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FULL PAPER

Epidemiology and clinical characteristics of pediatric rhinosinusitis in Vietnam

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This study investigates the antifertility potential of Beluntas leaves (Pluchea indica) by its comparison with related species within the Pluchea genus through phylogenetic and bioinformatics approaches. By collecting genetic sequence data of Pluchea species from the GenBank NCBI database, analyses were conducted using MEGA X software to generate a phylogenetic tree, amino acid composition, and genetic distance table. Among the 13 Pluchea species analyzed, this research found that P. indica has significant potential as an antifertility agent based on its impact on the quality of male white rat spermatozoa, including motility and spermatogenic cell count. Furthermore, phylogenetic analysis indicates a close genetic relationship between P. indica and P. ovalis, suggesting the potential of P. ovalis as a new antifertility candidate. These results affirm the potential of Beluntas leaves as a male antifertility agent and open opportunities for further research on the potential of other Pluchea species. This study underscores the importance of bioinformatics studies in identifying plants for antifertility drugs, especially within the Pluchea genus, and suggests the need for further laboratory analysis on species closely related to P. indica to verify their antifertility potential.

KEYWORDS

Rhinosinusitis; clinics; otitis media; pediatrics.

Introduction

Rhinosinusitis is defined by the inflammation of nasal mucosa and sinus mucosa, which may or may not involve bone lesions [1, 2]. In the USA, rhinosinusitis is a widespread disease, has a one-year prevalence of 10-15% and tends to become chronic [3]. In Vietnam, it is one of the most common reasons for antibiotic prescription, especially in large cities where the air is seriously polluted. Pediatric rhinosinusitis is defined as the presence of two or more symptoms, one of which should be either nasal obstruction or nasal discharge (anterior/posterior nasal drip) with/without facial pain or cough [4]. Pediatric rhinosinusitis can also be diagnosed by either endoscopic signs of nasal polyps/mucopurulent discharge or mucosal obstruction primarily in middle meatus or CT signs of mucosal changes within the ostiomeatal complex and/or sinuses [5]. Furthermore, the impact of pediatric

rhinosinusitis extends beyond immediate healthcare concerns, influencing various aspects of a child's life, including academic performance, social interactions, and overall quality of life. Chronic or recurrent rhinosinusitis can lead to missed school days, impaired concentration, and decreased productivity [5].

Moreover, untreated or inadequately managed rhinosinusitis in children may predispose them to complications such as sinusitis-related orbital or intracranial infections, emphasizing the importance of early recognition and appropriate intervention [4]. Therefore, a comprehensive understanding of pediatric rhinosinusitis, including its epidemiology and clinical presentation is essential for healthcare providers to optimize outcomes and mitigate the long-term impact on pediatric patients.

Materials and methods

A prospective study was conducted from July 2014 to October 2022 at the National Otorhinolaryngology Hospital in Hanoi, Vietnam. Ethics Committee approval for the study was obtained. Consent was obtained from all participants in this study

Patients were included if they were less than 16 years old and presented with typical symptoms of rhinosinusitis (purulent nasal discharge and nasal congestion). Ear, nose, and throat examination was carefully conducted for clinical characteristics. The endoscopic symptoms were meticulously collected to assess the status of the ostiomeatal complex, aiming to identify signs of mucopurulent discharge or obstruction.

TABLE 1 Demographic characteristics of patients

	Number of patients	Percentage (%)
Sex		
Male	272	64.8
Female	148	35.2
Age Group		
0-5 years old	166	39.5
6-10 years old	184	43.8
11-15 years old	70	16.7
Total	420	100.0

TABLE 2 Risk factors of pediatric rhinosinusitis

	Number of patients	Percentage (%)
Season		
Spring	120	28.6
Summer	149	35.5
Autumn	79	18.8
Winter	72	17.1
Living environment		
City	303	72.1
Rural area	117	27.9
Allergy		
Allergic history	91	21.7
Non-allergic history	329	78.3
Smoking		
Exposure to cigarette smoke	37	8.8
No exposure to cigarette smoke	383	91.2
Total	420	100.0

Results and discussion

The study included 420 patients (272 males, 148 females) under the age of 16 diagnosed with rhinosinusitis. Patients were divided into three groups according to the age criterion: from 0 to 5 years old (166 patients, 39.5%); from 6 to 10 years old (184 patients, 43.8%) and from 11 to 15 years old (70 patients, 16.7%) (Table 1).

