

STUDY OF PREVALENCE OF ODONTOGENIC DEEP NECK SPACE INFECTIONS: A RETROSPECTIVE STUDY OF 50 CASES

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ABSTRACT

Objectives: This study was conducted to find out the prevalence, distribution, presentation, sites involved, bacteriology and management of odontogenic deep neck space infections (DNSIs).

Methods: Between March 2023 and February 2025, 50 DNSI patients participated in this retrospective analysis. The prevalence of odontogenic DNSI was then determined after an analysis of the etiological variables of DNSIs. Every factor was examined, including bacteriology, age, sex, co-morbidities, presentation, site and necessary interventions in cases with odontogenic DNSIs.

Results: In majority of the cases etiological factor was odontogenic in origin (19 patients, 38%), followed by tonsillopharyngitis (30.0%), and infected lymphadenopathy (10%). Hence, the prevalence of odontogenic DNSIs was found as 38%. Out of these 19 patients of odontogenic DNSI, males were (57.69%) and females were (42.31%). Toothache was the most common symptom found in all 19 patients (100.0%), followed by neck swelling in 15 patients (78.95%), neck pain and odynophagia each in 12 patients (63.16%), fever in 14 patients (73.68%). The submandibular abscess was the most common clinical presentation of neck abscess in 8 odontogenic DNSIs patients (42.10%) followed by Ludwig's angina in 5 patients (26.31%). In terms of management incision and drainage, needle aspiration or both were done in 16 patients (84.21%). 3 patients (15.78%) were managed by medical treatment alone. All 19 patients were given broad-spectrum intravenous antibiotics which were later changed based on culture and sensitivity reports. One patient (5.26%) required emergency tracheostomy for airway management.

Conclusion: Based on our research, there has been a clear upward trend in the number of DNSI's reported annually. Dental infections and other oral health issues are increasingly contributing to this rise. This highlights the importance of raising public awareness about proper oral and dental hygiene, as well as encouraging regular dental check-ups to catch infections early. Timely diagnosis and prompt treatment are crucial to prevent complications and ensure better outcomes.

Keywords: Deep neck space infections, Infection, Abscess, Pharyngeal, Submandibular.

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INTRODUCTION

Deep neck space infections (DNSIs) are serious but treatable conditions that affect the spaces and fascial layers deep within the neck. These infections can present either as cellulitis or with abscess formation and are usually bacterial in origin. They often start from infections in the upper part of the respiratory or digestive tract and spread into the deeper tissues of the neck [1]. Common sources of DNSI include infections of the teeth and gums, tonsils, salivary glands or even retained foreign objects. These infections may arise after illnesses, such as dental caries, tonsillitis or pharyngitis or following trauma to the head-and-neck. Intravenous drug use is also a known risk factor. Odontogenic infections – those that originate in the teeth or surrounding structures – are among the leading causes of DNSIs, particularly in developing regions where access to dental care may be limited. Historically, tonsillar and peritonsillar infections were responsible for most DNSI cases (up to 70%) before antibiotics became widely available [2,3]. Nowadays, however, dental infections are considered the primary cause. DNSIs are typically polymicrobial, meaning they involve more than one type of bacteria. The most commonly identified organisms include streptococci, *Peptostreptococcus* species, *Staphylococcus aureus* and various anaerobic bacteria [4]. Symptoms can vary depending on which areas of the neck are involved but often include pain, fever, fatigue, malaise, swelling, difficulty swallowing (dysphagia), painful swallowing (odynophagia), restricted mouth opening (trismus), changes in voice (dysphonia), ear pain (otalgia) and difficulty breathing (dyspnea).

These infections can sometimes progress quickly and become life-threatening, particularly in individuals with weakened immune systems, such as those with diabetes, undergoing chemotherapy, taking steroids or living with human immunodeficiency virus. Although they were once more frequently encountered, the widespread use of broad-spectrum antibiotics has significantly reduced their occurrence [5]. Nevertheless, despite advances in medical treatment, DNSIs continue to pose serious health risks and can lead to considerable complications.

The aim of the study is to identify the prevalence, causes and predisposing factors of deep neck infections (DNIs) and recognize the possible factors that can lead to severe complications and slow down the healing process.

METHODS

This retrospective study was carried out in the ear, nose and throat (ENT) Department of Parul Institute of Medical sciences and Research, Vadodara, Gujarat, between March 2023 and February 2025. It included a total of 50 patients who visited the ENT outpatient department of our institution for the treatment of DNSIs.

