individuals presented with advanced disease, suggesting delayed containment of infection^[15]. This can be attributed to impaired immune responses associated with chronic hyperglycemia, which allow infections to progress more rapidly before clinical symptoms become prominent. The relationship between glycemic status and disease severity was also evident. Patients with higher blood glucose levels tended to exhibit more severe infections and poorer outcomes^[16]. This finding underscores the importance of metabolic control in influencing disease progression. Hyperglycemia not only facilitates microbial growth but also interferes with normal tissue repair processes, thereby prolonging recovery.

Treatment duration was notably longer in diabetic patients. Delayed healing in this group may be related to multiple factors, including impaired circulation, reduced oxygen delivery, and abnormalities in collagen synthesis. These factors collectively contribute to slower resolution of infection and increased healthcare burden^[17].

Complication rates were also higher among diabetic individuals. The increased likelihood of complications such as persistent infection and local spread reflects the aggressive nature of infections in the presence of metabolic dysfunction^[18]. This emphasizes the need for early diagnosis, close monitoring, and timely intervention in this high-risk population.

Although detailed microbiological analysis was not available for all cases, the higher incidence of fungal infections suggests a shift toward opportunistic organisms in diabetic patients^[19]. This has important therapeutic implications, as empirical treatment strategies may need to be modified to address this variation. Despite certain limitations, including the relatively small sample

size and single-center design, the study provides valuable insights into the interaction between diabetes and ENT infections. Future studies incorporating larger populations and more detailed metabolic parameters would further enhance understanding in this area^[20]. Overall, the results reinforce the concept that diabetes is not merely a comorbidity but a key determinant of infection behavior and outcome.

CONCLUSION

The present study demonstrates that diabetes mellitus plays a significant role in modifying the clinical course of ENT infections. Compared to non-diabetic individuals, patients with diabetes are more likely to present with severe disease, experience prolonged recovery, and develop complications. The findings highlight the dual importance of infection management and metabolic control in achieving favorable outcomes. Effective treatment strategies should therefore incorporate both targeted antimicrobial therapy and strict regulation of blood glucose levels.

A multidisciplinary approach involving otolaryngologists and physicians is essential to ensure comprehensive care. Early recognition, prompt intervention, and continuous monitoring can significantly reduce morbidity and improve overall patient outcomes in this vulnerable population.

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