Table 2 presents key risk factors associated with pediatric rhinosinusitis based on the collected data. Seasonal variation shows higher incidences during spring (28.6%) and summer months (35.5%), possibly linked to increased allergen exposure or viral infections. Living environment appears to play a role, with a higher proportion of cases observed in urban areas compared to rural settings. Allergic history emerges as a significant risk factor, as evidenced by the prevalence of rhinosinusitis among patients with a history of allergies. Exposure to cigarette smoke, though relatively low (8.8%), underscores the importance of environmental factors in pediatric rhinosinusitis development.

Among the patients, 253 were diagnosed with ARS and 167 with CRS. The most common symptom is purulent nasal discharge, seen in 366 cases (87.1%). Other important symptoms are nasal congestion, cough, and facial pressure. Endoscopic signs in patients are mainly mucopurulent nasal discharge (97.6%) and mucosal oedema (93.3%) (Table 3).

Our results underscore the distribution of main symptoms in pediatric rhinosinusitis patients. Anterior nasal drip is observed in 21.2% of cases, while posterior nasal drip is more prevalent at 32.6%. Notably, almost half of the patients (46.2%) exhibit both anterior and posterior nasal drip. In addition, the majority of patients (97.9%) experience bilateral nasal obstruction, emphasizing its prominence in the clinical presentation of pediatric rhinosinusitis (Table 4).

The present dataset reveals a predominant representation of children in the 5-to-10-year-old age bracket, aligning with previously reported rates [6]. A notable departure in our investigation is the remarkably low prevalence of rhinosinusitis within the 11 to 15-year-old age group, accounting for only 16.7%. This phenomenon can be attributed to the expanding sinuses and an increased sense of self-health awareness as children progress through adolescence. The gender distribution exhibits a male/female ratio of 1.84, slightly exceeding some recent studies [7].

This observation may be linked to the inherent differences in activity levels and hygiene awareness between boys and girls. In line with this, national research findings support our results, highlighting differences in epidemiological patterns among various countries. ARS was diagnosed in 60.2% patients, approximately 1.5 times higher than CRS. The elevated prevalence of ARS can be ascribed to its substantial impact on the quality of life for young children, prompting clinicians in tertiary hospital settings to administer prolonged, high-dose antibiotic regimens for complete resolution of acute inflammation. This practice contributes to the observed higher percentage of ARS in our study. Discrepancies with studies conducted in primary care settings may arise due to the limited treatment options available to clinicians in tertiary hospitals [8].

Table 2 provides a comprehensive analysis of the risk factors associated with pediatric rhinosinusitis, offering insights into seasonal variation, living environment, allergic history, and exposure to cigarette smoke.

The data reveal distinct patterns in the incidence of rhinosinusitis across different seasons, with a higher prevalence observed during spring (28.6%) and summer (35.5%) compared to autumn (18.8%) and winter (17.1%), mirroring the results of previous studies [9].

This seasonal variation could be attributed to increased allergen exposure or viral infections prevalent during warmer months. Furthermore, the study highlights the impact

of living environment on the prevalence of rhinosinusitis, with a significant proportion of cases reported in urban areas (72.1%) compared to rural settings (27.9%). This disparity may be linked to higher levels of air pollution, allergen exposure, and population density in urban environments, corresponding to findings by other scholars [10].

