

## Clinical Survey for Ludwig's Angina Cases Presented in the Emergency Department of Al-Salam Teaching Hospital

Yusra J Ahmed<sup>1</sup>, Aws Gh Younis<sup>2</sup>, Bashar A Tawfeeq<sup>3</sup> and Rawaa Y Al-Rawee<sup>4\*</sup>

<sup>1</sup>Department of Oral and Maxillofacial Surgery, Al- Jumhoree Hospital, Nineveh Health Directorate, Iraq.

<sup>2</sup>Al-Noor Dental Specialized Center, Nineveh Health Directorate, Iraq.

<sup>3</sup>Department of Oral and Maxillofacial Surgery, Al-Noor University College, Mosul, Iraq.

<sup>4</sup>Department of Oral and Maxillofacial Surgery, Al-Salam Teaching Hospital, Nineveh Health Directorate, Mosul, Iraq.

### \*Correspondence:

Rawaa Y. Al-Rawee, Department of Oral and Maxillofacial Surgery, Al-Salam Teaching Hospital, Nineveh Health Directorate, Mosul, Iraq, Tel: 009647726438648.

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### ABSTRACT

**Aim of the Study:** To record the demographic incidence, as well as evaluate the patients that presented within a 1-year period at the Al-Salam Teaching Hospital in Mosul City, and identify the reasons, complications, duration of hospital stay, treatment outcome and management protocols utilized for such instances.

**Material and Method:** Retrospective data collection for 68 patients presented to Al-Salam Teaching Hospital in Mosul City complaining from Ludwig's Angina swelling. Demographic informations with clinical parameters are recorded including (age, gender, cause, referral place, duration of symptom, hospital stay, sign and symptom and type of treatment performed).

**Results:** Show that female affected more than male, with age group between (41 – 50 years old). Dental infection s are the most common cause with odontogenic pain and swelling are highest symptoms recorded. Patients stay in the hospital 1 – 2 days and discharged with improvement. Best treatment are drainage and remove the cause & Antibiotics. No mortality rate recorded.

**Conclusion:** Early identification, careful attention to airway maintenance, intensive intravenous antibiotic therapy, and prudent management can reduce the risk of Ludwig's angina, which is a potentially fatal consequence. Furthermore, it is critical to identify and, if possible, eradicate the infection's source with the surgical intervention. Careful attention should be performed to geriatric and children to perform good oral hygiene with periodic dental follow-up to avoid such serious complications.

### Keywords

Ludwig's Angina, Submental Swelling, Odontogenic Infection, Antibiotics, Surgical Drainage.

### Introduction

A potentially fatal condition called "Angina Ludovici" or "Ludwig's angina" can cause airway blockage due to generalized cellulitis that affects the neck, floor of the mouth, and submandibular regions on both sides [1].

Angina maligna and Morbus strangularis are two synonyms. Angere, meaning to strangle in Latin, is the synonym to word (angina). Ludwig's angina victims have a choking sensation, which is why the name is given. The disease's aggressiveness, quick advancement leading to airway impairment, and high fatality rates are well-known [2]. The lower second and third molars are the most common sites of infection in people with Ludwig's angina, but any type of oral infection can cause this condition. If patient have peritonsillar or parapharyngeal abscesses, submandibular gland sialadenitis, sialolithiasis, or peritonsillar or parapharyngeal

abscesses, it can get worse [3]. Mandibular trauma, oral neoplasia, lymphangiomas, penetrating injuries to the floor of the mouth, and cultural behaviors like tongue piercing are among the other potential causes [4,5].

A possible airway blockage or asphyxiation could result from the displacement of the tongue superiorly and posteriorly caused by subsequent swelling. The illness starts on one side of the body and quickly spreads to the other [4]. Tissues swell quickly, which can obstruct the airway or make it difficult to swallow saliva. Breathing problems, mental changes (such as disorientation or a loss of concentration), fever, soreness or swelling in the neck, redness of the neck, weakness, extreme weariness, earaches, increased saliva production, and an unpleasant odor are all symptoms. Dysphagia, trismus, and odynophagia are further symptoms that may be present. Brawny, hard, tender induration of the submandibular region on both sides, accompanied by an elevation of the tongue, are the characteristic indications [5].

