

# CAUSATIVE FACTORS OF LUDWIG'S ANGINA

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### Abstract

**Introduction:** Ludwig's angina is a rapidly progressive, potentially fulminant cellulitis involving the sub-lingual, submental and sub-mandibular spaces. It typically originates from an infected or recently extracted tooth, most commonly the lower second and third molars. Besides, poor nutritional status, lack of proper medical supports are still major predisposing factors in developing Ludwig's angina in countries like Bangladesh.

**Aim:** Our study aimed to observe the role of odontogenic infection in development of Ludwig's Angina.

**Method:** We carried out a cross sectional study among 26 patients with Ludwig's angina admitted in the department of ENT and Head-neck surgery in SSMC & Mitford Hospital from January-December-2014.

**Results:** In this study we found that males are predominantly affected than females (21 males and 5 females, ratio-4.2:1) with odontogenic infection (18, 69%) as source. We found history of recent tooth extraction in 6 cases (23%) & organism was isolated from pus culture, Klebsiella in 10 cases (19.2%) out of 26 cases. We elicited underlying systemic disease mainly is Diabetes Mellitus in 9 cases (35%) that predisposes to Ludwig's angina.

**Conclusion:** Our study suggests that prompt and thorough clinical evaluation and definitive care will considerably improve patient condition and reduce morbidity and mortality.

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### Introduction:

Ludwig's angina is a potentially life-threatening, rapidly spreading cellulitis of the tissues of the floor of the mouth extending into sub mental, sublingual and submandibular spaces. It bears the threat for rapid airway obstruction<sup>1</sup>.

Ludwig's angina was first described in the year 1836 by German physician Karl Freidrich Willhelm Von Ludwig and hence named after him<sup>1</sup>. Angina is derived from the Latin word *angere* which means to strangle. Other names include "Angina Maligna", "Angina ludovici", "Garotillo" and "Morbus Strangularis". All these names refer

to the choking effect of Ludwig's angina on its Victim<sup>2</sup>.

The causative organisms are generally those of the oral flora, including: Streptococcus spp., Staphylococcus aureus, Bacteroides spp., Fusobacterium spp., Actinomyces spp. and Haemophilus influenza. Immunosuppression, Diabetes Mellitus and malignancy are the major risk factors<sup>2</sup>.

Ludwig's angina usually originates from odontogenic infection especially from lower second or third molar teeth<sup>3</sup>. These teeth have roots that lie at the level of the mylohyoid muscle and abscesses here can spread to the submandibular space<sup>3</sup>.

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The infection begins unilaterally. Cellulitis, rather than abscess formation, is the most common early presenting finding<sup>3</sup>. As the infection progresses, edema of the suprahyoid tissues elevate and displace the tongue posteriorly, resulting in life-threatening airway narrowing. In addition to airway compromise, cavernous sinus thrombosis and brain abscess have been described<sup>3</sup>. Other reported complications of Ludwig's angina include carotid sheath infection and arterial rupture, suppurative thrombophlebitis of the internal jugular vein, mediastinitis, empyema, pericardial and/or pleural effusion, osteomyelitis of the mandible, subphrenic abscess, and aspiration pneumonia<sup>3</sup>

Despite attempts at treatment, the disease was frequently fatal, giving rise to mortality rates exceeding 50% during the preantibiotic era<sup>3</sup>. Airway compromise has been recognized as the leading cause of death in the early 1900s. Since the introduction of antibiotics in 1940s, improved oral and dental hygiene and aggressive surgical approach, the mortality was reduced significantly<sup>3</sup>. Recent series quoted mortalities of 0-10% in Ludwig's angina which may be explained by abrupt airway obstruction<sup>3</sup>.

Late presentation of Ludwig's angina remains a typical feature<sup>4</sup>. Because of its invasive nature, early recognition and treatment is extremely important in this disease. Morbidity and mortality of Ludwig's angina may be reduced by identification, prevention and elimination of associated factors responsible for its development.

**Materials and methods:**

Materials and methods: The study was done on 26 patients treated in the department of ENT & Head-Neck surgery of Sir Salimullah Medical College Mitford Hospital, Dhaka from January, 2014 to December, 2014. It was a cross sectional study.

**Results:**

**3.1 Frequency of Ludwig's angina**

Table 3.1 showed that a total number of 772 patients were admitted in the Department of

Otolaryngology and Head-Neck surgery in SSMC and Mitford Hospital between January 2014- November 2014.

