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Original Article

Ear, Nose and Throat Section

Deep Neck Space Infection among Diabetic and Non Diabetic Patients: A Prospective Cohort Study

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ABSTRACT

Introduction: Deep Neck Space Infections (DNSI) were first described by Galen in the second century. They refer to infections of potential spaces and fascial planes of the neck and are a cause of significant morbidity and mortality. Additionally, the presence of Diabetes Mellitus (DM) increases the possibility of life-threatening complications.

Aim: To compare the clinical characteristics, bacteriological spectrum, aetiological aspects, biochemical parameters, treatment protocol, complications, and mortality rate among diabetic and non diabetic patients with DNSIs.

Materials and Methods: A prospective cohort study was conducted in the Department of Otorhinolaryngology, Mysore Medical College and Research Institute, Mysuru, Karnataka, India from January 2022 to December 2022. 52 patients with DNSIs were grouped into diabetics and non diabetics. The age group of the patients included in the study was 18-65 years. A detailed history, clinical examination, haematological investigations, and Contrast-enhanced Computed Tomography (CECT) were performed. Patients were either treated conservatively or underwent incision and drainage, depending on the presentation. The data obtained were analysed using the Statistical Package for the Social Sciences (SPSS) version 20.0.

Results: The age range was 18 to 65 years, with a mean age of 51 years (51.35±13.46 years) in the diabetic group and 37 years (37.9±13.2 years) in the non diabetic group. Patients were divided into 26 (50%) diabetics and 26 (50%) non diabetics. Of the 52 patients, 34 (65.3%) were males and 18 (34.7%) were females. Multiple space involvement was present in eight patients among the diabetic group and three patients in the non diabetic group. Odontogenic infections constituted the leading foci in 17 (65.4%) of diabetics and 13 (50%) of non diabetics. In diabetics, 12 (46%) patients had high levels (>6.5%) of HbA1c, and *Klebsiella* was the causative organism in 9 (39%). A total of 23 (88.5%) diabetic patients underwent incision and drainage, while 13 (50%) non diabetic patients were treated conservatively. Among the diabetics, 21 (80.8%) patients had a hospital stay of >7 days, 7 (27%) patients had complications, and the mortality rate was observed in 5 (19.2%) patients.

Conclusion: The study emphasises a definitive association of DM in the occurrence of DNSIs. Hence, the need for early detection and treatment of primary infections is highlighted, insisting on appropriate management of blood sugar levels.

Keywords: Abscess, Bacteriological spectrum, Diabetes mellitus, Drainage

INTRODUCTION

The Deep Neck Space Infections (DNSI) are a group of infections that affect the deep cervical space through a variety of aetiological processes, resulting in a diverse clinical presentation [1,2]. These infections have the potential for rapid progression and life-threatening complications, making timely management essential [3]. Despite the availability of a wide variety of broad-spectrum antibiotics, imaging techniques, and modern operating facilities in this generation, these infections persist as a significant health issue with substantial morbidity and possible mortality. Conditions that cause immune dysfunction, such as DM, Human Immunodeficiency Virus (HIV) and chemoradiotherapy, form the basis for this enhanced inflammatory process [4].

The cervical fascia invests the muscles and organs of the neck, limiting and influencing the direction of spread of infection. The relationship of the fascial layers to each other and adjacent structures creates potential spaces. Therefore, understanding the anatomy of the layers of the cervical fascia is key to comprehending the spread of infection through these planes [5]. There are about 11 deep neck spaces within the intricate framework formed by the cervical fascial planes [6].

Since the preantibiotic era, tonsillar and peritonsillar infections were the most common sources in many cases [7]. Nowadays, odontogenic foci have become predominant. Another possible source is the lymphatic spread of infection from the oral cavity, face, and superficial neck spaces, leading to cervical lymphadenopathy and abscess formation [8,9]. Clinical features of DNSIs include fever, neck swelling and pain, dysphagia, odynophagia, and trismus [4,10]. Exudate cultures typically show a polymicrobial growth, consisting mostly of aerobic, anaerobic, Gram-positive, and Gram-negative organisms [2]. Despite the availability of antibiotics, these infections can lead to severe complications such as upper airway obstruction, mediastinitis, jugular vein thrombosis, septic emboli, carotid artery rupture, respiratory distress syndrome, pericarditis, septic shock, and disseminated intravascular coagulopathy [11].