Grodinsky developed five diagnostic criteria for Ludwig's angina [6]. Instead of an abscess, they show an infection in the submandibular space called cellulitis. The infection never just affects one space, but both; it causes gangrene with serosanguineous infiltration and little to no pus; it targets connective tissue, fascia, and muscles instead of glandular structures; and it spreads through continuity instead of lymphatics [6].

Factors that increase the risk of infection include cavitated carious teeth, recent dental work, systemic diseases such as AIDS, and organ transplantation as well as pain and suffering [7,8]. Other possible causes of Ludwig's angina include mandibular trauma, oral neoplasm, lymph-angiomas, penetrating injuries to the floor of the mouth, and oral tumors. Treatment start with, protecting the airway has been considered paramount. Although intravenous steroid injections may alleviate edema and, by extension, the danger of airway compromise, the gold standard of treatment remains an aggressive broad-spectrum intravenous (IV) antibiotic [9]. It is crucial to remove the infection's source and perform surgical decompression of the fascial planes [10,11].

### **Aim of the Study**

To record the demographic incidence, as well as evaluate the patients that presented within a 1-year period at the Al-Salam Teaching Hospital in Mosul City, and identify the reasons, complications, duration of hospital stay, treatment outcome and management protocols utilized for such instances.

### **Materials and Method**

#### **Study Design and Ethical Approval**

A retrospective data collection was conducted for the patients between January 2023 to January 2024 who attained the Emergency Department with the Maxillofacial Department of Al-Salam Teaching Hospital in Mosul City of Nineveh Province. The study follows the ethical principles of Declaration of Helsinki. Approval to conduct this study was obtained from the Institutional Review of the Authorised Scientific Committee in Nineveh Health

Directorate with the numbered session 256 in 5/ 6 / 2024 with research number 2024083 (No. 22517, Date 9 / 6 / 2024).

### **Inclusion and Exclusion Criteria**

All patients who were presented with clinical symptoms and signs of Ludwig's angina or diagnosed as Ludwig angina are included in this study regardless to age or gender.

Involvement of other neck swelling or other space infection are excluded, as well as any missed data cases also excluded from the study.

### **Sample Size**

The total sample size was (75) excluded seven cases because of missed data so the sample size were (68) cases.

### **Method**

A thorough dental and medical history was recorded. In addition thorough physical examination conducted, including a systems review, after taking the patient's medical history. All cases underwent standard laboratory testing, including hemoglobin, differential counts, erythrocyte sedimentation rate, urine, random blood sugar, hepatitis B surface antigen, and human immunodeficiency virus, renal and liver function test done on need. Radiographical examination also recorded to detect the cause of infection.

### **Parameters Collection**

#### **Demographical informations**

Age divided into six groups (1day- 10 years, 11-20 years, 21 – 30 years, 31 - 40 years, 41 – 50 years and more than 51 years. Gender distributed too male and female.

### **Clinical Information Data includes**

#### **A. Causes**

- Dental Infection
- Tonsil Infection
- Tooth Extraction
- Oral Mucosal Lesions
- Traumatic Injuries
- Periodontal Lesions
- Medically compromised with Dental Infection

#### **B. Referral Side**

- Dental Health Specialized Center
- Primary Health care Centers
- Private Clinic
- Personal
- Emergency Department

#### **C. Duration of Symptom**

- 3 days
- 5 Days
- 7 Days
- 10 Days
- More than 10 days

#### D. Hospital Stay Time

- 1 – 2 days
- 3 – 5 days
- 6 - 8 days
- Mora than 10 days

#### E. Symptoms and Sign

- Fever
- Toothache
- Submental swelling
- submandibular swelling
- Trismus
- Elevation of the tongue
- Difficulty in breathing
- Poor Oral Hyigen
- Halitosis
- Submental and submandibular swelling bilateral

#### F. Treatment

- Observation & Antibiotics
- Drainage / Antibiotics and follow-up
- Drainage and remove the cause & Antibiotics

### Results

Sixty-eight patients enrolled in the study. The highest percent of patients (24%) with age ranged from (41-50 years) followed by patients aged less than ten years with 22% percent. Slight differences between male to female with highest female percent (51%). Causes also varied with peak to dental infection (46%) while the least cause related to traumatic injuries and tonsillar infection equally (3%, 3%). Different places can referee such patients dental health specialized centers record the uppermost percent (34%).

