International Journal of General Medicine

Dovepress
open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Rising Incidence of Acute Epiglottitis in Eastern China: An Eight-Year Retrospective Study and Its Association with the 24 Solar Terms

Feng Lu[1,*], Yangyang Wang[2,*], Fangyu Miao[3], Chengzhou Han[2], Xiangming Meng[2]

[1]Department of Emergency Medicine, Affiliated Huishan Hospital of Xinglin College, Nantong University, Wuxi Huishan District People's Hospital, Wuxi, 214187, People's Republic of China; [2]Department of Otolaryngology, Affiliated Huishan Hospital of Xinglin College, Nantong University, Wuxi Huishan District People's Hospital, Wuxi, 214187, People's Republic of China; [3]Information Centre, Affiliated Huishan Hospital of Xinglin College, Nantong University, Wuxi Huishan District People's Hospital, Wuxi, 214187, People's Republic of China

*These authors contributed equally to this work

Correspondence: Xiangming Meng, Department of Otolaryngology, Affiliated Huishan Hospital of Xinglin College, Nantong University, Wuxi Huishan District People's Hospital, 2 Zhanqian North Road, Luoshe Town, Huishan District, Wuxi, 214187, People's Republic of China,
Email xiangming_meng@hotmail.com

Purpose: This study aimed to investigate the clinical characteristics of acute epiglottitis (AE) patients in East China and examine the correlation between the incidence of AE and the 24 solar terms (24 STs).

Methods: A retrospective, observational study was conducted on patients diagnosed with AE between January 2014 and December 2021 at a single-center medical institution in East China. The clinical characteristics of patients with AE and their correlation with the 24 STs were investigated.

Results: A total of 287 patients with AE were included in this study, among which there were 179 males (62.37%) and 108 females (37.63%), with a mean age of 47.79 ± 13.83 years (range 16–87 years). Of these patients, 100 (34.84%) had at least one comorbidity and the most common comorbidities were hypertension, smoking and type 2 diabetes. The duration of hospitalization was 3 days (IQR, 1–16 days). All patients, except for one who required tracheal intubation, were cured with intravenous antibiotic administration and the combined use of corticosteroids. The incidence of AE showed significant fluctuations between the 24 STs and the highest number of cases occurred during the Summer solstice (24 cases, 8.36%).

Conclusion: The incidence of AE was seen to increase annually in this study. The main features of AE are sore throat, dysphagia, odynophagia and fever, which may be accompanied by inflammation in surrounding areas. A clear correlation exists between the incidence of AE and the fluctuations within the 24 STs, notably with the peak incidence observed during the Summer solstice, which approximately corresponds to June 21 to July 7 in the Gregorian calendar.

Keywords: acute epiglottitis, 24 solar terms, seasonal variations, incidence, summer solstice

Introduction

Acute epiglottitis (AE) is a potentially life-threatening condition characterized by inflammation of the epiglottis and adjacent supraglottic structures.[1,2] The inflamed epiglottis can swell to the point of airway obstruction and subsequent respiratory distress within hours.[1] While AE is primarily caused by bacterial infections, it can also result from fungal or viral infections.[3] Additionally, AE can be non-infectious, from thermal or chemical burns or ingesting foreign bodies.[4] *Haemophilus influenza* is the most frequent cause of AE, a potentially dangerous bacterium that can also lead to other life-threatening conditions such as meningitis, pneumonia, and others.[5] After the COVID-19 pandemic, AE related to SARS-CoV-2 has been recorded.[6] Following the implementation of the *Haemophilus influenzae* type B vaccine, the occurrence of AE in pediatric populations was significantly reduced.[7] As a result, the onset of AE is now primarily seen in adults, which differs from the manifestation in children.[8] Moreover, the occurrence of AE in adults exhibited seasonal patterns.[9–11]

Received: 15 February 2024
Accepted: 23 April 2024
Published: 29 April 2024

The 24 Solar terms (24 STs), a unique traditional Chinese calendar, were established by ancient Chinese scholars over 2000 years ago.[12] In 2016, the "24 STs" were recognized and included on the Representative List of the Intangible Cultural Heritage of Humanity by the United Nations Educational, Scientific and Cultural Organization (UNESCO).[13] The 24 STs divide the ecliptic into 24 equal segments, following the sun's path along the ecliptic.[14] Figure 1 illustrates the Gregorian calendar dates corresponding to each of the 24 STs. The 24 STs are a unique Chinese system of temporal knowledge and social customs guiding people's agricultural pursuits, daily routines, and healthcare practices from antiquity to the present.[15,16] Recent studies have revealed a distinct correlation between the onset of certain illnesses, such as ischemic stroke, Parkinson's disease, and acute myocardial infarction, as well as variations in the 24 STs.[17–19] However, there are no studies on the correlation between the onset of AE and the 24 STs.

This study aimed to describe the clinical features of patients with AE in Eastern China and investigate the correlation between the incidence of AE and the 24 STs.

Patients and Methods

Patients

The digitized medical records of patients discharged from the Department of Otolaryngology, Wuxi Huishan District People's Hospital, Wuxi, China, with the diagnosis of AE (International Classification of Diseases, Tenth Revision [ICD-10] J05.1) between January 1, 2014, and December 31, 2021, were reviewed. In this study, comorbidities identified included

