



ORIGINAL RESEARCH PAPER

ENT

A STUDY OF ETIOPATHOLOGY AND OUTCOMES IN CASES OF NECK ABSCESSSES AND TREATMENT MODALITIES IN A TERTIARY CARE CENTRE

KEY WORDS: Neck abscess, Comorbidities, Etiologies, Treatment.

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ABSTRACT

Background: Neck abscess is infection of potential spaces of throat with bacterial pathogens which may present diagnostic difficulties and lead to serious complications. Most deep neck infections arise from foci in the mucosal surfaces of the upper aerodigestive tract or from a carious tooth. Usually associated unregulated comorbidities play a major role in advancement of the disease process. Treatment decision relies on the extent and severity of neck abscesses. The aim of the present study was to correlate neck abscesses and etiologies with comorbidities and various treatment modalities for these cases.

Aims and Objectives of the Study:

Aims OfThe Study.-

1. To do a prospective etiopathological analysis and outcomes of neck abscesses among patients attending IPD of a tertiary care centre.
2. To evaluate various treatment modalities in the patients of neck abscesses.

Objective OfThe Study-

A proper way to deal with those cases can be understood and can be followed.

Methodology: A prospective study was performed in 90 cases of neck abscesses in a tertiary care hospital for a period of 1.5years from February 2019 to July 2020. Association between neck abscesses with etiological factors, disease outcomes and various treatment modalities were noted.

Result: It is better understood that unregulated comorbidities play major role associated with all tilogical factors in formation of neck abscesses and meticulous management of all etiological factors and comorbidities are the proper way to deal with a case of neck abscess through multidisciplinary approaches.

INTRODUCTION

Because the widespread use of antibiotics, 70% of deep neck space infections were caused by spread from tonsillar and pharyngeal infections. Today, tonsillitis remains the most common etiology of deep neck space infections in children whereas odontogenic origin is the most common etiology in adults.^{1,2} Study by Adovi□a et al found that out of 263 patients hospitalized for deep neck space phlegmons and/or abscesses, 70.6% of the cases arised from dental infections³.

Causes of deep neck infections include the following:

- Tonsillar and pharyngeal infections
- Dental infections or abscesses
- Oral surgical procedures or removal of suspension wires
- Salivary gland infection or obstruction
- Trauma to the oral cavity and pharynx (eg, gunshot wounds, pharynx injury caused by falls onto pencils or Popsicle sticks, esophageal lacerations from ingestion of fish bones or other sharp objects)
- Instrumentation, particularly from esophagoscopy or bronchoscopy
- Foreign body aspiration
- Cervical lymphadenitis
- Thyroiditis
- Mastoiditis with petrous apicitis and Bezold abscess
- Laryngopyomucocele
- IV drug use
- Necrosis and suppuration of a malignant cervical lymph node or mass 20-50% of deep neck infections have no identifiable source.

Other important considerations include patients who are immunosuppressed because of human immunodeficiency virus (HIV) infection, chemotherapy or immunosuppressant drugs for transplantation and unregulated comorbidities like diabetes. These patients may have increased frequency of deep neck infections and atypical organisms and they may have more frequent complications.

A retrospective study by Alotaibi et al indicated that in patients with odontogenic infection, criteria for hospital admission based on a risk of deep neck space infection should include not just the well-known risk signs—fever, trismus, leukocytosis, swollen neck, dysphagia, dyspnea, and elevated C-reactive protein levels—but also the presence of mandibular (as opposed to maxillary) odontogenic infection and/or dental abscess. The study included a cohort of 97 patients.⁴

Systemic lupus erythematosus (SLE) may be another etiologic factor in deep neck space infection. A retrospective study by Chang et al indicated that individuals with SLE have an approximately five-fold greater risk of developing the condition.⁵

The management of deep neck infections is challenging and should be carried out by an interdisciplinary team. The prognosis of deep neck infections depends on the comorbidities of the patient such as diabetes mellitus, alcoholism or drug abuse⁶. Computer tomography (CT-scan) of the head and neck and the upper thorax is the most

common tool for diagnosis⁷.

Since most deep neck infections are considered surgical emergencies, there are no randomized trials to determine the best procedure, antibiotic or duration of treatment. The only definitive data is that surgery is recommended in almost all patients with neck abscess. The earlier the surgery, the better the outcomes.⁸

Neck abscesses can be difficult to drain and have fatal consequences if not timely diagnosed, accurately localised and promptly incised and drained. Yet the management is commonly left in the hands of surgical trainees.