Diagnosis of DNSIs was made based on patient history, supported by clinical evaluation, lab investigations and imaging studies.

Inclusion criteria

The study included patients of all ages and both genders who had clinically confirmed abscesses.

Exclusion criteria

We excluded patients with incomplete medical records, those presenting with cellulitis, infected traumatic wounds and tumors of the head-and-neck. Cases linked to inhalation injuries or malignancies were also not considered. Among the confirmed cases, we focused specifically on patients whose DNSIs were of dental origin.

Various factors were analyzed, including age, gender, existing health conditions, presenting symptoms, the anatomical site of infection, bacterial culture results, treatment approach, complications and overall outcomes. Initially, all patients were treated with amoxicillin-clavulanate and metronidazole. These antibiotics were later adjusted based on individual culture and sensitivity reports.

Statistical analysis was done by calculating the Number and Percentage of DNSIs by using an Excel sheet.

RESULTS

We evaluated 50 patients of DNSIs. In our study, the mean age of patients was 35.2 ± 2.5 years with a minimum age of 4 years and a maximum of 70 years.

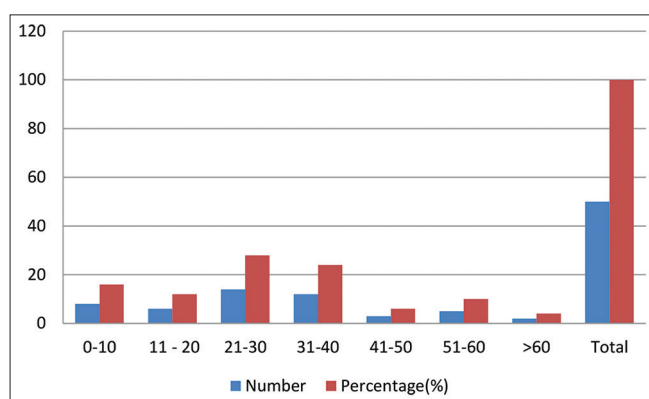
Majority of patients were in the age group of 21–30 years, followed by 31–40 years (Table 1 and Graph 1).

Out of total 50 patients, 29 patients (58.0%) were males and 21 patients (42.0%) were females with a male-female ratio of 1.38:1 (Graph 2). As per demographic distribution, 30 patients (60%) were from rural background and 20 (40%) patients were from urban background.

In majority of the cases, the etiological factor was odontogenic in origin (19 patients, 38%), followed by tonsillopharyngitis (30.0%), infected lymphadenopathy (10%), and furunculosis (4.0%). The etiological factor was unknown in 3 patients (6.0%). Hence, the prevalence of odontogenic DNSI was found as 38%. Out of these 19 patients of odontogenic DNSIs, males were (57.69%) and females were (42.31%) (Table 2).

Table 1: Distribution of age in patients (n=50) with deep neck space infections

Age group (year)	Number (n)	Percentage
0–10	8	16
11–20	6	12
21–30	14	28
31–40	12	24
41–50	3	6
51–60	5	10
>60	2	4
Total	50	100



Graph 1: Age-wise distribution of deep neck space infection patients (n=50)

Out of 19 patients, 2 patients (10.52%) were having diabetes mellitus, 2 patients (10.52%) were intravenous drug users and 1 patient (5.26%) had chronic kidney disease. Nine patients (47.36%) were tobacco chewers and 5 patients (26.31%) were smokers.

Toothache was the most common symptom found in all 19 patients (100.0%), followed by neck swelling in 15 patients (78.95%), neck pain and odynophagia each in 12 patients (63.16%), fever in 14 patients (73.68%), trismus in 6 patient (31.58%) and airway difficulty in 2 patients (10.53%) and (Table 3 and Graph 3).

The submandibular abscess was the most common clinical presentation of neck abscess in 8 odontogenic DNSIs patients (42.10%) followed by Ludwig's angina in 5 patients (26.31%), masticator abscess in 2 patients (10.53%) submental abscess, and parapharyngeal abscess in 1 patient each. The majority of our patients (17, 89.47%) underwent a computed tomography scan, in 2 patients (10.52%) ultrasound neck was done (Table 4 and Graph 4).