In accordance to duration of symptoms; more than third of patients take five days to attain the hospital (32%). Forty percent of patients stay for one to two days in the hospital only. Sign and symptoms are also varied between patients the most common symptom are tooth-ach, poor oral hygiene and submental swelling (90%, 75% and 54%). Near sixty percent treated by drainage, remove the cause and antibiotics. Table 1 show the descriptive analysis for all cases in details.

Clinical Parameters		No. of Pt.	%
Age Groups	1day- 10 years	15	22%
	11 – 20 years	8	12%
	21 – 30 Years	13	19%
	31 – 40 Years	11	16%
	41 – 50 Years	16	24%
	More than 51 years	5	7%
Gender	Male	33	49%
	Female	35	51%
Causes	Dental Infection	31	46%
	Tonsil Infection	2	3%
	Tooth Extraction	7	10%

Causes	Oral Mucosal Lesions	17	25%
	Traumatic Injuries	2	3%
	Periodontal Lesions	4	6%
	Medically compromised with Dental Infection	5	7%
Referee	Dental Health Specialized Center	23	34%
	Primary Health care Centers	11	16%
	Private Clinic	5	7%
	Personal	12	18%
	Emergency Department	17	25%
Duration of Symptom	3 days	17	25%
	5 Days	22	32%
	7 Days	20	29%
	10 Days	6	9%
	More than 10 days	3	4%
Hospital Stay Time	1 – 2 days	27	40%
	3 – 5 days	20	29%
	6 – 8 days	9	13%
	Mora than 10 days	12	18%
Symptoms & Sign	Fever	45	66%
	Toothache	61	90%
	Submental swelling	37	54%
	submandibular swelling	18	26%
	Trismus	29	43%
	Elevation of the tongue	9	13%
	Difficulty in breathing	19	28%
	Poor Oral Hygiene	51	75%
	Halitosis	27	40%
	Submental and submandibular swelling bilateral	13	19%
Treatment Plane	Observation & Antibiotics	10	15%
	Drainage / Antibiotics and follow-up	18	26%
	Drainage and remove the cause & Antibiotics	40	59%

### Discussion

Ludwig's angina considered as serious condition can end with death if neglected. The main aim from this analysis study to record the most age groups and gender that need to take care from the causes that can result in such emergency situation need urgent surgical intervention. Also emphasize the most common cause with best management protocol.

Ludwig's angina typically affects a wide age range (from 1 day to more than 51 years old). The first and fourth decades of life were the most impacted age groups in this study, accounting for 22% and 24%, respectively. These results are inconsistent with those of Huang and colleagues' study [12], which found that 52.4% of patients were in their 50s and 34.1% were in their 70s. The study is consistent with the Okoji study, which had a mean age of 47.7 years [13].

Economic considerations may have had an impact on the patient distribution in the present study. One possible explanation for the high percentage of patients in our study who are in their 40s could be a delay in this demographic, who are often busy with their work and family lives, leaving little time for hospital presentations. For this economically engaged demographic, going to the doctor means

Figure one highlighting the different symptoms and sign percent.