Aims and Objectives of the Study:

AIMS OF THE STUDY

1. To do a prospective etiopathological analysis and outcomes of neck abscesses among patients attending IPD of a tertiary care centre.
2. To evaluate various treatment modalities in the patients of neck abscesses.

Objective Of The Study

A proper way to deal with those cases can be understood and can be followed.

METHODOLOGY

The prospective study has been conducted over a period of 1.5years (From February 2019 to July 2020)in the Department of ENT and Head Neck surgery in a Tertiary Care Cente. Total patients studied during the period was 90.

Inclusion Criteria: Patients presenting with clinical features of neck abscess like Difficulty in Swallowing, Pain, Fever, Difficulty in Breathing, Torticollis, Trismus, Difficulty in moving neck etc and diagnosed with prior imaging and FNAC where indicated.

Exclusion Criteria:

1. Age more than 70years.
2. Children less then 5years of age.
3. Swelling of neck other than neck abscess diagnosed by prior imaging and fnac where feasible.

Laboratory Investigations:

1. Complete blood count and serum electrolytes.
2. Aspirated pus for culture and sensitivity.
3. Pus for AFB stain and CBNAAT.
4. Blood sugar (fbs, ppbs, random).
5. Lipid profile and Liver Function Tests.
6. Blood for serological studies for HIV, Hepatitis C and Hepatitis B.

Parameters Studied:

- Incidence of Neck Abscess in each anatomical neck spaces among the study sample patients.
- Demographic characters of the study population and socioeconomic status as per B.G.Prasad's classification.
- Imaging characteristics (X-RAY, USG, CT or MRI) of Neck Abscesses (site of abscess and/or complications).
- Association of comorbidities like Diabetes, Immunodeficiency, Steroid therapy, Chemotherapy, Dyslipidemia and Hypertension.
- Treatments used and outcomes of treatment protocols in patients.

RESULTS AND ANALYSIS

Table 1(Distribution of Age in Year) n=90

Age In Years	Number of Patients	Percentage
≤10	5	5.6
11-20	10	11.1
21-30	14	15.6
31-40	13	14.4
41-50	20	22.2
51-60	18	20.0
61-70	10	11.1
Total	90	100.0

In the study, 20(22.2/100) patients were 41-50 years old, 18(20.0/100) patients were 51-60 years old. 5(5.6/100) patients were ≤10 years old, 10(11.1/100) patients were 11-20years old, 14(15.6/100) patients were 21-30years old, 13(14.4/100) patients were 31-40 years old and 10(11.1/100) patient were 61-70years old.

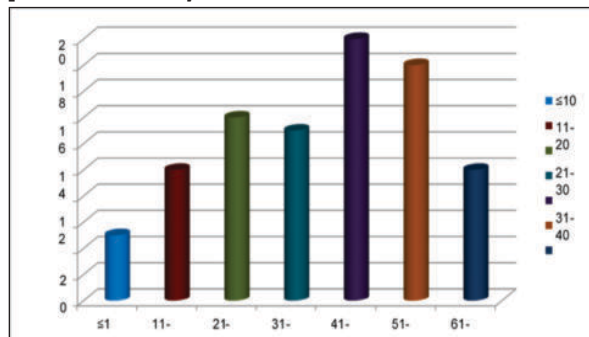


Table 2(Sex Distribution) n=90

SEX	Number of Patients	Percentage
Female	26	28.9%
Male	64	71.1%
Total	90	100.0%

In the study, 64(71.1%) patient were Males and 26(28.9%) patients were Females.

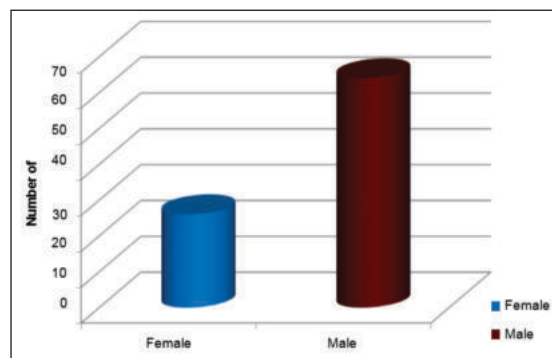


Table 3 (Socioeconomic status of the Study Population), n=90

Socioeconomic Status	Number of Patients	Percentage
Upper class(uc)	5	5.56
Upper Middle Class(UMC)	6	6.67
Middle Class(MC)	7	7.78
Lower Middle Class(LMC)	22	24.44
Lower Class(LC)	50	55.56
Total	90	100

In the study, it was found that 50 out of 90 patients (55.56%) belonged to lower class and 22 out of 90 patients (24.44%) belonged to lower middle class. 5 out of 90 patients(5.56%) belonged to upper class, 6 out of 90 patients (6.67%) belonged to upper middle class, 7 out of 90 patients(7.78%) belonged to middle class.