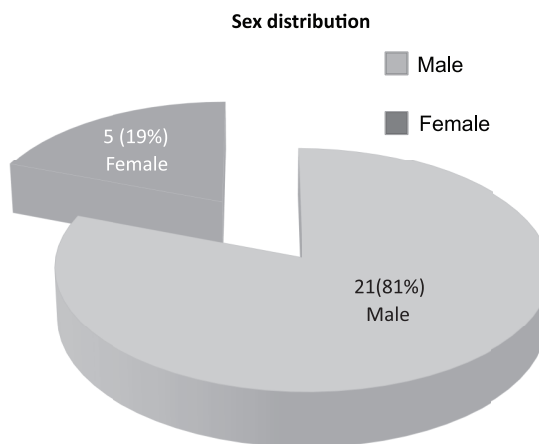
**Table 3.1**  
*Frequency of Ludwig's angina among the admitted patients*

Total patient admitted	Total Ludwig's angina cases	Percentage among all cases
772	26	3.36%

26 patients were diagnosed as Ludwig's angina in study period at this centre.

**3.2 Sex distribution**

Male patients were predominantly affected by Ludwig's angina than female which were 21 (81%) and 5 (19%) respectively. The male and female ratio was 4.2: 1.



**Fig 3.1** Sex distribution of the patients (n=26)

**3.3 Age distribution:**

Minimum age of the patient suffering from Ludwig's angina was 6yrs and maximum age of the patient suffering this disease was 75yrs.

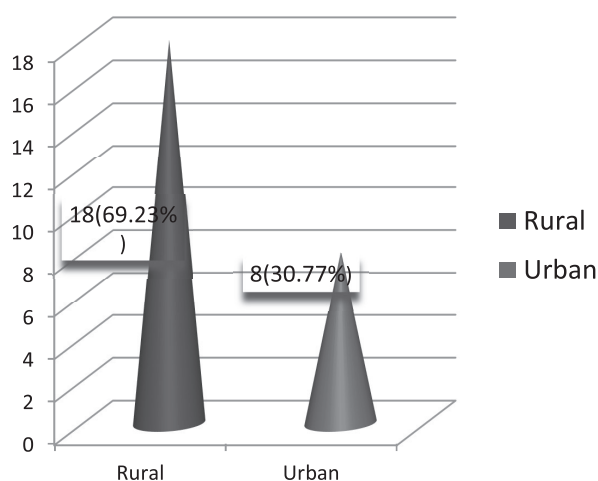
Patients of 5<sup>th</sup> decade (41-50 yrs) suffered most (9; 34.61%) from Ludwig's angina. Then comes the patients of 4<sup>th</sup> decade (31-40yrs). 6 patients (23.07%) of 4<sup>th</sup> decade suffered from this disease. Patients of 3<sup>rd</sup> decade suffered from Ludwig's angina (4; 15.38%) following patients of 4<sup>th</sup> decade.

**Table 3.2**  
*Age distribution of patients (n=26)*

Age (In decades)	Number of Patients
1 <sup>st</sup> decade (1-10yrs)	1
2 <sup>nd</sup> decade (11-20yrs)	3
3 <sup>rd</sup> decade (21-30yrs)	4
4 <sup>th</sup> decade (31-40yrs)	6
5 <sup>th</sup> decade (41-50yrs)	9
6 <sup>th</sup> decade (51-60yrs) and above	3
<b>Total</b>	<b>26</b>

**3.4 Habitat**

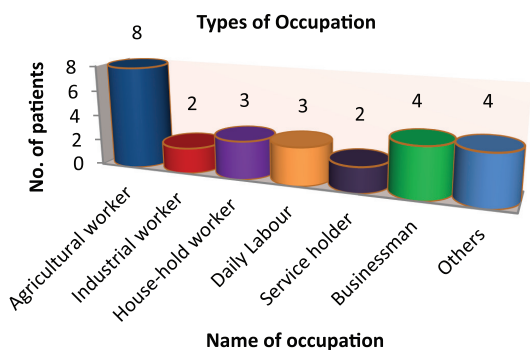
Among the study population, 18(69.23%) patients resided in rural area whereas 8(30.77%) patients were from urban area.



**Fig 3.2** *Habitat of the patient (n=26)*

**3.5 Types of occupation**

Regarding occupation of the patients, 8(30.76%) patients were agricultural worker followed by Businessman and other professions. Both shared equal number i.e. 4(15.38%).