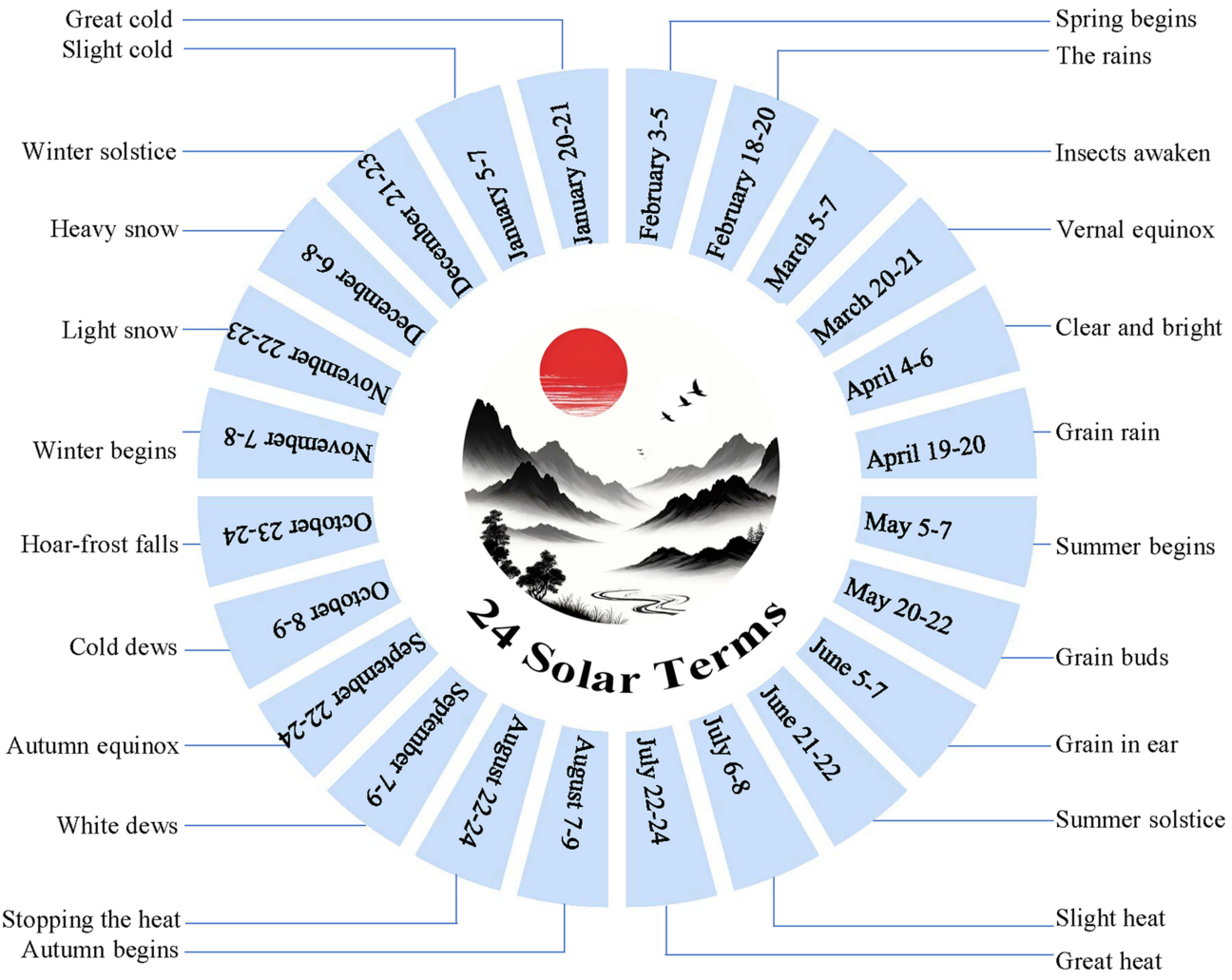

Figure 1 The figure shows the Gregorian calendar dates corresponding to each of the 24 STs.

hypertension (I10), type 2 diabetes (Z11.9), hypokalemia (E87.5), anemia (D64), hepatic impairment (K76.9), pulmonary infections (J98.4), coronary heart disease (I25.9), reflux esophagitis (K21.0), hyperthyroidism (E05.9), emphysema (J43.9), cor pulmonale (I27.9), premature atrial contractions (I49.1), bronchiectasis (J47.0), asthma (J45.9), lymphoma (C85.9), leukocytosis (D72.8), nasopharyngeal carcinoma (C11.9), and epiglottic cyst (J38.1). These conditions were examined to offer a detailed assessment of patient health status and investigate their potential associations with outcomes of AE. The inclusion of patients was not restricted by age. Exclusion criteria were patients who were not admitted to the department of otolaryngology with AE as the primary diagnosis, but who were hospitalized in other departments of the hospital for other systemic diseases and confirmed to have AE by a consultant otolaryngologist. All included patients underwent an electronic laryngoscopy and were graded as mild, moderate, or severe according to the degree of epiglottic edema.[20]

The Chinese Calendar 24 STs online tool was used to confirm the 24 STs matching the hospitalization of the patient.[21] Data were extracted systematically from the Hospital Information System and imported into a well-designed spreadsheet (Microsoft Excel 2019; Microsoft Inc., Redmond, USA). The following data were included: gender and age, admission and discharge dates, onset times, potential predisposing factors, grades, comorbidities, treatment, airway management, outcome, and 24 STs.

The study strictly adhered to the principles of the Declaration of Helsinki, as approved by the Ethics Committee (Grant number: HYLL20220609001). Personal information was anonymized ahead of time for this study, kept fully confidential during the statistical analysis and used solely for scientific purposes. Therefore, the requirement for informed patient consent was waived.

Statistical Analyses

All of the statistical analyses were performed using R statistical software (Version 4.2.2). The categorical variables were described using absolute frequencies (n) and percentages (%). The continuous variables were assessed for normal distribution using the histograms and QQ plots. The normally distributed variables were described by the mean and standard deviation (Mean ± SD), whereas non-normally distributed variables were described by the median and interquartile range (IQR). A linear trend test was used to examine the trend in the number of AE incidences per year $P < 0.05$ was considered statistically significant.

Results

Demographics

Initially, 291 patients were included in the study. After more analysis of the patient data, four patients were removed from the study; two of them were admitted for peritonsillar abscesses with mild epiglottic mucosal edema and the other two were hospitalized for different systemic disorders before they were diagnosed with AE. Thus, a total of 287 patients were included in the final analysis.

The patients included 179 males (62.37%) and 108 females (37.63%) with a mean age of 47.79 ± 13.83 years (range 16–87 years). The distribution of these patients by age and gender is shown in Figure 2.

The most common potential predisposing factor was fatigue (n = 27, 9.40%), followed by foreign bodies (n = 12, 4.18%) and colds (n = 9, 3.13%). In addition, some patients stated that burns, alcohol consumption, surgical infections, and motor vehicle accidents were the predisposing factors.

Of these patients, 100 (34.84%) had at least one comorbidity, and 19 (6.62%) had two or more comorbidities. Hypertension was the most common comorbidity (n = 61, 21.25%), followed by smoking (n = 27, 9.41%), type 2 diabetes (n=16, 5.57%) and hypokalemia (n = 6, 2.09%). In addition, some uncommon comorbidities include anemia, liver function impairment and lung infections. The demographic characteristics, predisposing factors and comorbidities of patients with AE included in the study are shown in Table 1.

The Incidence by Year, Month and Week

From 2014 to 2021, the number of AE cases per year ranged between 25 and 45 and increased annually (a test for linear trend, $p < 0.01$). The number of cases per year is shown in Figure 3B.