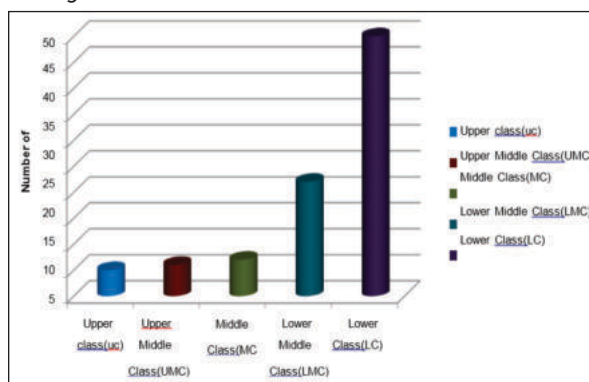


Table 4(Distribution of Etiologies) n=90

Etiology	Present	Absent	Percent
ODONTOGENIC	44	48	48.89%
URTI	20	70	22.22%
SALIVARY GLAND INFECTION	3	87	3.33%
TRAUMA TO NECK	2	88	2.22%
FOREIGN BODY	1	89	1.11%
INSTRUMENTATION	2	88	2.22%
TUBERCULOSIS	3	87	3.33%
INFECTED CYSTS	0	90	0.00%
UNKNOWN CAUSE	15	75	16.67%

In the study, 44(48.89%) patients had Odontogenic Infection, 20(22.22%) patients had URTI.

3(3.33%) patients had Salivary Gland Infection, 2(2.22%) patients had Trauma to Neck, 1(1.11%) patients had Foreign Body, 2(2.22%) patients had Instrumentation, 3(3.33%) patients had Tuberculosis and 15(16.67%) patient had Unknown etiologies.

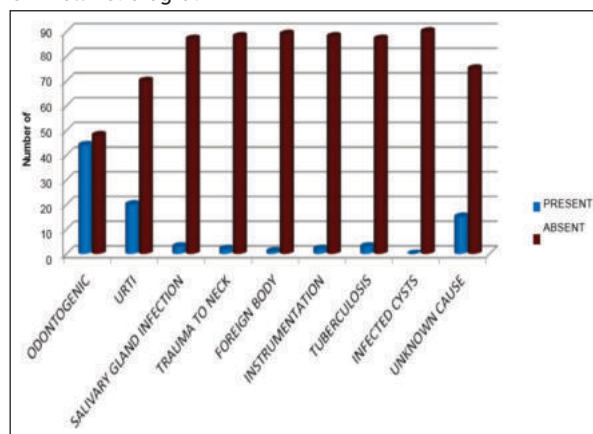


Table 5 (neck Space Involvements) N=90

Neck Space Involved	Present	Absent	Incidence among study population per 100
PARAPHARYNGEAL	44	46	48.9
SUBMANDIBULAR	50	40	55.6
PAROTID	9	81	10.0
RETROPHARYNGEAL	15	75	16.7
PREVERTEBRAL	3	87	3.33
PERTONSILLAR	13	77	14.44
MASTICATOR/ TEMPORAL	9	81	10.0
PRETRACHEAL	7	83	7.78
BUCCAL	0	90	0.00
CAROTID	1	89	1.11
SUBMENTAL	13	77	14.44
CANINE	0	90	0.00
MULTIPLE SPACES	48	42	53.33

In the study, 50(55.6%) patients had Submandibular abscess and 44(48.9%) patients had Parapharyngeal abscess. 48(53.33%) patients had Multiple Spaces involved in abscess.

9(10.0%) patients had Parotid abscess, 15(16.7%) patients had Retropharyngeal abscess, 3 (3.33%) patients had Prevertebral abscess, 13(14.44%) patients had Peritonsillar abscess, 9(10.0%) patients had Masticator/temporal abscess, 7 (7.78%) patients had Pretracheal abscess, 1(1.11%) patients had Carotid abscess, 13(14.44%) patients had Submental abscess.