DM is a systemic disease that can exacerbate infections in neck spaces and present with diverse features. The DM is the most common systemic disease associated with DNSIs and significantly affects morbidity and mortality [2]. In diabetics, polymorphonuclear leukocytes are not normally activated and have reduced bactericidal capacity. Impairment in this respiratory burst activity, where oxygen metabolites play a crucial role in host defense, may contribute to the pathogenesis of infectious complications in diabetes [5].

Previous studies have described the clinical features, bacteriology, antibiotic usage, timing of surgical management, and prognosis of DNSIs in both diabetic and non diabetic patients. However, the significance of Glycated Haemoglobin (HbA1c) levels as an indicator in predicting complications has not been identified [2,3,5,6]. Therefore, there is a need to perform HbA1c tests in all patients with DNSIs as a prognostic factor.

The study aimed to compare the clinical characteristics, bacteriological spectrum, aetiological aspects, biochemical parameters, treatment protocols, complications, and mortality rates.

MATERIALS AND METHODS

A prospective cohort study was conducted in the Department of Otorhinolaryngology, Mysore Medical College and Research Institute, Mysuru, Karnataka, India, between January 2022 and December 2022. Ethical clearance was obtained from the Institutional Ethics Committee (MMC EC 63/21). Written informed consent was obtained from all patients.

Inclusion criteria: A total of 52 patients presenting with DNSIs in the age group of 18-65 years were included.

Exclusion criteria: Immunocompromised states other than DM, such as diagnosed cases of HIV and known cases of malignancy on chemotherapy or radiotherapy, were excluded from the study.

A purposive sampling method was adopted, and selected patients were grouped into diabetics and non diabetics. A total of 52 patients were included during the one-year study period.

Study Procedure

A detailed history was taken, and clinical examinations were performed for all patients. The socioeconomic status of all patients was assessed according to the Kuppuswamy classification [12]. All patients were clinically evaluated for the presence of abscess or cellulitis. The presence of abscess was confirmed by aspiration using an 18G needle and syringe. The obtained exudate was sent for culture. Haematological investigations and contrast-enhanced computed tomography were performed. The involvement of neck spaces were assessed with radiological extensions. Fasting blood sugar, postprandial blood sugar, and HbA1c levels were measured in all patients, who were then divided into diabetic and non diabetic groups.

Treatment protocol: All patients were evaluated based on clinical features, high blood sugar levels, and tomographic evidence of abscess extension to two or more spaces. A conservative treatment protocol was followed when patients presented with clinical and radiological features of cellulitis. Patients who clinically deteriorated with a temperature >38°C and elevated white blood cell counts of more than 10,000 cells/cu mm after 48 hours of treatment were assessed for any complications [3]. The severity of infection was determined by the following features: rapid onset of neck swelling with fluctuation, odynophagia, moderate to severe trismus (mouth opening of 16-30 mm/0-15 mm), high blood sugar levels confirmed with high HbA1c, and tomographic evidence of abscess extension to adjoining neck spaces [13].

STATISTICAL ANALYSIS

The data of all the patients were collected and analysed using Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive statistics were summarised by mean, percentage, and standard deviation, while inferential statistics were analysed using t-tests and Chi-square tests.