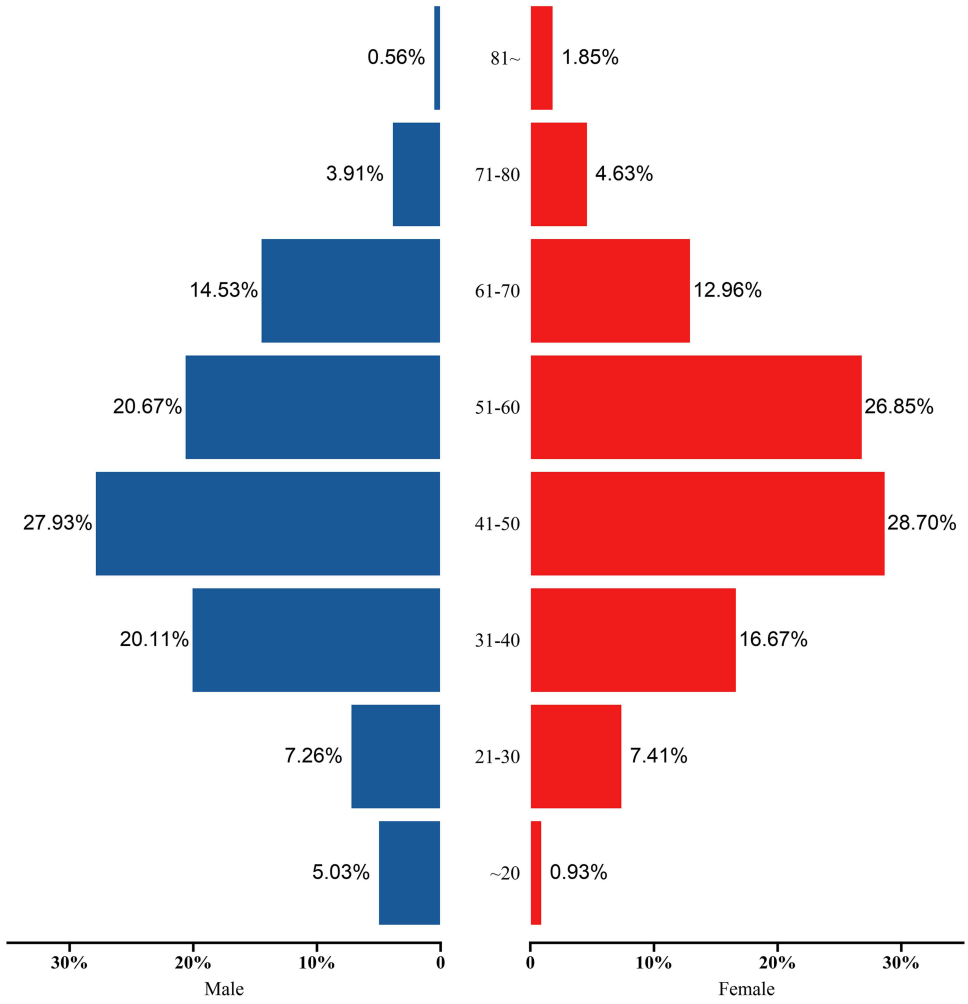

Figure 2 The figure shows the age and gender distribution of patients with acute epiglottitis.

June had the largest number of cases (n = 39, 13.58%), followed by September (n = 33, 11.49%) and March (n = 31, 10.80%). November was the month with the smallest number of cases, with only 13 reported (4.52%). Figure 3C depicts the incidence per month.

Table 1 Demographic Characteristics, Predisposing Factors, and Comorbidities of Patients with Acute Epiglottitis

	No, (%)
Age, yr, median (Mean ± SD)	47.79 ± 13.83
Gender, no, (%)	287(100.00)
Male, no, (%)	179(62.37)
Female, no, (%)	108(37.63)
Predisposing factors, no, (%)	287(100.00)
Without an obvious predisposing factor, no, (%)	233(81.18)
Fatigue, no, (%)	27(9.41)
Foreign bodies, no, (%)	12(4.18)
Colds, no, (%)	9(3.14)
Others, no, (%)	6(2.09)

(*Continued*)

Table 1 (Continued).

	No, (%)
Comorbidities, no, (%)	287(100.00)
Hypertension, no, (%)	61(21.25)
Smoking, no, (%)	27(9.41)
Type 2 diabetes, no, (%)	16(5.57)
Hypokalemia, no, (%)	6(2.09)
Anemia, no, (%)	3(1.05)
Hepatic impairment, no, (%)	2(0.70)
Pulmonary infections, no, (%)	2(0.70)
Coronary heart disease, no, (%)	1(0.35)
Reflux esophagitis, no, (%)	1(0.35)
Hyperthyroidism, no, (%)	1(0.35)
Emphysema, no, (%)	1(0.35)
Cor pulmonale, no, (%)	1(0.35)
Premature atrial contractions, no, (%)	1(0.35)
Bronchiectasis, no, (%)	1(0.35)
Asthma, no, (%)	1(0.35)
Lymphoma, no, (%)	1(0.35)
Leukocytosis, no, (%)	1(0.35)
Nasopharyngeal carcinoma, no, (%)	1(0.35)

According to the weekly model, Sunday had the fewest cases (n = 26, 9.05%), while the number of cases from Monday to Saturday varied from 39 to 48 (n = 39–48, 13.58–16.72%). Figure 3D illustrates the patient incidence distribution by week.

The Incidence of AE and the 24 STs

Across the 24 STs, the incidence of AE varies dramatically. The Summer solstice had the highest number of cases of AE, with 24 (8.36%). Moreover, 18 (6.27%) and 17 (5.92%) cases occurred in White dew and the Grain in ear, respectively. Hoar-frost falls had the fewest occurrences, with only 6 cases (2.09%). Surprisingly, the number of cases of AE declined precipitously from 24 at the Summer solstice to 8 at the Slight heat (the following solar term), which was a rather low incidence. Figure 4 shows the association between the number of cases of AE and the 24 STs of the year, which correspond to spring, summer, autumn and winter.

Clinical Presentation

The most common symptoms were sore throat (n = 287, 100.00%) and dysphagia (n = 233, 81.18%), followed by odynophagia (n = 93, 32.40%), fever (n = 79, 27.52%) and dyspnea (n = 27, 9.40%). The clinical presentation of patients with AE throughout the 24 STs is shown in Figure 5. The median duration of symptoms from onset to hospital admission was 48 hours (IQR, 2–168) and the frequency density plot is shown in Figure 3A.

