Vasomotor rhinitis in children

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Abstract.

Background: Chronic rhinitis is a prevalent healthcare challenge with diverse clinical manifestations and causes. Vasomotor rhinitis (VMR) is a subtype often diagnosed when allergies are excluded. Despite its significant impact, limited literature exists on VMR, especially in children. Methods: We studied 230 children under 18 with chronic rhinitis, focusing on those diagnosed with VMR. Detailed clinical histories, endoscopy, nasal swab microscopy, CT scans, and IgE levels were assessed. Results: Out of the cohort, 126 children (54.7%) had VMR, with a majority in older age groups. Notably, 65% were male. Common VMR symptoms included nasal congestion (99.2%), irritability (82.5%), rhinorrhea (79.3%), and postnasal cough (77.8%). Endoscopic findings revealed mucosal congestion (77.7%), turbinate hypertrophy (35%), and nasal discharge (31.7%). Additionally, 26.2% had negative adrenergic test results. Vasomotor rhinitis often exhibits autonomic dysregulation, neurological manifestations, and heightened reactivity to various stimuli. Conclusion: Vasomotor rhinitis, especially in children, remains an understudied condition. The etiology, pathogenesis, and management of VMR require further investigation, as it poses a significant healthcare challenge. Improved diagnostic methods and treatment outcomes are needed to address this common condition in pediatric populations. This study underscores the necessity of further research to enhance our understanding and management of VMR in children.

Keywords:
Vasomotor rhinitis
children
nonallergic rhinitis
rhinitis
INTRODUCTION

Chronic rhinitis poses a significant and widespread healthcare challenge, distinguished by its diverse clinical presentations and functional characteristics. Among patients complaining of nasal congestion, rhinorrhea, and sneezing following the exclusion of allergies, a diagnosis of vasomotor rhinitis (VMR) is often made. However, in many cases, clinicians refrain from conducting further investigations, leading to unwarranted treatments [1,9]. Available literature in the field of otorhinolaryngology needs to provide more information regarding the outcomes of VMR management. Authors have frequently emphasized the need for further epidemiological and research studies, especially in the context of nonallergic rhinitis (NAR).

NAR is generally applied to diagnose any nasal condition with symptoms identical to allergic rhinitis but devoid of allergic etiology. In the literature, NAR is defined as a syndrome characterized by persistent symptoms such as sneezing, rhinorrhea, nasal congestion, and postnasal drip without a specific etiology over time. Alternative terms for this condition include vasomotor rhinitis, idiopathic rhinitis, nonallergic, and non-infectious rhinitis. Several studies have indicated that more than half of rhinitis patients suffer from NAR.

Crucially, there are no specific diagnostic tests for NAR, highlighting the significance of thoroughly examining patients' medical histories and disease backgrounds as the best diagnostic tool [1,2,3,7]. The existing literature exhibits a notable gap in knowledge regarding the pathogenesis, clinical and laboratory diagnostics, and the conservative and surgical outcomes of VMR in children [8]. Comprehensive and large-scale studies are warranted to investigate the treatment results for this condition in both adults and children.

Study Objective: To assess the prevalence and clinical course of vasomotor rhinitis in children within a single clinical hospital.

MATERIALS AND METHODS

A comprehensive study was conducted on 230 patients with chronic rhinitis at the Tashkent Pediatric Medical Institute.
Within the Ear, Nose, and Throat (ENT) department, spanning the years 2021 to 2023. The diagnosis of vasomotor rhinitis (VMR) was primarily established through a stepwise diagnostic approach, which included the following methods:

**Medical History**
A thorough medical history was obtained for all children presenting with symptoms of chronic rhinitis. This history-taking process was crucial for identifying the presence of nasal symptoms lasting for over a year and for excluding other potential causes of rhinitis.

**Nasal Endoscopy**
A nasal endoscopy was performed to visualize the nasal cavity and assess any signs of mucosal congestion, turbinate hypertrophy, or other abnormalities indicative of vasomotor rhinitis.

**Nasal Swab Microscopy**
Microscopic examination of nasal swab samples was conducted to examine the nasal mucosa further and identify any abnormalities or irregularities that might support the diagnosis of vasomotor rhinitis.

**Computer Tomography (CT)**
Computer tomography scans were employed to obtain detailed images of the nasal and sinus structures, aiding in assessing any structural or anatomical abnormalities associated with chronic rhinitis.