RESULTS

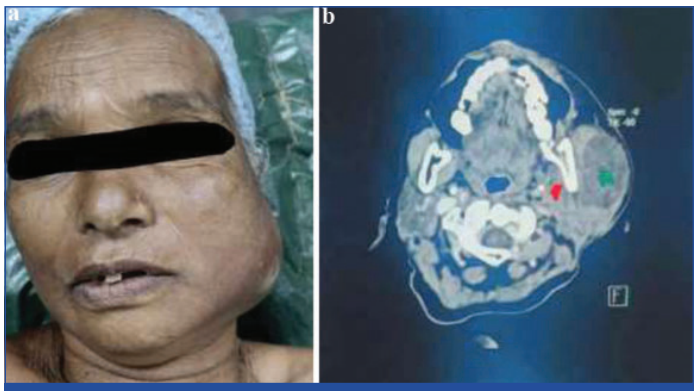
In the study of 52 patients, 34 (65.4%) were males and 18 (34.6%) were females. Of all patients, 26 were grouped as diabetic and 26 as non diabetic. Among them, 25 patients had type 2 diabetes, while one patient had type 1 diabetes. The age range was 18 to 65 years, with a mean age of 51 years (51.35±13.46 years) in the diabetic group and 37 years (37.9±13.2 years) in the non diabetic group. The mean age of patients with diabetes was higher compared to non diabetics, and this difference was statistically significant (p-value=0.001). Among them, 94% of the patients belonged to a low socioeconomic status [Table/Fig-1]. Multiple space involvement was present in eight patients in the diabetic group and three patients in the non diabetic group [Table/Fig-2,3].

Variables	Diabetic	Non diabetic	p-value
Mean age (years)	51.35±13.46 years	37.9±13.2	0.001
Gender distribution	Males-19	Males-15	0.191
	Females-7	Females-11	
Mean HbA1c levels	9.78±2.181	5.23±0.386	0.001
Socioeconomic status	Middle class-3	Middle class-2	0.676
	Lower class-23	Lower class-24	
Duration of hospital stay	11.6±5.1	7.9±3.6	0.004
Complications	7	3	0.159
Death	5	1	0.191

[Table/Fig-1]: Comparison of variables between diabetic and non diabetic group.

Space involved	Diabetic	Non diabetic
Submental	0	1 (3.8%)
Submandibular, unilateral	11 (42.3%)	8 (30.8%)
Submandibular, bilateral	0	1 (3.8%)
Submandibular+submental (unilateral)	4 (15.4%)	0
Submandibular+visceral (unilateral)	1 (3.8%)	1 (3.8%)
Peritonsillar abscess (unilateral)	1 (3.8%)	7 (26.9%)
Peritonsillar+submandibular (bilateral)+submental	1 (3.8%)	0
Retropharyngeal	2 (7.7%)	2 (7.7%)
Parapharyngeal (unilateral)	1 (3.8%)	3 (11.6%)
Parotid gland abscess	3 (11.6%)	2 (7.7%)
Parotid+submandibular+buccal space (unilateral)	0	1 (3.8%)
Parotid+submandibular+buccal space (bilateral)	2 (7.7%)	0
Total	26	26

[Table/Fig-2]: Involvement of neck spaces among diabetic and non diabetic group.



[Table/Fig-3]: (a) Image showing a patient with parotid abscess with fluctuant swelling and inflamed skin; (b) Computed tomography image of same patient in which parotid abscess (green mark) was extending to masticator space and buccal space (red mark).

Symptoms such as rapid onset of neck swelling with fluctuation, odynophagia, and moderate to severe trismus were more pronounced in the diabetic group. Additionally, authors observed that the interval between the onset of symptoms and hospitalisation was 4±2.4 days in diabetics, whereas it was 6±2.2 days in non diabetics.

The aetiological factors for the development of DNSIs were identified in 20 (76.9%) of diabetics. Odontogenic infections constituted the leading foci of DNSIs in 17 (65.4%) diabetics and 13 (50%) non diabetics in present study [Table/Fig-4]. The focus of infection was unknown in 6 (23%) patients in the diabetic group. Upper respiratory tract infections, foreign bodies, and trauma comprised the other sources of infection.