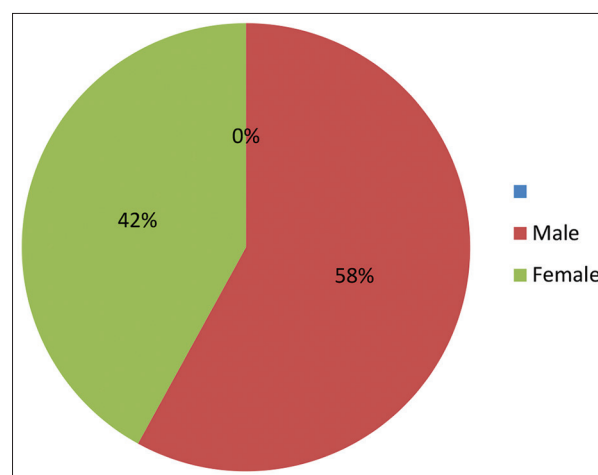
Out of 19 patients, 16 patients (84.21%) undergone intervention either incision and drainage or needle aspiration or both and pus specimen of all these patients was sent for culture and sensitivity.

Fifteen patients had positive culture results. The most common organism cultured was *Streptococcus* (04, 26.66%), followed by *Staphylococcus* (03, 20%), polymicrobial (1, 6.66%), *Pseudomonas* (1, 6.66%), Anaerobes (1, 6.66%) and *Klebsiella* (01, 6.66%). No growth was found in 4 patients.

In term of management incision and drainage, needle aspiration or both were done in 16 patients (84.21%). 3 patients (15.78%) were managed

Table 2 : Prevalence of various etiological factors in patients (n=50) with DNSI

S. no.	Etiology	Number of patients (n)	Percentage
1	Tonsillopharyngitis	15	30
2	Odontogenic	19	38
3	Infected lymphadenopathy	5	10
4	Salivary gland infections	1	2
5	Thyroglossal cyst	1	2
6	Trauma	2	4
7	Furunculosis	2	4
8	Foreign body	1	2
9	Complicated otitis media	1	2
10	Unknown	3	6
	Total	50	100



Graph 2: Gender-wise distribution of deep neck space infections cases (n=50)

Table 3: Symptoms of patients (n=50) of odontogenic deep neck space infections

S. no.	Symptom	Number of patients (n)	Percentage
1	Neck swelling	15	78.95
2	Odynophagia	12	63.16
3	Toothache	19	100
4	Fever	14	73.68
5	Neck pain	12	63.16
6	Trismus	6	31.58
7	Airway difficulty	2	10.53

Table 4: Location of abscess in odontogenic deep neck space infections (n=19)

S. no.	Presentation	Number of patients (%)
1	Masticator abscess	2 (10.53)
2	Ludwig's angina	5 (26.31)
3	Submandibular abscess	8 (42.10)
4	Peritonsillar abscess	01 (5.26)
5	Buccal abscess	01 (5.26)
6	Submental abscess	01 (5.26)
7	Parapharyngeal abscess	01 (5.26)
	Total	19 (100)

by medical treatment alone. All 19 patients were given broad-spectrum intravenous antibiotics, which were later changed based on culture and sensitivity reports. One patient (5.26%) required emergency tracheostomy for airway management.

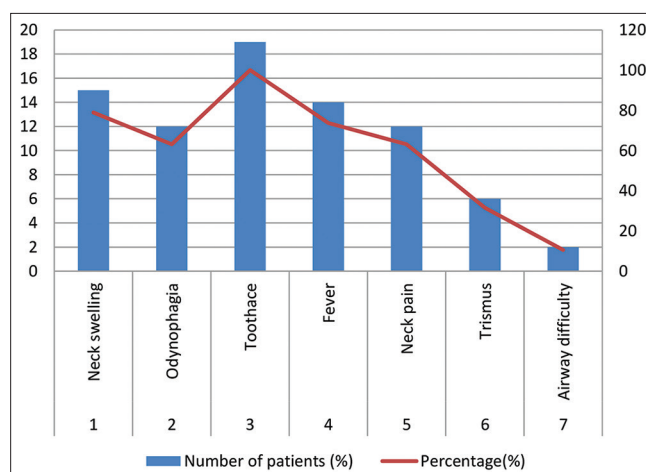
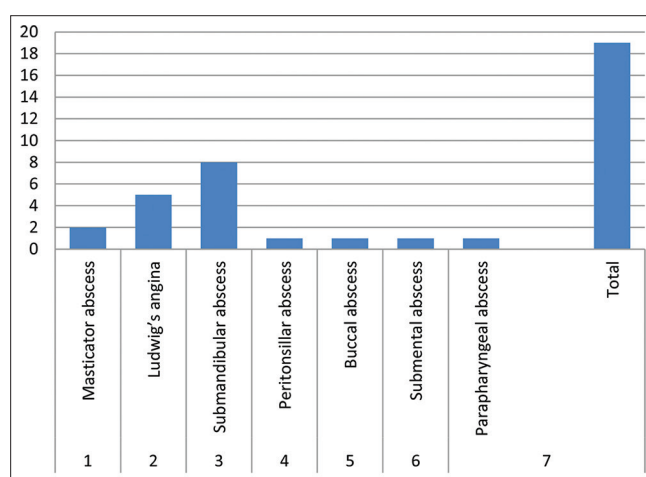
In a few patients, complications were encountered. Two patients had upper airway obstruction, one patient had septic shock and 1 patient had skin necrosis. The mean hospital stay was 3.5 days with a minimum of 3 days and a maximum of 15 days.