Before admission, 59 patients (20.55%) self-administered oral antibiotics (first- and second-generation cephalosporins, or roxithromycin) and/or Chinese patent medicines for clearing fever and detoxification. Twenty-three patients (8.01%) visited a community health service center and were administered cephalosporin antibiotics intravenously.

Upon admission, all patients received an electronic laryngoscopy. The edema of the epiglottis and adjacent tissues was rated as mild (n = 66, 22.99%), moderate (n = 142, 49.47%), or severe (n = 79, 27.52%).

Patients with AE also experienced infections and lesions in other areas of the throat, most commonly acute laryngitis (n = 13, 4.52%), followed by oropharyngeal ulcers (n = 8, 2.78%), peritonsillar abscess (n = 7, 2.43%) and acute tonsillitis (n = 6, 2.09%). Moreover, parapharyngeal space infections, epiglottic abscess, acute pharyngitis, throat burns, esophageal foreign bodies, orbital cellulitis, vocal cord palsy, peripheral facial palsy, and submandibular lymphadenitis were also observed.

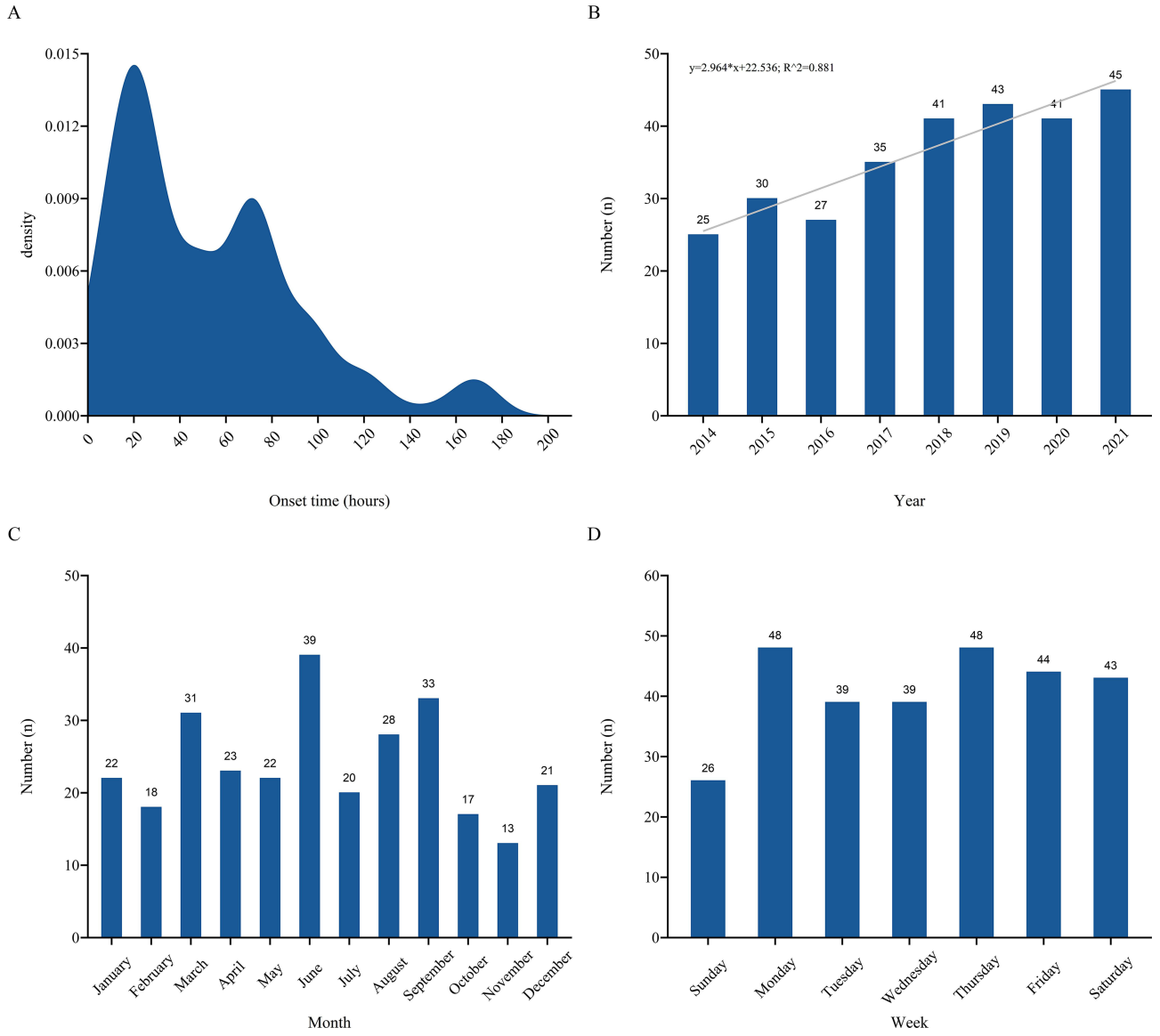

Figure 3 This figure displays a density plot depicting the time between onset and hospitalization for patients with acute epiglottitis, as well as the incidence numbers based on year, month and week. (**A**) a density plot illustrating the time elapsed from onset to hospitalization; (**B**) a bar chart displaying the incidence numbers by year; (**C**) a bar chart showing the incidence numbers by month; (**D**) a bar chart representing the incidence numbers by week.

Laboratory Examinations

On admission, the white blood cell (WBC) counts were available for 281 patients (97.90%) with AE, with a median count of 5.27×10^9 (IQR 4.52–28.6). C-reactive protein (CRP) values were obtained in 273 patients (95.12%). Most patients exhibited elevated CRP levels (27.00, IQR 0.50–200.00).

Treatment and Outcomes

The duration of hospitalization was three days (IQR, 1–16 days). Except for two patients who were transferred to the intensive care unit (ICU) because their respiratory distress worsened, all patients were treated in the otolaryngology ward. One of the two patients treated in the ICU underwent tracheal intubation and airway intervention, while the other was closely monitored without intubation. Fortunately, all patients were cured with no complications.