Focus of infection	Diabetic	Non diabetic
Odontogenic	17 (65.4%)	13 (50%)
Unknown	6 (23.1%)	4 (15.4%)
URTI	2 (7.7%)	7 (27%)
Foreign body	0	1 (3.8%)
Tuberculosis	1 (3.8%)	0
Trauma	0	1 (3.8%)

[Table/Fig-4]: Source of infection in diabetic and non diabetic group.
URTI: Upper respiratory tract infections

Among the diabetic and non diabetic groups, the sources of infection were similar and therefore statistically not significant (p-value=0.140, Chi-square test).

The bacteriological profile showed a predominance of *Klebsiella* in 9 (39.2%) diabetics and 3 (25%) non diabetics [Table/Fig-5]. Non haemolytic *streptococcus* was the second leading organism isolated in diabetics. The organisms isolated in diabetic patients with complications were *Staphylococcus aureus*, *Streptococcus viridans, Enterococcus*, and *E. coli*.

Organisms	Diabetic	Non diabetic
Klebsiella	9 (39.2%)	3 (25%)
Non hemolytic *streptococcus*	4 (17.4%)	2 (16.7%)
Staphylococcus aureus	3 (13.1%)	3 (25%)
Streptococcus	2 (8.7%)	2 (16.7%)
E. Coli	2 (8.7%)	2 (16.7%)
Enterococcus	1 (4.3%)	0
Proteus	1 (4.3%)	0
Pseudomonas	1 (4.3%)	0
Culture not done	3	14
Total	26	26

[Table/Fig-5]: Bacteriological profile of diabetic and non diabetic groups.
(p=0.003, chi-square test, statistically significant)

In the study, HbA1c levels varied between 6.9% and 15.5%. 12 (46.1%) patients had HbA1c levels of >10% [Table/Fig-6]. Among the 12 patients with newly detected DM, nine had HbA1c levels of >9%, and two of them had multiple space involvement. It was observed that patients with multiple space involvement displayed HbA1c levels of >10%, suggestive of severe immune dysfunction. One patient with an HbA1c level of 15.5% was admitted with recurrent abscess and presented with multiple space involvement. A high HbA1c level was correlated with the involvement of multiple spaces but was not statistically significant (p-value=0.159).

HbA1c level	No. of patients	No. of patients with multiple space involvement
Mild (6.5-8%)	4 (15.4%)	0
Moderate (8-10%)	10 (38.5%)	1
Severe (>10%)	12 (46.1%)	7

[Table/Fig-6]: HbA1c levels in diabetic group and its association with multiple space involvement.
(p=0.159, Chi-square test, not significant)

Co-morbidities in diabetic patients included chronic liver disease, hypertension, bronchial asthma, and seizure disorder. Except in a patient with chronic liver disease, the co-morbidities did not have any cumulative effect on diabetes.

A total of 23 (88.5%) diabetics and 12 (46%) non diabetics had abscess formation and underwent Incision and drainage. Of all 50% of non diabetics were treated conservatively with Intravenous antibiotics only [Table/Fig-7,8].

The duration of hospital stay ranged from 5 to 22 days. Total of 61% of non diabetics had a hospital stay of <7 days, while 80% of diabetics had >7 days as most of them underwent incision and drainage [Table/Fig-9].

Treatment	Diabetic	Non diabetic
Intravenous antibiotics	2 (7.7%)	13 (50%)
Incision and drainage+Intravenous antibiotics	23 (88.5%)	12 (46.1%)
Tracheostomy+Intravenous antibiotics	0	1 (3.8%)
Antitubercular treatment	1 (3.8%)	0

[Table/Fig-7]: Treatment followed for diabetic and non diabetic groups.
(p=0.03, chi-square test, significant)

[Table/Fig-8]: Image showing a patient of necrotising fasciitis recovered after debridement and intravenous antibiotics.