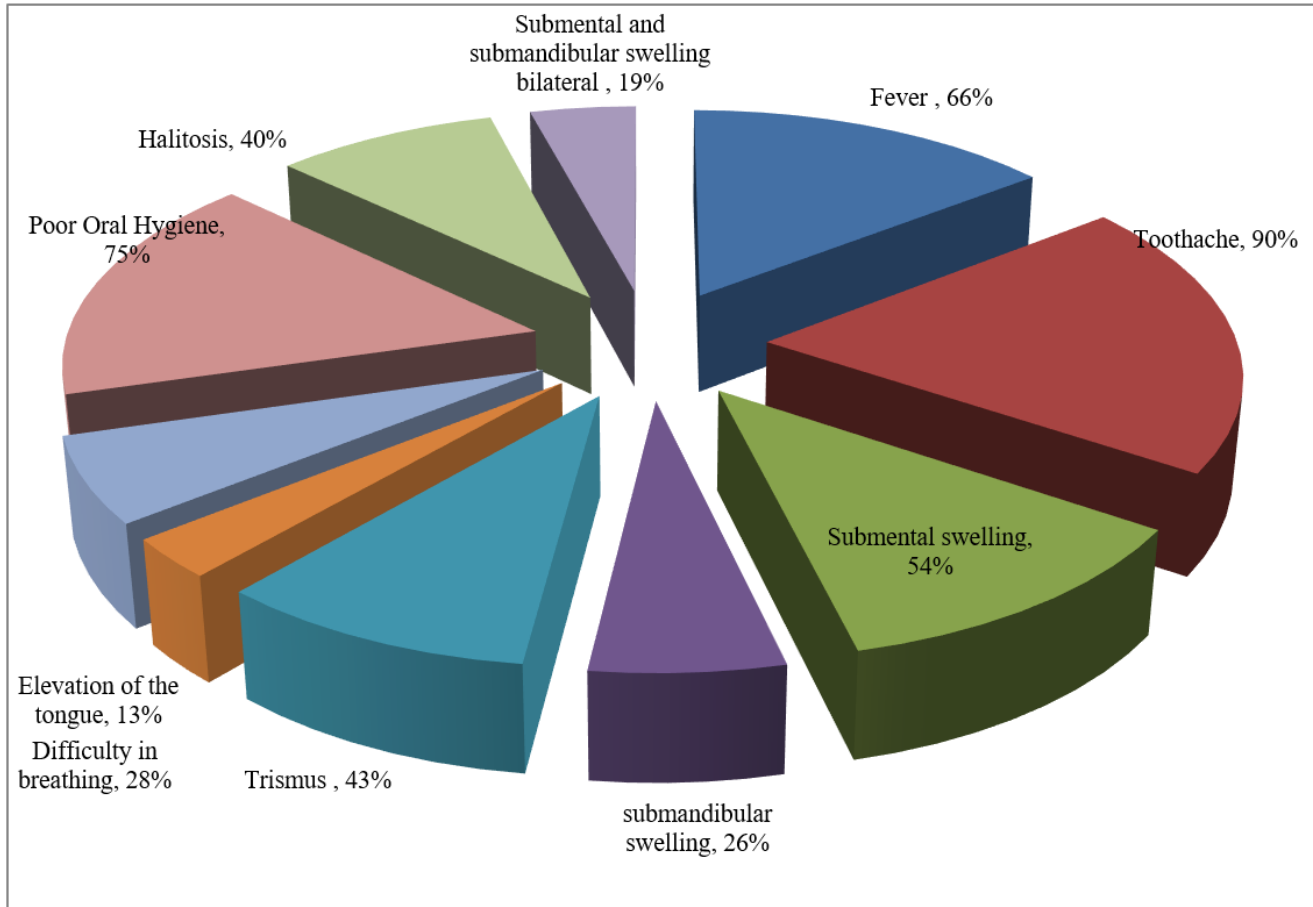


Figure 1: Different Symptom and Sign Recorded in Patients.

missing work, which is something they'd rather not do, especially in Mosul, as a city passes through many political circumstances such as ISIS and COVID 19 that affect the economy. According to multiple studies and surveys, the older age group (7th decade) may be associated with the growing problem of younger careers neglecting their elderly loved ones due to financial difficulties [14], thereby delaying the presentation.

Previous researches has highlighted that men are more likely to experience LA [15,16]. According to Botha and colleagues [17], as well as Mahmud et al. [15], the male-to-female ratio ranged from 2.32:1 to 5.5:1. Different societies can explain this gender disparity by expecting men to work full-time as breadwinners, which may make it difficult for them to prioritize their dental health.

The gender disparity in this study was not as significant as it was in previous research. Several studies [18,19] have shown that females are increasingly taking up the role of breadwinner in the Mosul setting, and the time restrictions that come with being a family may also be contributing to the disproportionately high percentage of females in this sample with a slight difference (51%, 49%). Financial support is a barrier that delays both genders' access to dental treatment.

Researchers have discovered that odontogenic causes account for up to 90% of adult Ludwig's angina cases [20-22]. Study findings confirm that 46% of patients had an odontogenic source. Research's small sample size may contribute to this, but it further supports the idea that odontogenic foci are the primary cause of Ludwig's angina. Specialized dental centers and emergency departments receive the majority of cases (34%, 25%), where patients with emergency dental problems like swelling are most common.