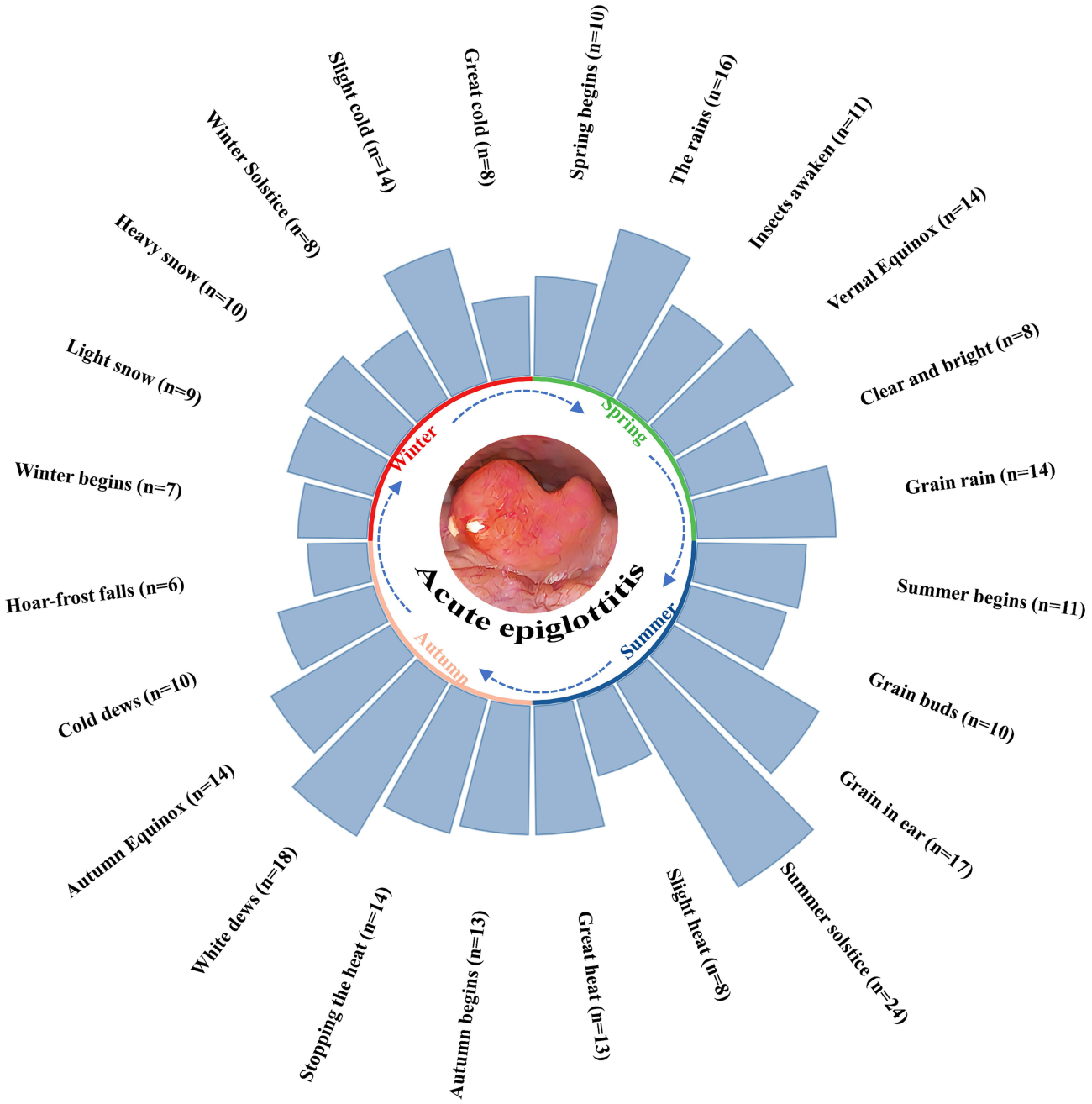

Figure 4 The figure illustrates the relationship between the incidence of acute epiglottitis cases and the 24 Solar terms of the year, which correspond to the seasons of spring, summer, autumn and winter.

Piperacillin-sulbactam (3.0g every 12 hours) was administered intravenously to 258 patients (89.89%), whereas clindamycin (0.6g every 12 hours) or levofloxacin (0.5g once daily) was administered to the other patients. In 192 (66.89%) patients, ornidazole (0.5g every 12 hours) was administered as an antibiotic combination.

All but three patients received glucocorticoid therapy. Glucocorticoids were administered intravenously in 279 patients (97.21%) except for five, who were treated with aerosol inhalation of budesonide suspension. Intravenous dexamethasone (10mg once daily) was administered in 271 cases (94.42%), intravenous methylprednisolone (40mg once daily) was administered in 105 cases (36.58%) and aerosol inhalation of budesonide suspension (1.0mg every 12 hours) was administered in 246 cases (85.71%). Most patients were given a combination of glucocorticoids.