Duration of hospital stay	Diabetic	Non diabetic
5-7 days	5 (19.2%)	16 (61.6%)
8-14 days	12 (46.2%)	8 (30.7%)
>15 days	9 (34.6%)	2 (7.7%)

[Table/Fig-9]: Duration of hospital stay in diabetic and non diabetic groups.
(p=0.004, t-test, significant)

Complications were present in 7 (26.9%) diabetics and 3 (11.5%) non diabetics [Table/Fig-10]. Haemodynamically unstable patients were admitted to intensive care units and intubated/tracheostomised depending on their clinical condition. One diabetic patient with chronic liver disease died of septic shock and multiorgan dysfunction. Four diabetic patients and one non diabetic patient without co-morbidities succumbed to sepsis. The mortality rate was 19.2% in diabetics and 3.8% in non diabetics. The description of attributes in diabetic patients who developed complications is mentioned in [Table/Fig-11].

Complications	Diabetic	Non diabetic
Diabetic ketoacidosis	1	0
Necrotising fasciitis	1	1
Necrotising fascitis, sepsis, death	1	0
Pneumonia, sepsis, death	1	1
Mediastinitis, sepsis, multiorgan dysfunction, death	3	0
Stridor	0	1

[Table/Fig-10]: Complications in diabetic and non diabetic groups.
(p=0.159, chi-square test, not significant)

An association of HbA1c with hospital stay, response of the patients, and complications was noted. A delayed response to treatment was seen in 8 (30.76%) patients whose blood glucose levels were dysregulatory despite appropriate medical treatment. There was a significant association of high HbA1c levels with longer hospital stays (p-value=0.004), delayed treatment response (8 patients, p-value=0.004), and a higher complication rate (p-value=0.159, not statistically significant) [Table/Fig-12]. Hence, HbA1c can be considered as a prognostic indicator of complications. A strong

Complications	Age	Space involved	Duration of diabetes	Bacteriology	HbA1c	Treatment response
Diabetic ketoacidosis	65 years	Parotid+buccal+masseteric space	15 years, patient had stopped medications since 3 months	*E-Coli*	15.5	Recovered
Necrotising fasciitis	65 years	Submandibular+submental	4 years, patient was on regular treatment	*Staphylococcus aureus*	8.7	Recovered
Necrotising fasciitis, septic shock, death	50 years	Submandibular+parotid+masseteric space	Newly detected Diabetes Mellitus (DM)	*Streptococcus viridans*	9.2	Death
Pneumonia, septic shock, death	63 years	Submandibular (unilateral)+submental	3 months, patient was not on any medications since the time of diagnosis of Diabetes	*Staphylococcus aureus*	11.5	Death
Mediastinitis+Septic shock, multiorgan dysfunction, death	30 years	Submandibular (unilateral)+submental	Newly detected Diabetes Mellitus (DM)+chronic liver disease	*Enterococcus*	10.8	Death
Mediastinitis+Septic shock, multiorgan dysfunction, death	52 years	Submandibular+submental	Newly detected Diabetes Mellitus (DM)	*Streptococcus viridans*	12.1	Death
Mediastinitis+Septic shock, multiorgan dysfunction, death	65 years	Submandibular (unilateral)+submental	2 years, Irregular treatment since 2 months	*Satphylococcus aureus*	12.5	Death

[Table/Fig-11]: Description of attributes in diabetic patients who developed complications.

Parameters		Mild HbA1c	Moderate HbA1c	Severe HbA1c	p-value
Number of patients		4 (15.3%)	10 (38.5%)	12 (46.2%)	-
Hospital stay (days) (Mean±SD)		7±2 days	14±4 days	16±5 days	0.004
Delayed treatment response		1	4	3	0.004
Response to treatment	Responded to treatment	All patients responded well	8 patients responded to incision and drainage+Intravenous antibiotics	7 patients responded to incision and drainage+Intravenous antibiotics	-
	Complication	No	1 patient of necrotising fasciitis had a delayed recovery	1 patient had diabetic ketoacidosis with a delayed recovery	0.159
	Death	Nil	1	4	-

[Table/Fig-12]: Association of HbA1c with hospital stay, response of patients and complications.

association was also seen with longer hospital stays when infected with *Klebsiella* species (p-value=0.048). An overall comparison between diabetic and non diabetic groups is summarised to provide a more comprehensive view of the infection [Table/Fig-13].