**Fig 3.3** *Types of occupation of the patients (n=26)*

**3.6 Diagnostic delay**

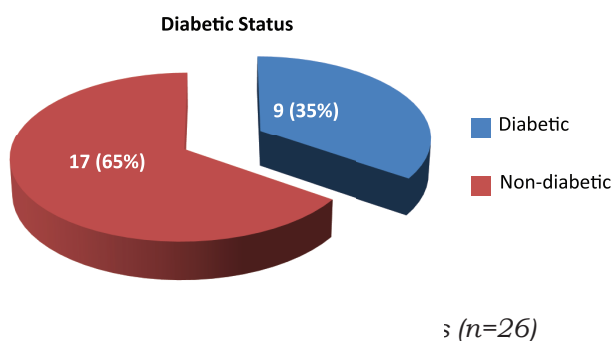
Half (13) of the patients were diagnosed a week after appearance of symptom. 6(23.08%) patients were diagnosed as Ludwig's angina in third week. Only 5(19.23%) patients were identified in first week of symptom appearance.

**Table 3.3**  
*Duration between symptom appearance and diagnosis*

Duration	Number of patients	Percentage
<1 week	5	19.23%
1-2 week	13	50%
2-3 week	6	23.08%
>3 week	2	7.69%
<b>Total</b>	<b>26</b>	<b>100%</b>

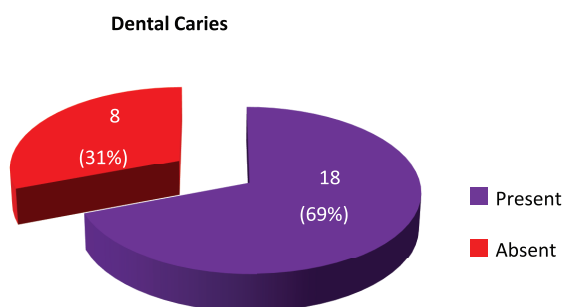
**3.7 Diabetic status**

Out of twenty-six Ludwig's angina patients, 9(35%) were diabetic



**3.8 Dental caries**

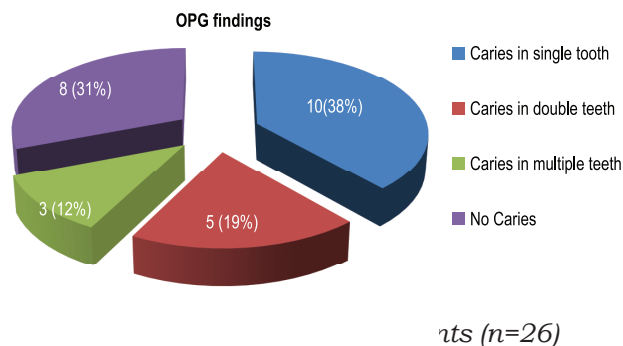
Out of 26 patients, 18(69%) patients had positive history of dental caries.



*(n=26)*

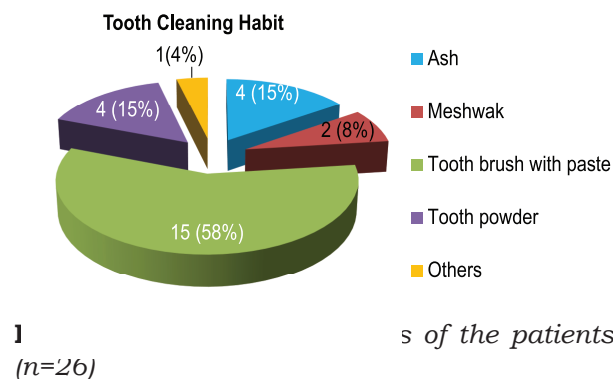
**3.9 OPG findings:**

10(38%) patients had caries in single tooth, followed by 5(19%) and 3(12%) for caries in double and multiple teeth respectively. 8(31%) patients had no caries in OPG.



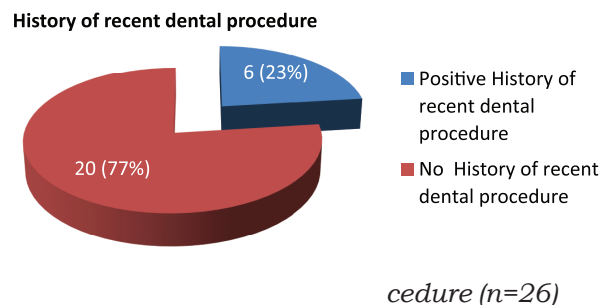
**3.10 Tooth cleaning habit**

Most patients (15, 58%) used tooth brush with paste for tooth cleaning followed by using of ash and tooth powder by 4 (15%) patients.