DISCUSSION

DNSIs are serious yet manageable infections that affect the potential spaces and fascial planes of the neck, often presenting as cellulitis or abscesses. Among the leading causes are infections originating from the teeth and gums – odontogenic and periodontal sources. Oral health is closely related to general health and the mother's nutritional status during pregnancy can affect her child's tooth growth process during the fetal growth period. Thus, mothers' nutritional status in pregnancy can determine the dental and oral health of their children [6]. The second most common cause is tonsillopharyngitis. These infections are typically polymicrobial, reflecting the diverse flora found in the upper aerodigestive tract.

In our study, we observed a higher number of male patients, which aligns with findings from researchers, such as Sethi [7], Mumtaz [8], Khode [9], Meher [10], and Parischar [11], all of them reported a similar trend. This may suggest that men tend to be less attentive to oral hygiene and are less likely to seek timely dental care due to other commitments. Age also played a role – odontogenic DNSIs were less frequent in older patients, likely due to a reduced number of natural teeth. In rural populations, the high incidence may be linked to limited access to healthcare and dental facilities [11].

Toothache was the most commonly reported symptom in our study, followed by neck swelling, neck pain, odynophagia and limited mouth opening (trismus). These findings are in line with other studies conducted by Bakir [12], Meher [10], Sethi [7], Stanley [13], and Marioni. Historically, odontogenic infections have been a major contributor to DNSIs. For instance, Tschiasny [14] reported that 70% of DNSIs cases were dental in origin. Similarly, in a retrospective study by Parischar and Harel [11], 43% of cases were traced back to dental causes. Bottin

**Graph 3: Percentage wise Distribution of Symptoms found in DNSI Patients****Graph 4: Location of abscess in odontogenic deep neck space infections (n=19)**

and colleagues reported a comparable figure of 42%, while studies by Huang [15], Marioni [16], and Eftekharian [17] identified odontogenic infections as the source in 42%, 38.8%, and 49% of cases, respectively.

In our analysis, the most common form of odontogenic DNSIs was a submandibular abscess (42.10%), followed by Ludwig's angina (26.31%), masticator space abscess (10.53%), and both submental and parapharyngeal abscesses (each at 5.26%). These findings are consistent with reports by Zamiri [18], Meher [10], and Rega [19], who also found the submandibular space to be most frequently affected in 32%, 37%, and 30% of their cases, respectively. This is likely due to the close anatomical relationship between the roots of the mandibular molars and the submandibular space, making it a common site for the spread of infection.

Streptococcus species were the most frequently cultured organisms in patients with odontogenic DNSIs, which supports the findings of Ridder [20], Parischar [16], and Mumtaz [8]. In 4 cases, no organisms were identified, possibly because the patients had already received antibiotics before cultures were taken.

Effective management of deep neck infections relies on three core principles: maintaining a secure airway, administering appropriate antibiotics and ensuring adequate drainage. While recent studies have explored non-surgical options, such as medical management or image-guided aspiration, many clinicians still follow the principle that

antibiotics alone are not enough – they must be paired with proper surgical intervention.

A key limitation of this study is its retrospective nature and the relatively small sample size – due to strict exclusion criteria – also limits the generalizability of the findings.

CONCLUSION

Based on our research, there has been a clear upward trend in the number of DNSI's reported annually. Dental infections and other oral health issues are increasingly contributing to this rise. This highlights the importance of raising public awareness about proper oral and dental hygiene, as well as encouraging regular dental check-ups to catch infections early. Timely diagnosis and prompt treatment are crucial to prevent complications and ensure better outcomes.

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CONFLICT OF INTEREST

Nil.

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