Characteristics	Diabetic	Non diabetic	p-value
Multiple space involvement$	8 patients	3 patients	0.159
Clinical features-predominantly present	Moderate to severe trismus and fluctuant neck swelling	Dysphagia and indurated neck swelling	-
Source of infection-odontogenic$	17 (65.4%)	13 (50%)	0.140
Bacteriology$	*Klebsiella*	*Klebsiella and staphylococcus aureus*	0.003
Treatment$	Incision and drainage in 23 (88.5%) of patients	Intravenous antibiotics in 13 (50%) of patients	0.03
Hospital stay#	12 (46.2%) of patients recovered by 8-14 days	16 (61.6%) of patients recovered by 5-7 days	0.004

[Table/Fig-13]: Comparison of various characteristics of diabetic and non diabetic group.
#: t-test; $: Chi-square test

DISCUSSION

Deep Neck Space Infections (DNSIs) have not been accurately assessed worldwide, as there is great variability in what is reported in the literature [14]. For centuries, the diagnosis and treatment of DNSIs have been a challenge for Otolaryngologists, given the complex anatomy, deep location, and presence of vital structures [13].

A variety of studies have reported DM as a risk factor for DNSIs, responsible for worsening symptoms, longer hospital stays, and vulnerability to complications [2,3,5,6]. The mechanisms associated with infections in diabetics include increased glycation, which can inhibit the generation of Interleukin-10 by myeloid cells and of Interferon gamma and Tumour Necrosis Factor (TNF)-α by T cells. Glycation would also lower the expression of class I major histocompatibility complex on the surface of myeloid cells, impairing cell immunity [15]. Additionally, the hyperglycemic setting blocks antimicrobial function by inhibiting glucose-6-phosphate dehydrogenase, increasing apoptosis of polymorphonuclear leukocytes, and reducing polymorphonuclear leukocyte transmigration through the endothelium [16]. Furthermore, in tissues that do not require insulin for glucose transport, the hyperglycemic condition increases intracellular glucose levels, which are metabolised using Nicotinamide Adenine Dinucleotide Phosphate (NADPH) as a cofactor. The reduction in NADPH levels prevents the regeneration of molecules crucial for the cell's antioxidant mechanisms, increasing susceptibility to oxidative stress. The reduction of C4 in diabetics is correlated with polymorphonuclear dysfunction and reduced cytokine response [17].

In the study, the mean age of the diabetic and non diabetic groups was 51.35±13.46 years and 37.9±13.2 years, respectively. This was similar to the study by Huang TT et al., (diabetic: 57 years, non diabetic: 46 years, p-value: 0.0007). The study enrolled 65.4% males and 34.7% females, which was comparable to a study conducted by Ashokan S et al., (males=65.78% and females=34.21%) and Huang TT et al., (males=109, females=76) [2,3].

The most common space involved was the submandibular space (73.1%) in both groups, which correlated with a study conducted by Ashokan S et al., (submandibular space-64.2%) [3]. Multiple space involvement was seen in 30.7% of diabetics and 11.4% of non diabetics, which was statistically significant (p-value=0.021). Authors also compared the symptoms according to the spaces involved in both groups. In submandibular abscess, grade 3 trismus was the predominant symptom in diabetics, while an indurated neck swelling was a striking feature in non diabetics. When multiple spaces were involved, most diabetic patients were toxic and developed complications, while non diabetic patients recovered.

The focus of infection in present study was predominantly odontogenic in diabetic (65.4%) and non diabetic (50%) patients, which was comparable to the study by Ashokan S et al., (68.4%) and Huang TT et al., (42%) [2,3]. Poor dental hygiene was the primary

cause for an increase in the number of odontogenic infections. The etiology was unknown in 23.1% of diabetic patients.