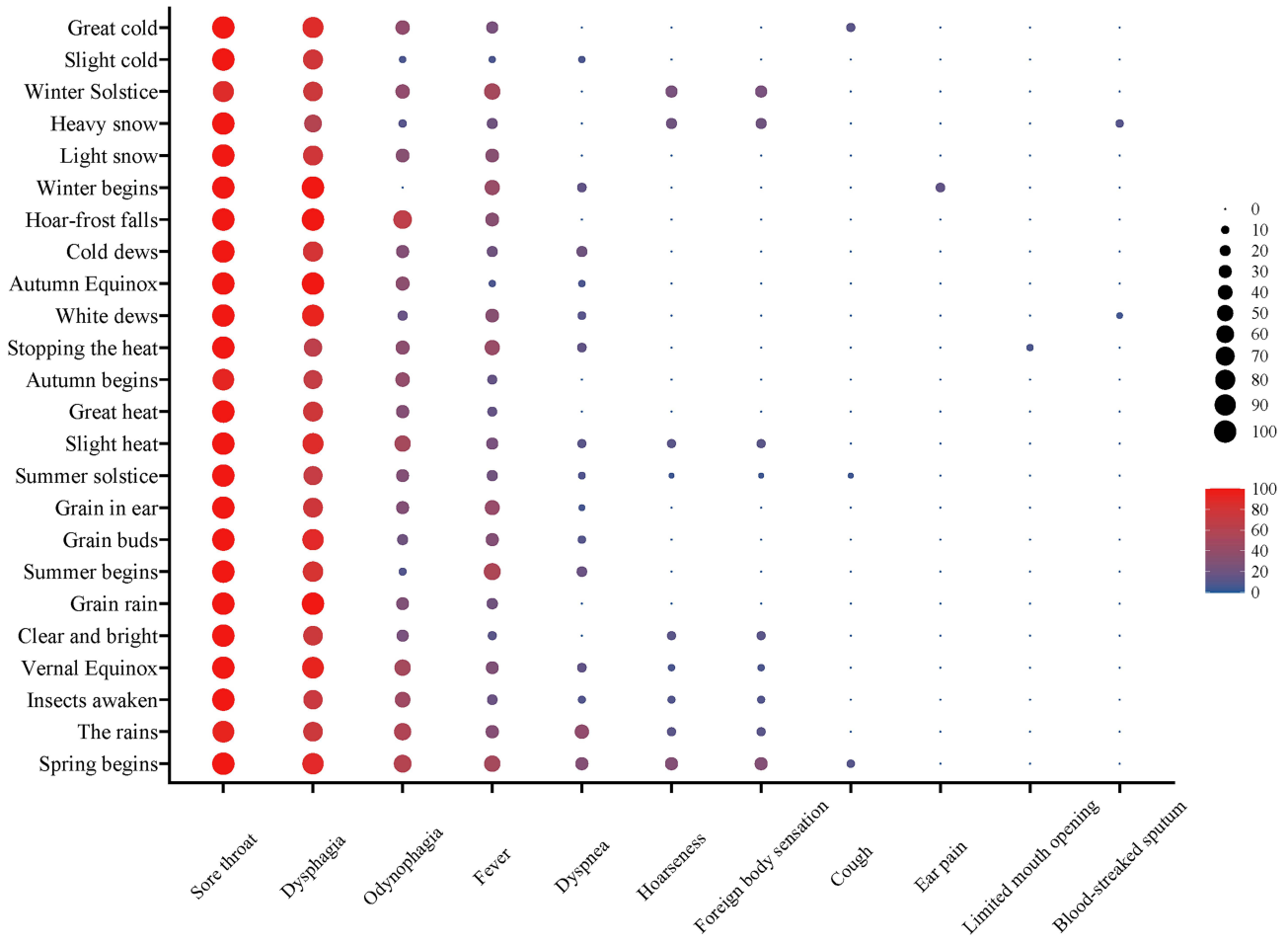

Figure 5 This figure depicts the clinical characteristics of patients with acute epiglottitis throughout all 24 Solar terms.

Discussion

In the present study, we retrospectively analyzed AE's clinical characteristics and treatment outcomes during an eight-year period at a tertiary care hospital in Eastern China. Sore throat, dysphagia, odynophagia, and fever were the most frequently experienced symptoms among the patients included in this study. We found a strong correlation between the occurrence of AE and alterations in the 24 STs. Out of the 24 STs, the Summer solstice had the highest number of recorded cases of AE, with 24 incidents. White dew and Grain in ear followed closely with 18 and 17 cases, respectively. The solar term with the lowest frequency of AE was Hoar-frost Falls, with only six recorded cases.

Our study revealed that the prevalence of AE in Eastern China is rising annually. This could be linked to industrialization-related factors, such as the ensuing air pollution. A recent study has shown a positive correlation between the occurrence of AE and exposure to nitrogen dioxide, a consequence of air pollution.[22] Even during the COVID-19 pandemic of 2020–2021, epidemic prevention and control measures, such as city lockdowns, maintaining social distancing, and wearing masks, had little impact on the incidence of AE. The low number of patients hospitalized on Sundays in this study may be attributed to the fact that people travel during weekends and cannot promptly seek medical treatment.

In this study, male patients accounted for 62.37%, which is consistent with previous studies.[8,23,24] This could be related to unfavorable lifestyle habits in men, such as smoking and alcohol consumption. The mean age of our patients upon admission was 47.79 years, which is comparable to other published data.[8,23,24] In our study, 34.84% of the patients exhibited comorbidities, including hypertension, smoking, and type 2 diabetes, potentially influencing the development

of AE. Besides the epiglottis infection, some patients also displayed coexisting infections in the adjacent areas, such as acute laryngitis, oropharyngeal ulcers, peritonsillar abscesses and acute tonsillitis. Shapira Galitz et al also noticed that AE might be accompanied by concomitant infections, comparable to our findings.[8]

Except for one patient who underwent tracheal intubation in the ICU, no patients received airway intervention and all achieved favorable outcomes, which may be attributed to several factors. First, the short interval from symptom onset to hospitalization, with a mean of 48 hours, ensured timely treatment for the patients. Second, the most common symptoms among patients were sore throat and dysphagia, with only 9.40% of patients experiencing dyspnea. Severe respiratory distress indicates the need for airway intervention, but it rarely occurred in the patients included in our study. Third, all patients received timely treatment with antibiotics and glucocorticoids upon admission to the hospital. Furthermore, the combination of steroid administration of intravenous dexamethasone and nebulized budesonide suspension has expedited the regression of epiglottic edema. A nationwide retrospective cohort study, including thousands of cases, showed that systemic corticosteroids might benefit patients with AE requiring airway intervention.[2]

Yoon et al found that 29 of the 117 cases of AE were caused by the infection of pre-existing epiglottic cysts.[25] AE patients with epiglottic cysts were more likely to require airway intervention than those without.[25] In this way, prompt surgical treatment is appropriate for patients with epiglottic cysts detected during outpatient laryngoscopy. The videolaryngoscope-assisted coblation of epiglottic cysts is a preferred surgical technique due to its safety, effectiveness, and low complication rate.[26] However, this characteristic was not observed in our study. Our study revealed that fatigue, foreign bodies and colds are potential triggers for AE. This may be related to factors such as the fast-paced lifestyle and preference for fish among the local residents.

Climate factors such as temperature and humidity may have a role in the onset of AE. Previous studies have noted that AE occurs seasonally, with a higher frequency during a specific time of the year. Navarrete et al documented a cohort of 58 Spanish patients with AE exhibiting a distinct seasonal pattern of onset, with the highest incidence occurring in the autumn and summer seasons and the peak number of cases being recorded in November.[10] An analysis of data from 599 Japanese hospitals involving 6072 AE patients showed that although admissions peaked during the summer, seasonality had no significant impact on the severity of AE.[27] Kass et al similarly found that summer boasts the highest prevalence of AE.[9] Contrarily, Wong et al discovered that 41% of Australian patients with AE occurred in September, which marks the beginning of spring in the southern hemisphere.[11] However, these studies measured the incidence of AE based on broad time frames such as season or month, limiting the precision of the incidence data for each specific time period.