Ludwig's angina has been associated with systemic illnesses such as hypertension, diabetes, and kidney disease. In this study, only 7% have medical problems, mostly diabetes. Okoje's study [13] revealed that nearly 40% of patients had a systemic illness. Huang et al. [12], reviewing a larger case series of 185 individuals, found a comparable percentage of 34.1%. The small sample size of 68 patients in this study may be a contributing factor. Most of the previous research [12,16,23,24] considered that diabetes was the most prevalent co-morbidity. These researches clearly links diabetes to impaired wound healing, impaired immunity, and an increased risk of infection, as evidenced in Ludwig's Angina [24,25].

The duration of symptom occurrence until hospital admission ranged from 3 to more than 10 days, with the highest percentage

(32%) occurring after five days of symptom occurrence. We attribute this to the majority of patients seeking straight forward treatment with antibiotics and analgesics until their symptoms deteriorate. The hospital stays ranged from one day to more than 10 days. Forty percent of patients improved within 1 to 2 day hospital stays and advised them to follow up as outpatients. According to Okoje [13], more than 50% of the total spent more than 10 days in the hospital. Rowe et al. documented a total of 7 days of hospital stay (2 days in the ICU and 5 in the hospital) in their group of patients who had similarly undergone surgical drainage; therefore, this is lower than the 93% of instances reported [26]. Most patients dislike hospital stays, particularly when they begin to improve. On the contrary, 18% of the patients who stayed more than 10 days, especially older people, were more likely to experience problems that necessitated more advanced treatment and required subsequent care. In addition, they might suffer from long-term systemic diseases like diabetes and hypertension. The results are consistent with those of Huang et al., who also found something similar [12]. The most common symptom recorded is pain (90%) and swelling (54%), adjuvant to poor oral hygiene, which increases the infection's spread.

Despite the potentially fatal nature of LA, all patients have shown improvement, with no recorded mortality rate. Following antibiotic treatment, surgical intervention, and removing the cause, there is a good improvement [27-29].

In the Okoje study, two people (15.38%) died. Both individuals arrived late and had uncontrolled diabetes mellitus, which exacerbated the complications in the second case and led to death on the ward [13].

## Conclusion

Early identification, careful attention to airway maintenance, intensive intravenous antibiotic therapy, and prudent management can reduce the risk of Ludwig's angina, which is a potentially fatal consequence. Furthermore, it is critical to identify and, if possible, eradicate the infection's source with the surgical intervention.

Careful attention should be performed to geriatric and children to perform good oral hygiene with periodic dental follow-up to avoid such serious complications.

## Authors Contribution

Dr. Rawaa Y. Al-Rawee responsible for concept, design, definition of intellectual content, literature search, clinical studies, data acquisition, manuscript preparation.

Dr. Aws collecting the data and analyzing it.

Dr. Yusra manuscript editing and manuscript review.

Dr. Bashar A. Tawfeeq approve the writing scientifically.

## References

1. Murphy SC. The person behind the eponym: Wilhelm Frederick von Ludwig (1790-1865). *J Oral Pathol Med.* 1996; 25: 513-515.