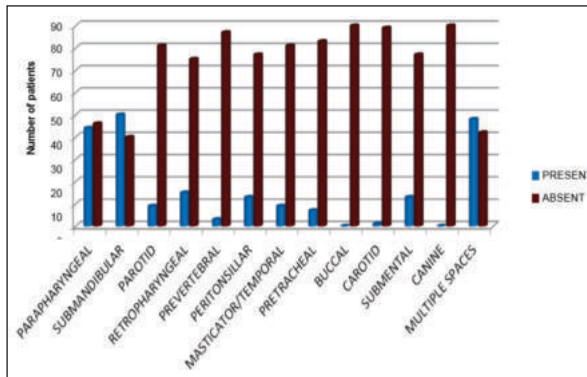


Table 6(Associated Comorbidities) n=90

Comorbidity	Present	Absent	Percentage
DIABETES	35	55	38.9%
HYPERTENSION	17	73	18.9%
DYSLIPIDAEMIA	10	80	11.11%
HIV	4	86	4.44%
HEPATITIS B	3	87	3.33%
HEPATITIS C	0	90	0.00%
CHRONIC KIDNEY DISEASE(CKD)	5	85	5.56%
CARDIAC DISEASE	5	85	5.56%
CHRONIC LIVER DISEASE(CLD)	9	81	10%
CHEMOTHERAPY	0	90	0.00%
STEROID THERAPY	0	90	0.00%
MULTIPLE	29	61	32.22%
NO COMORBIDITY	40	50	44.44%

In Comorbidity Group, 35(38.9%) patients had Diabetes and 28(32.22%) patients had Multiple comorbidities.

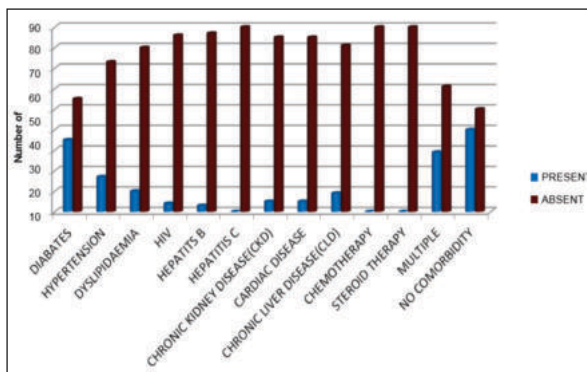


Table 7(associated Complications), N=90

Complications	Present	Absent	Percentage
AIRWAY OBSTRUCTION	10	80	11.11%
SKIN CHANGES	52	38	57.8%
PNEUMONIA	6	84	6.67%
SEPSIS	5	85	5.56%
MEDIASTINITIS	3	87	3.33%
MIXED	16	74	17.8%
NONE	30	60	33.33%

Among Complications, 52(57.8%) patients had Skin Changes, 10(11.11%) patients had Airway Obstruction, 6(6.67%) patients had Pneumonia, 5(5.56%) patients had Sepsis, 3(3.33%) patients had Mediastinitis and 16(17.8%) patient had Mixed complications.

Table 8 (management Modalities) N=90

Management modalities	Number	Percentage
Only Medical	14	15.56%
Incision & drainage+ medical management	51	56.7%

Incision& drainage+ tracheostomy	3	3.33%
Incision & drainage + tracheostomy+ tooth extraction	4	4.44%
Incision & drainage+ tooth extraction	15	16.67%
Medical+tooth extraction	3	3.33%

In Management modalities, 51(56.7%) patients had Incision & drainage +medical management.14(15.56%) patients had Only Medical, 3(3.33%) patients had Incision & drainage+ tracheostomy, 4(4.44%) patients had Incision & drainage + tracheostomy + tooth extraction, 15(16.67%) patients had Incision & drainage+ tooth extraction and 4(3.33%) patients had Medical management + tooth extraction. In this all observations comorbid patients were managed for their comorbidities as per WHO guidelines.

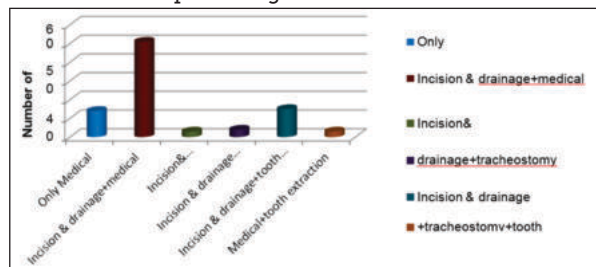


Table 9 (Complete Blood profile, Liver fuction tests and Serum electrolyte level)

Total neck abscess patients (n) =90

FINDINGS	PRESENT	ABSENT	PERCENTAGE OF PRESENCE OF LEUKOCYTOSIS
LEUKOCYTOSIS	88	2	97.78

It is found that 97.78% patients of neck abscess had leukocytosis.