Moreover, the data underscore the association between allergic history and pediatric rhinosinusitis, with 21.7% of patients having a history of allergies. This suggests that underlying allergic conditions may predispose individuals to develop rhinosinusitis, further emphasizing the importance of allergy management in disease prevention [11, 12].

In addition, exposure to cigarette smoke emerges as a potential environmental risk factor, with 8.8% of patients reporting exposure to cigarette smoke. Despite the relatively low prevalence, this finding underscores the need to consider environmental tobacco smoke as a contributing factor in the development of pediatric rhinosinusitis, as seen in other studies [13, 14].

Moving to the clinical symptoms, the majority of patients reported nasal discharge (87.1%), making it the most prevalent symptom, similar to several other researchers [5, 15]. Nasal obstruction was the second most commonly observed symptom at 48.1%, followed by cough (44.5%). Facial pain or pressure was the least reported symptom, observed in 8.6% of the cases. The latest updates from EPOS 2020 indicate that nasal discharge and nasal obstruction continue to stand out as the two major symptoms for diagnosing rhinosinusitis [5]. Furthermore, cough serves as an alternative indicator for anosmia, as it proves challenging to assess in young children. The manifestation of facial pain/pressure is predominantly observed within the age group of 11-15 years.

TABLE 3 Clinical characteristics of patients

	Number of patients	Percentage (%)
Diagnosis		
ARS (<12 weeks)	253	60.2
CRS (≥12 weeks)	167	39.8
Clinical symptoms		
Nasal discharge	366	87.1
Nasal obstruction	202	48.1
Cough	187	44.5
Facial pain/pressure	36	8.6
Endoscopic signs		
Mucopurulent discharge from middle meatus	410	97.6
Mucosal oedema in middle meatus	392	93.3
Total	420	100.0

TABLE 4 Characteristics of main symptoms of pediatric rhinosinusitis

	Number of patients	Percentage (%)
Nasal discharge		
Anterior nasal drip	89	21.2
Posterior nasal drip	137	32.6
Both nasal drip	194	46.2
Nasal obstruction		
Unilateral	9	2.1
Bilateral	184	97.9
Total	**420**	**100.0**

Table 4 indicates a detailed breakdown of the characteristics of main symptoms of pediatric rhinosinusitis. The data reveals that nasal discharge manifests in different forms, with anterior nasal drip observed in 21.2% of cases and posterior nasal drip in 32.6% of cases. Interestingly, a significant proportion of patients (46.2%) experience both anterior and posterior nasal drip simultaneously, suggesting a complex interplay of underlying pathophysiological mechanisms.

Anterior nasal drip, typically associated with allergic or viral rhinitis, may result from irritation or inflammation of the nasal mucosa, leading to the excessive production of thin, watery mucus [5, 16]. On the other hand, posterior nasal drip, characterized by the sensation of mucus dripping down the throat, often indicates inflammation or infection of the paranasal sinuses, resulting in the production of thicker, purulent secretions [15]. The coexistence of both types of nasal drip in nearly half of the patients underscores the multifactorial nature of pediatric rhinosinusitis and highlights the need for a comprehensive clinical evaluation to discern the underlying etiology. Moreover, the table highlights the occurrence of nasal obstruction, a common symptom associated with rhinosinusitis. It is worth to noate that nearly all cases of nasal obstruction were reported as bilateral (97.9%), with only a minimal percentage (2.1%) presenting with unilateral obstruction.

Conclusion

Clinical symptoms underscore nasal discharge, nasal obstruction, and cough as predominant features, consistent with EPOS 2020 updates. In addition, our research identifies facial pain/pressure predominantly within the 11-15 age group. The multifactorial nature of pediatric rhinosinusitis is highlighted by the coexistence of anterior and posterior nasal drip in nearly half of the cases, emphasizing the need for comprehensive clinical evaluation and management strategies targeting different symptom profiles.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Authors' contributions

All authors contributed to data analysis, drafting, and revising of the article and agreed to be responsible for all aspects of this work.

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