2. Barakate MS, Jensen MJ, Hemli JM, et al. Ludwig's angina: Report of a case and review of management issues. *Ann Otol Rhinol Laryngol.* 2001; 110: 453-456.
3. Wong TY. A nationwide survey of deaths from oral and maxillofacial infections: The Taiwanese experience. *J Oral Maxillofac Surg.* 1999; 57: 1297-1299.
4. Williams AM, Southern SJ. Body piercing: To what depths? An unusual case and review of associated problems. *Plast Reconstr Surg.* 2005; 115: 50e-54e.
5. Perkins CS, Meisner J, Harrison JM. A complication of tongue piercing. *Br Dent J.* 1997; 182: 147-148.
6. Grodinsky M. Ludwig's angina: An anatomical and clinical study with review of the literature. *Surgery.* 1939; 5: 678-696.
7. Diarks E, Meyerhoft WL, Schuttz B, et al. Fulminate interaction of odontogenic origin. *Laryngoscope.* 1987; 97: 271-273.
8. Moreland LW, Corey J, Mckeuzie R. Ludwig's angina. *Arch Intern Med.* 1988; 148: 461-465.
9. Honrado CP, Lam SM, Karen M. Bilateral submandibular gland infection presenting as Ludwig's angina: First report of a case. *Ear Nose Throat J.* 2001; 80: 217-218, 222-223.
10. Britt JC, Josephson GD, Gross CW. Ludwig's angina in the pediatric population: Report of a case and review of the literature. *Int J Pediatr Otorhinolaryngol.* 2000; 52: 79-87.
11. John NM, Kumar RA, Subbegowda SH. Ludwig's Angina: A Study on Etiology and Factors affecting the Prognosis and Management. *Int J Otorhinolaryngol Clin.* 2018; 10: 47-51.
12. Huang TT, Liu TC, Chen PR, et al. Deep neck infection: analysis of 185 cases. *Head Neck.* 2004; 26: 854-60.
13. Okoje VN, Ambeke OO, Gbolahan OO. Ludwig's Angina: An Analysis of Cases Seen at The University College Hospital, Ibadan. *Ann Ibd Pg Med.* 2018; 16: 61-68.
14. Sijuwade PO. Elderly Care by Family Members: Abandonment, Abuse and Neglect. *The Social Sciences.* 2008; 3: 542-547.
15. Mahmud S, Haque R, Mamun AA, et al. Factors influencing Ludwig's Angina. *Bangladesh J Otorhinolaryngol.* 2014; 20: 5-7.
16. Fakir MAY, Bhuyan MAH, Uddin MM, et al. Ludwig's Angina: a study of 50 cases. *Bangladesh J Otorhinolaryngol.* 2008; 14: 51- 56.
17. Botha A, Jacobs F, Postma C. Retrospective analysis of etiology and comorbid diseases associated with Ludwig's Angina. *Ann Maxillofac Surg.* 2015; 5: 168-173.
18. Eboiyehi FA, Muoghalu CO, Bankole AO. In their Husband's Shoes: Feminism and Political Economy of Women Breadwinners in Ile-Ife, Southwestern Nigeria. *Journal of International Women's Studies.* 2016; 17: 102-121.
19. Akanle O, Adesina JO, Nwaobiala UR. Turbulent but I must endure in silence: Female breadwinners and survival in Southwestern Nigeria. *Journal of Asian and African Studies.* 2016; 51: 1-17.

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20. Osunde O, Bassey G, Ver-Or N. Management of Ludwig's Angina in Pregnancy: A Review of 10 Cases. *Ann Med Health Sci Res.* 2014; 4: 361-364.
  21. Kao J-K, Yang S-C. Ludwig's angina in children. *Journal of Acute Medicine.* 2011; 1: 23-26.
  22. Srirompotong S, Art-Smart T. Ludwig's angina: a clinical review. *Eur Arch Otorhinolaryngol:* 2003; 260: 401-403.
  23. Bross-Soriano D, Arrieta-Gomez JR, Prado- Calleros H, et al. Management of Ludwig's angina with small neck incisions: 18 years' experience. *Otolaryngol Head Neck Surg.* 2004; 130: 712-717.
  24. Vincent Ugboko, Kizito Ndukwe, Fadekemi Oginni. Ludwig's Angina: An Analysis of Sixteen Cases in a Suburban Nigerian Tertiary Facility. *African Journal of oral Health.* 2005; 2: 16-23.
  25. Chen MK, Wen YS, Chang CC, ET AL. Deep neck infections in diabetic patients. *Am J Otolaryngol.* 2000; 21: 169-73.
  26. Rowe DP, Ollapallil J. Does surgical decompression in Ludwig's angina decrease hospital length of stay?. *ANZ J Surg.* 2011; 81: 168-171.
  27. Nigeria [Internet]. World Health Organization. 2018; [cited 22 January 2018]. Available from: <http://www.who.int/countries/nga/en/>
  28. Sujatha MP, Madhusudhana R, Amrutha KS, et al. Anaesthetic management of Ludwig's angina with comorbidities. *Indian J Anaesth.* 2015; 59: 679-681.
  29. Fellini RT, Volquind D, Schnor OH, et al. [Airway management in Ludwig's angina - a challenge: case report]. *Rev Bras Anesthesiol.* 2015; 67: 637-640.