Total Chronic Liver disease (CLD) patients found in the study (n) =9

FINDINGS	NORMAL	DERANGED	PERCENTAGE OF DERANGED
LIVER FUNCTION TESTS AMONG CLD PATIENTS	0	9	100%

It is found that all CLD patients in this study had deranged liver function test.

Total multiple comorbid patients (n) =29

FINDING	NORMAL	DERANGED	PERCENTAGE OF DERANGED
SERUM ELECTROLYTE LEVEL	23	6	20.69

It is seen that among patients having multiple comorbidities, 20.69% patients had deranged serum electrolyte levels. These patients constitute mostly comorbidities of hypertension, diabetes mellitus, chronic kidney disease and cardiac diseases.

Table 10 (Significant Association between Comorbidities and Neck abscesses)

Total Patients of Neck Abscess With Comorbidities (n) =50

Comorbidity	Present	Absent	P value
Diabetes	35	15	0.00006

In the study it is found that among comorbid patients, Diabetes has a significant association with neck abscess formation (p value significant at <0.05 with chi square test).

Table 11 (Significant Association between Comorbidities

and Complications in patients with Neck abscesses)

Comorbidity	Complication present	Complication absent	P value
Diabetics (n =35)	26	9	0.0005
Multiple comorbidities (n=29)	23	6	0.0001

In the study, diabetic patients have a significant association with formation of complications in neck abscess (p value significant at <0.05 with chi square test). Also patients presenting with multiple comorbidities have significant association with formation of complications of neck abscess (p value significant at 0.0001 with chi square test).

Table 12 (Significant Association between Management modalities and Neck abscess)

Total neck abscess patient=90

	Incision& drainage required	Medical management	P value
Total neck abscess patients (n=90)	73	17	0.0001

In this study it is found that Incision & Drainage modality is a significant treatment modality for neck abscess patients rather than medical management alone (p value significant at <0.05 with chi square test).

DISCUSSION

The study was performed with 90 patients of neck abscess to find out etiopathological correlation. In the study, Male patients were 64(71.1%) and 26(28.9%) patients were Female. More vulnerability to deep neck space infections are due to higher rate of odontogenic and upper respiratory tract infectivity and comorbidities which are more commonly seen in males than females so susceptibility of neck abscess formation is also more commonly seen in males. **Brito TP et al⁹ (2017)** also in his study found that there was predominance in the male gender (55.5%) and young people (mean age 28.1 years) in neck abscess cases. In our study, 20(22.2/100) patients were 41-50 years old, 18(20.0/100) patients were 51-60 years old. **Huang TT et al¹⁰ (2004)** studied 185 patients; 109 (58.9%) were males and 76 (41.1%) were females with a mean age of 49.5 ± 20.5 years. Ninety seven (52.4%) of the patients in his study were older than 50 years of age.

In our study, we found that 50 out of 90 patients (55.56%) belonged to lower class and 22 out of 90 patients (24.44%) belonged to lower middle class. 5 out of 90 patients (5.56%) belonged to upper class, 6 out of 90 patients (6.67%) belonged to upper middle class, 7 out of 90 patients (7.78%) belonged to middle class. Lower class persons are more susceptible to infections due to unhygienic practices in daily life and also due to prevalence of unchecked comorbidities. **Agarwal AK et al¹¹ (2007)** in his study assessed the socioeconomic factors, presentation, aetiological factors, microbiology and management of deep neck space abscesses. Most of the patients were of low socioeconomic status in his study.

In our study, 44(48.89%) patients had Odontogenic Infection, 20(22.22%) patients had URTI. 3(3.33%) patients had Salivary Gland Infection, 2(2.22%) patients had Trauma to Neck, 1(1.11%) patients had Foreign Body, 2(2.22%) patients had Instrumentation, 3(3.33%) patients had Tuberculosis and 15(16.67%) patient had Unknown etiologies. **Vieira F et al¹² (2008)** found in his study that the most common primary sources of deep neck infection are odontogenic, tonsillar, salivary gland, foreign body and malignancy. **Brito TP et al⁹ (2017)** showed in his study that the most frequent causes of neck space infections were bacterial tonsillitis (31.68%) and odontogenic infections (23.7%).