The bacteriological profile showed *Klebsiella* as the causative factor in 39.2% of diabetics, consistent with the study by Ashokan S et al., [3]. The organisms isolated in diabetic patients with complications were *Staphylococcus aureus*, *Streptococcus viridans, Enterococcus*, and *E. coli*.

A 46.1% of patients had an HbA1C level of >10%. Authors observed that patients with involvement of multiple spaces displayed HbA1C levels of >10%, suggestive of severe immune dysfunction. Only one patient with an HbA1C level of 15.5% had a recurrent abscess, where the recurrent episode showed involvement of multiple spaces. This correlated with the study conducted by Lin HT et al., [18]. Past studies have also shown that a rise in HbA1c level is associated with high mortality, and for every one percent rise in HbA1c level, the prospect of heart failure increases by eight percent [18]. This may be the reason for the high mortality in the study.

The primary clinical presentation in newly detected diabetic patients was DNSI. The age group of these patients was 30-50 years, and the foci of infection were predominantly odontogenic. The HbA1C levels of the majority of patients were >9%, and hence can be adapted as a prognostic tool in DNSIs. These observations compel us to scrutinise the missing link in the causation of diabetes in this age group and emphasise the need to prioritise annual health check-ups for the early diagnosis of prediabetes, which can be reversible. Co-morbidities in diabetic patients were chronic liver disease, hypertension, asthma, and seizure disorder, and did not significantly contribute to the development of complications in the study.

An 88.5% of diabetics and 46.1% of non diabetics had abscess formation and underwent incision and drainage, which was similar to the study by Ashokan S et al., [3]. The neck swelling in 50% of non diabetics was indurated and responded well to intravenous antibiotics only. The duration of hospital stay in 80.8% of diabetics was >7 days, consistent with the study by Ashokan S et al., [3].

In the study, complications were present in 26.9% of diabetics, which correlated with studies by Huang TT et al., and Ashokan S et al., [2,3]. The mortality rate was 19.2% in diabetic patients and 3.8% in non diabetic patients. The present study showed higher mortality rates compared to studies by Huang TT et al., (3%) and Ashokan S et al., (2.6%) [2,3].

Extensive research on the mechanisms to explain the association of DNSI with diabetes may also be hypothesised to immunocompromised status, difficulty in identifying the primary infection, and the virulence of organisms [19]. Anaerobes express remarkable virulence factors, including adherence and spreading factors, such as hyaluronidase, collagenase, and fibrinolysin, which may boost the dissemination of a localised infection. Such bacteriological differentiation between patients with and without diabetes suggests that diabetic infections might be colonised with different bacterial flora, making culture and sensitivity data more important in their comprehensive management [20].

The present study affirmed the pernicious association between diabetes and DNSI. To address this problem, a preventive approach needs to be adopted. Annual health check-ups to diagnose and manage prediabetes with dental check-ups to treat dental issues must be made imperative. In diabetics, regular glucose monitoring with adherence to treatment must be encouraged. Early treatment of the primary infection must be emphasised in diabetics. Incision and drainage should be performed at the earliest to evade complications.

Limitation(s)

The study was designed with a small sample size, and hence the actual incidence of newly detected diabetic patients presenting with DNSIs could not be assessed statistically. Due to the unavailability of standardised grading of high HbA1C, patients were grouped in a pattern suggested by physicians.

CONCLUSION(S)

The study affirms the prospect of an enhanced inflammatory response in poorly controlled DM. Higher levels of HbA1C are a determining factor for longer hospital stays, higher complication rates, and mortality rates. DNSI can become grievous in association with poorly controlled DM due to an enhanced inflammatory response. Early surgical intervention is essential in the majority of diabetics to reduce the complication rates. High HbA1C levels were found to be liable for longer hospital stays, delayed treatment response, higher complication rates, and mortality rates. It is also imperative to note that regular and appropriate treatment of DM can abate this accentuated inflammation and hence, the incidence of DNSIs.

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