In contemporary astronomy, a solar term refers to the duration taken for the sun to travel 15 degrees from zero longitudes.[14] Due to its 360-degree journey, it experiences 24 STs annually.[14] Typically, a solar term lasts for 15 days; however, this is not a rigid rule, as there may be instances where it lasts for 14 or 16 days. As a result, figures depicting the incidence of AE using the shorter time frame of 24 STs offer a more precise representation of the disease's frequency.

The higher incidence of AE during the Summer solstice may be attributable to the hot and humid weather. The Summer solstice occurs on June 21st or 22nd of each Gregorian year, which marks the beginning of summer, characterized by the longest days and shortest nights of the year.[15] As the temperature rises, the rate of bacterial reproduction increases. Our hospital is located in Wuxi City, which belongs to the subtropical monsoon climate zone, with abundant heat and plentiful precipitation.[28] The Summer solstice typically coincides with the plum rain season in this region. This is scientifically referred to as the East Asian rainy season and provides an ideal environment for mold growth due to the high temperatures and humidity levels in indoor and outdoor spaces during the prolonged rainy days of this season.[29] Molds and their metabolites can harm human health, particularly by contributing to the development of respiratory diseases such as asthma and allergies.[29] These respiratory conditions either directly or indirectly contribute to the development of AE. Furthermore, fungal infections may potentially trigger AE.[30]

To the best of our knowledge, our study is the inaugural exploration of the correlation between the 24 STs and AE incidence, merging traditional calendar systems with contemporary epidemiological analysis. This unique blend underscores the pivotal influence of cultural and environmental factors on health outcomes and advocates for a multidisciplinary approach in healthcare planning and public health policies. The insights gained from understanding the dynamics between these elements are instrumental in enhancing disease prediction and management, potentially paving the way for more efficacious prevention strategies and optimized healthcare resource distribution. Highlighting AE's epidemiology within China's distinctive cultural and environmental milieu, our research pioneers integrating traditional knowledge with modern health science, championing a comprehensive perspective in medical research and practice.

Our study is limited by its retrospective design and the focus on a single center, which may restrict the extrapolation of our findings. Specifically, it explores the association between AE incidence and the 24 STs in Eastern China, indicating potential regional limitations in applying our results. The analysis did not account comprehensively for potential confounding factors, such as environmental variations or changes in healthcare services, that could affect AE incidence. Additionally, the COVID-19 pandemic, during the study's final years, added complexity by impacting various otolaryngology conditions, including AE, and disrupting healthcare services, which could have influenced our results.[6,28,31–37] Furthermore, aside from recognizing environmental factors like temperature and humidity, there is still insufficient knowledge about the underlying mechanisms driving the diverse incidence patterns of AE throughout the 24 STs.

Moving forward, we aim to conduct a multi-center, prospective study in East China to investigate the relationship between AE and the 24 STs more thoroughly. This future research will include various confounding factors and delve into the underlying mechanisms of AE's seasonal patterns. By overcoming the current study's limitations and utilizing our findings for prediction and management, we seek to enhance the understanding and outcomes of AE patients.

Conclusion

The incidence of AE is rising yearly in Eastern China, with primary symptoms including sore throat, dysphagia, odynophagia and fever. AE may also be accompanied by infections in other areas of the throat, such as acute laryngitis. At least one or more comorbidities existed in 34.84% of AE patients, with hypertension being the most common. If patients with AE can promptly seek medical attention and receive timely intravenous antibiotics and combined glucocorticoid therapy, most can avoid airway intervention and achieve a satisfactory outcome. There is a clear correlation between the incidence of AE and the changes in the 24 STs, with the peak number of cases occurring during the Summer solstice, aligning with the period from June 21 to July 7 in the Gregorian calendar.

Abbreviations

AE, Acute epiglottitis; ICU, Intensive care unit; 24STs, 24 Solar terms.

Acknowledgments

We thank Dr. Chuanchuan Yu, Department of Medical Statistics, School of Public Health, Sun Yat-sen University, for helping with statistical data.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

This work was supported by the Soft Science Research Project of Science and Technology Association of Wuxi Municipality, China (Grant number: KX-22-C121).

Disclosure

The authors declare that they have no conflicts of interest in this work.

References

1. Tapiovaara LK, Aro KLS, Bäck LJJ, Koskinen AIM. Comparison of intubation and tracheotomy in adult patients with acute epiglottitis or supraglottitis. *Europ Archiv Oto-Rhino-Laryngol*. 2019;276(11):3173–3177. doi:10.1007/s00405-019-05624-0
2. Kimura Y, Jo T, Inoue N, et al. Association between systemic corticosteroid use and mortality in patients with epiglottitis. *Laryngoscope*. 2023;133(2):344–349. doi:10.1002/lary.30110
3. Bridwell RE, Koyfman A, Long B. High risk and low prevalence diseases: adult epiglottitis. *Am J Emerg Med*. 2022;57:14–20. doi:10.1016/j.ajem.2022.04.018