In our study, 50(55.6%) patients had Submandibular abscess

and 44(48.9%) patients had Parapharyngeal abscess. 48(53.33%) patients had Multiple Spaces involved in abscess. Premolar, molar and Canine teeth are directly in close proximity to Submandibular and Parapharyngeal and Canine spaces so chances of spread of infectivity from dental causes to these spaces are higher. **Bakir S et al**¹² (2012) in his study also found the most common involved site in neck abscess formation was the submandibular space (26.1%). In 29.5% of cases of his study, the infection involved more than one space. Among the comorbid patients in our study, 35(38.9%) patients had Diabetes and 28(32.22%) patients had Multiple comorbidities. It is seen that among patients having multiple comorbidities, 20.69% patients had deranged serum electrolyte levels. These patients constitute mostly comorbidities of hypertension, diabetes mellitus, chronic kidney disease and cardiac diseases. In our study, among comorbid patients, Diabetes has a significant association with neck abscess formation (p value significant at <0.05 with chi square test). Diabetic patients have a significant association with formation of complications in neck abscess (p value significant at <0.05 with chi square test). Also patients presenting with multiple comorbidities have significant association with formation of complications of neck abscess (p value significant at 0.0001 with chi square test). In our study, among 4 HIV patients, all 4 developed secondary bacterial infection leading to neck abscess and all 4 patients needed Incision and Drainage of abscess. **Boscolo-Rizzo P et al**¹⁴

(2012) retrospectively identified 365 adult patients with Deep Neck Infections and there were 67 patients (18.4%) developing life-threatening complications. Diabetes mellitus (odd ratio 5.43; P < 0.001) and multiple deep neck spaces involvement (odd ratio 4.92; P < 0.001) were the strongest independent predictors of complications. The mortality rate was 0.3%. Airway obstruction and descending mediastinitis are the most troublesome complications of Deep Neck Infections. **Nwashindi A et al**¹⁵ (2019) had the objective of his study to analyze a series of patients with facial space infection associated with comorbidities. Data were collected from 98 patients with facial and deep neck space infections who met the inclusion criteria over a period of 3 years. Data included demographic information, anatomic space involved and comorbid factors. A total of 98 patients who met the inclusion criteria were investigated in this study. Diabetes mellitus (DM) was the highest comorbid factor. The patients presented mostly within 24–48 hours from the onset of infection. **Chen MK et al**¹⁶ (2000) also found in his observation that compared with the Non diabetic patients, the unique features of deep neck infections in diabetic patients were as follows: (1) older age, (2) tendency of unclear infection source, (3) tendency to involve multiple spaces, (4) required more aggressive surgical intervention, (5) prolonged hospitalization and (6) higher complication rate. The differences were statistically significant (P < .05) in his study. Overall susceptibility of body to any kind of infections are raised with uncontrolled diabetes.

In Management modalities, 51(56.7%) patients had Incision & drainage +medical management. 14(15.56%) patients had Only Medical, 3(3.33%) patients had Incision & drainage+ tracheostomy, 4(4.44%) patients had Incision & drainage + tracheostomy + tooth extraction, 15(16.67%) patients had Incision & drainage+ tooth extraction and 4(3.33%) patients had Medical management + tooth extraction. In this all observations comorbid patients were managed for their comorbidities as per WHO guidelines. Incision & Drainage modality is a significant treatment modality for neck abscess patients rather than medical management alone in both comorbid and non comorbid patients in our study (p value significant at <0.05 with chi square test). **Lee YQ et al**¹⁷ (2011) reviewed patient demographics, etiology, bacteriology, systemic disease, radiology, treatment, complications and outcomes in his study. 131 patients were included (64.9% male, 35.1% female) with a median age of 51.0 years. 108

(82.4%) patients underwent surgical drainage. All 19 patients, who had upper airway obstruction, had either a tracheostomy or intubation. Old age and Diabetes were risk factors for developing deep neck abscesses and their sequelae in his study. Airway obstruction were anticipated in multi-space and floor of mouth abscesses.

CONCLUSION

More common age groups of patients of neck abscesses are adults. Majority of the patients are males. Lower socioeconomic status plays pivotal role in disease progression. Odontogenic and Upper Respiratory Tract Infections are main predisposing factors in development of neck abscesses. Usually Submandibular and Parapharyngeal spaces are mostly involved. Diabetes and other associated comorbidities like Hypertension, Chronic liver disease, Dyslipidaemia etc aggravates severity of neck abscesses and the complications. Meticulous management of all etiological factors and comorbidities are the proper way to deal with a case of neck abscess through multidisciplinary approaches.

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