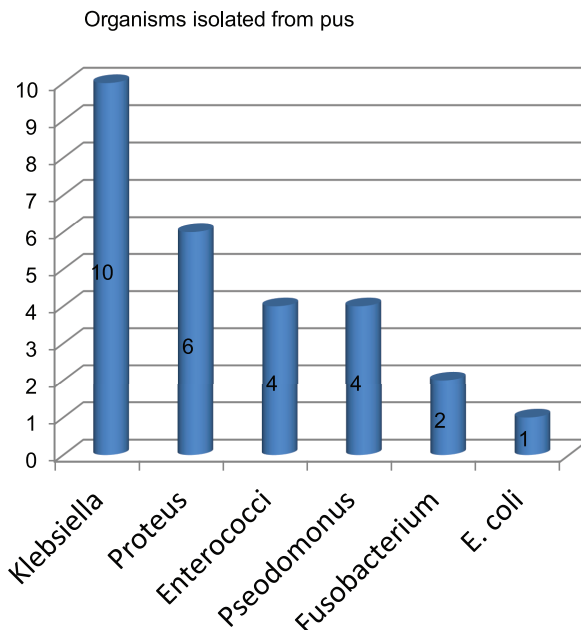
**3.11 H/O recent dental procedure**

Among 26 patients, 6(23%) have positive history of recent dental procedures and 20(77%) patients gave no such history of dental procedure.



**3.12 Organisms isolated from pus**

Klebsiella was the most common organism (in 10 cases) isolated followed by proteus(in 6 cases), Enterococci and pseudomonas(both in 4 cases) in this study.



**Fig 3.9** Organisms isolated from pus

**Discussion:**

There are few studies with comment on demographic pattern of Ludwig’s angina. This is probably because of its uncommon occurrence. Majority of studies were case reports.

However our findings are consistent with earlier reports showing male adult preponderance with sporadic incidents in children<sup>4</sup>. Here male to female ratio was 4.2:1, which was nearly consistent to the previous studies<sup>4</sup>. The disease was found among the people of as younger of 4 months and as older of 79 years<sup>4</sup>. The disease is common in 5<sup>th</sup> decade which may be associated with concurrent disease such as uncontrolled Diabetes mellitus, unhygienic tooth cleaning habit, negligence to odontogenic and oral infections. Agricultural workers residing in rural area were commonly suffered from Ludwig’s angina which may be due to low socio-economic condition and poor oral hygiene.

No data was found in literature about duration between appearance of symptom and diagnosis. It is expected that patients will present early because Ludwig's angina is a rapidly progressive disease. However, we observed that fifty percent of the patients in this study were diagnosed after one week. This may be explained by scarcity of trained practitioner having knowledge on this disease among poor villagers who are highest among the sufferers of Ludwig's angina. Distance from rural referring centers, self-medication and abuse of antibiotics, ignorance of orthodox medical practitioners cause more time consumption making delay in presentation. This late presentation is supported by Andreoli et al.<sup>5</sup>.

In earlier studies, role of concurrent disease, particularly Diabetes Mellitus, in the aetiopathogenesis of several orofacial infections was highlighted ((Moreland et al. 1988, p.466). This study also found nine out of twenty six patients (35%) suffering from Diabetes mellitus which is supported by past literature<sup>5</sup>.

Ludwig's angina can arise from various sources odontogenic infection especially from lower second or third molar teeth<sup>5</sup>. Other less commonly reported causes of Ludwig's angina include sialadenitis, peritonsillar abscess<sup>6</sup>, open mandibular fracture, infected thyroglossal duct cyst, epiglottitis, intravenous injections of drugs into the neck, traumatic bronchoscopy, endotracheal intubation<sup>6</sup>, oral lacerations<sup>6</sup>, tongue piercing (Perkins et al. 1997, p.148), upper respiratory infections and trauma to the floor of the mouth. We found 18 (69%) patients suffering from dental caries. The present study showed that 6 (23%) patients had recent dental procedure among 26 cases. Thus, similarity with previous reports regarding role of dental infection and treatment in causation of Ludwig's angina was evident<sup>6</sup>.

Klebsiella was the most common (38.46%) organism isolated followed by proteus (23.07%), Enterococci and pseudomonas (15.38% both) in this study. But this report was dissimilar with previous study<sup>7</sup>. This differentiation may be explained by small sample size, use of antibiotic in some patients before culture.

#### **Conclusion:**

Ludwig's angina can be life threatening. It can be cured with proper treatment of the airway and appropriate antibiotic. Dental caries and unhygienic teeth are common influencing factors associated with Ludwig's angina which are preventable. We must be very careful during treating Ludwig's angina because of fatality rate of about 4%.

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