4. Guerra AM, Waseem M. Epiglottitis. In: *StatPearls [Internet]*. Treasure Island (FL): StatPearls Publishing; 2024. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430960/. Accessed April 24, 2024.
5. Baiu I, Melendez E. Epiglottitis. *JAMA*. 2019;321(19):1946. doi:10.1001/jama.2019.3468
6. Meng X, Han C, Wang Y. Acute epiglottitis caused by COVID-19: a systematic review. *Biomol Biomed*. 2023;23(4):568–574. doi:10.17305/bb.2022.8861
7. Guldfred LA, Lyhne D, Becker BC. Acute epiglottitis: epidemiology, clinical presentation, management and outcome. *J Laryngol Otol*. 2008;122(8):818–823. doi:10.1017/s0022215107000473
8. Shapira Galitz Y, Shoffel-Havakuk H, Cohen O, Halperin D, Lahav Y. Adult acute supraglottitis: analysis of 358 patients for predictors of airway intervention. *Laryngoscope*. 2017;127(9):2106–2112. doi:10.1002/lary.26609
9. Kass EG, McFadden EA, Jacobson S, Toohill RJ. Acute epiglottitis in the adult: experience with a seasonal presentation. *Laryngoscope*. 1993;103(8):841–844. doi:10.1288/00005537-199308000-00002
10. Navarrete ML, Quesada P, Garcia M, Lorente J. Acute epiglottitis in the adult. *J Laryngology Otol*. 1991;105(10):839–841. doi:10.1017/s0022215100117487
11. Wong EY, Berkowitz RG. Acute epiglottitis in adults: the Royal Melbourne Hospital experience. *ANZ J Surg*. 2001;71(12):740–743. doi:10.1046/j.1445-1433.2001.02265.x
12. Yu Z. Luoxia Hong and 24 solar terms and their translations. *J Contemp Educ Res*. 2020;4(4). doi:10.26689/jcer.v4i4.1181
13. Shen Y. 二十四节气 [Life Nurturing in the illustrated daoyin of the 24 solar terms]. *Chin Med Cult*. 2019;2(1):6–14. doi:10.4103/CMAC.CMAC_3_19
14. Xu T, Wang Q. On the formation of taiji diagram from the perspective of twenty-four solar terms. *Saudi J Biol Sci*. 2018;25(8):1670–1677. doi:10.1016/j.sjbs.2016.09.006
15. Chen X, Liao Y, Li Y. Following the rhythm of nature: wisdom in the 24 solar terms and the 12 Constellations. In: Zhou G, Li Y, Luo J, editors. *Science Education and International Cross-Cultural Reciprocal Learning: Perspectives from the Nature Notes Program*. Cham: Springer International Publishing; 2023:11–26.
16. Chen G, Shi J. From solar terms to medical terms (Part I): a first step with big data. *Sci China Earth Sci*. 2017;60(9):1707–1718. doi:10.1007/s11430-016-9059-0
17. Huang H, Chen C, Chen F, Huang Z, Zhu X, Wang H. Correlation between the incidence of ischemic stroke and the changes of 24 solar terms in Fuzhou; 2020: 182–186. doi:10.1145/3429889.3430084
18. Wang J, Xiong K, Chao J, Zhuang S, Li J, Liu C. Seasonal variations of nonmotor symptoms in patients with Parkinson's disease in Southeast China. *Chin Med J*. 2022. doi:10.1097/cm9.0000000000002276
19. Wang M, Liu J, Xie X, et al. Study on the 24 solar terms distribution of hospital admissions for acute myocardial infarction in Beijing. *Int J Cardiol*. 2011;152:S96. doi:10.1016/j.ijcard.2011.08.785
20. Ovnat Tamir S, Marom T, Barbalat I, Spevak S, Goldfarb A, Roth Y. Adult supraglottitis: changing trends. *Europ Archiv Oto-Rhino-Laryngol*. 2015;272(4):929–935. doi:10.1007/s00405-014-3464-x
21. The 24 Solar terms. Available from: https://jieqi.bmcx.com/. Accessed April 24, 2024.
22. Kim SY, Min C, Yoo DM, Park B, Choi HG. Short-term exposure to air pollution and epiglottitis: a nested case-control study. *Laryngoscope*. 2021;131(11):2483–2489. doi:10.1002/lary.29560
23. Penella A, Mesalles-Ruiz M, Portillo A, et al. Acute infectious supraglottitis in adult population: epidemiology, management, outcomes and predictors of airway intervention. *Europ Archiv Oto-Rhino-Laryngol*. 2022;9:1–9. doi:10.1007/s00405-022-07365-z
24. Felton P, Lutfy-Clayton L, Smith LG, Visintainer P, Rathlev NK. A retrospective cohort study of acute epiglottitis in adults. *West J Emerg Med*. 2021;22(6):1326–1334. doi:10.5811/westjem.2021.8.52657
25. Yoon TM, Choi JO, Lim SC, Lee JK. The incidence of epiglottic cysts in a cohort of adults with acute epiglottitis. *Clin Otolaryngol*. 2010;35(1):18–24. doi:10.1111/j.1749-4486.2009.02069.x
26. Meng X, Wen Q, Gu J, Wang Y. Videolaryngoscope-assisted coblation of epiglottic cysts. *Europ Archiv Oto-Rhino-Laryngol*. 2020;277(4):1129–1132. doi:10.1007/s00405-020-05804-3
27. Suzuki S, Yasunaga H, Matsui H, Fushimi K, Yamasoba T. Factors associated with severe epiglottitis in adults: analysis of a Japanese inpatient database. *Laryngoscope*. 2015;125(9):2072–2078. doi:10.1002/lary.25114
28. Meng X, Dai Z, Wang Y, et al. Application of smartphone otoscope in telemedicine in rural medical consortium in Eastern China in the COVID-19 era. *Front Public Health*. 2022;10:879410. doi:10.3389/fpubh.2022.879410
29. Ye J, Qian H, Zheng X, Cao G. Plum Rain-Season-Oriented Modelling and intervention of indoor humidity with and without human occupancy. *Atmosphere*. 2019;10(2):97. doi:10.3390/atmos10020097
30. Durell J, Taha R, Pipi G, Oko M. Aspergillus epiglottitis in a non-immunocompromised patient. *BMJ Case Rep*. 2011;2011(1):bcr1120103485. doi:10.1136/bcr.11.2010.3485
31. Meng X, Deng Y, Dai Z, Meng Z. COVID-19 and anosmia: a review based on up-to-date knowledge. *Am J Otolaryngol*. 2020;41(5):102581. doi:10.1016/j.amjoto.2020.102581
32. Meng X, Pan Y. COVID-19 and anosmia: the story so far. *Ear Nose Throat J*. 2021;1455613211048998. doi:10.1177/01455613211048998
33. Meng X, Wang J, Sun J, Zhu K. COVID-19 and sudden sensorineural hearing loss: a systematic review. *Front Neurol*. 2022;13:883749. doi:10.3389/fneur.2022.883749
34. Meng X, Zhu K, Wang J, Liu P. Can SARS-CoV-2 positive pregnant women affect the hearing of their newborns: a systematic review. *Am J Otolaryngol*. 2022;43(5):103523. doi:10.1016/j.amjoto.2022.103523
35. Han C, Wang H, Wang Y, Hang C, Wang Y, Meng X. The silent reservoir? SARS-CoV-2 detection in the middle ear effusion of patients with Otitis media with effusion after omicron infection. *Am J Otolaryngol*. 2024;45(3):104229. doi:10.1016/j.amjoto.2024.104229
36. Meng X, Wang Y, Han C, et al. Clinical manifestations and outcomes of otitis media with effusion in adult patients following Omicron infection in China. *Biomol Biomed*. 2024. doi:10.17305/bb.2024.10239
37. Dai Z, Wang Y, Hang C, Zhu K, Meng X. Telemedicine for ear diseases with the smartphone otoscopes via WeChat in the COVID-19 era. *Am J Otolaryngol*. 2021;42(4):102997. doi:10.1016/j.amjoto.2021.102997