**Immunoglobulin E (IgE) Levels**
The levels of IgE, a marker often elevated in allergic conditions, were measured to help differentiate between allergic and nonallergic rhinitis.

These diagnostic steps collectively contributed to accurately identifying vasomotor rhinitis in the pediatric population under study. The study period extended from 2021 to 2023, and these methods provided the foundation for evaluating the prevalence, clinical features, and diagnosis of vasomotor rhinitis in children.

**RESULTS**
A total of 230 children under 18 with chronic rhinitis were examined. Among them, 126 (54.7%) were diagnosed with vasomotor rhinitis, 55 (23.9%) had allergic rhinitis, and 49 (21.3%) had chronic rhinosinusitis (Diagram 1). After
establishing the final diagnosis, we focused on studying the children with vasomotor rhinitis.

In the examination of demographic factors, it was observed that vasomotor rhinitis occurred more frequently in children in the older and adolescent age groups. In the age group of 11-14 years, the condition was diagnosed in 46% of cases, while in the age group of 15-18 years, it accounted for 34% of the total examined population. Younger children experienced vasomotor rhinitis less frequently (Table 1). Upon gender stratification, it was noted that 65% of children with vasomotor rhinitis were males, while a smaller proportion, comprising 35%, were females.

Table 1

<table>
<thead>
<tr>
<th>Demographic characteristics of patients (n=126)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>1-6 years old</td>
<td>6</td>
</tr>
<tr>
<td>7-10 years old</td>
<td>19</td>
</tr>
</tbody>
</table>

Figure 1
Distribution of patients with chronic rhinitis
The analysis of primary complaints in children with 
vasonotor rhinitis revealed the following symptoms: nasal 
congestion in 125 cases (99.2%), irritability in 104 cases 
(82.5%), rhinorrhea in 100 cases (79.3%), and postnasal cough 
in 98 cases (77.8%). Additionally, less frequently reported 
complaints included nasal irritation/itching in 68 cases 
(53.9%), sneezing in 59 cases (46.8%), and sleep disturbance 
in 28 cases (22.2%) among children with vasonotor rhinitis. 
A detailed description and frequency of symptom occurrence in 
children with vasonotor rhinitis are presented in Table 2.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Abs (n=126)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal congestion</td>
<td>125</td>
<td>99.2</td>
</tr>
<tr>
<td>Free-breathing</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>Weakly expressed</td>
<td>12</td>
<td>9.5</td>
</tr>
<tr>
<td>Moderate</td>
<td>87</td>
<td>69</td>
</tr>
<tr>
<td>Severe</td>
<td>26</td>
<td>20.3</td>
</tr>
<tr>
<td>Sneezing</td>
<td>59</td>
<td>46.8</td>
</tr>
<tr>
<td>No sneezing</td>
<td>67</td>
<td>53.1</td>
</tr>
<tr>
<td>From mild to moderate</td>
<td>40</td>
<td>31.7</td>
</tr>
<tr>
<td>Moderate to severe</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>After nasal drops</td>
<td>98</td>
<td>77.8</td>
</tr>
<tr>
<td>No postnasal cough</td>
<td>28</td>
<td>22.2</td>
</tr>
<tr>
<td>From mild to moderate</td>
<td>53</td>
<td>42</td>
</tr>
<tr>
<td>Moderate to severe</td>
<td>45</td>
<td>35.7</td>
</tr>
<tr>
<td>Irritation/itching of the nose</td>
<td>68</td>
<td>53.9</td>
</tr>
<tr>
<td>No irritation/itching of the nose.</td>
<td>58</td>
<td>46</td>
</tr>
<tr>
<td>From mild to moderate</td>
<td>45</td>
<td>35.7</td>
</tr>
<tr>
<td>Moderate to severe</td>
<td>23</td>
<td>18.2</td>
</tr>
</tbody>
</table>
Upon nasal endoscopy, findings revealed nasal mucosal edema in 98 children (77.7%), hypertrophy of nasal turbinates in 44 children (35%), and nasal discharge in 40 children (31.7%). Additionally, when an adrenergic test was administered, 33 children (26.2%) yielded negative results.

Furthermore, anterior rhinomanometry data indicated that 113 children (89.6%) experienced difficulty in airflow passage, with values falling below the norm.

The diagnosis of chronic rhinitis is typically based on the presence of two or more nasal symptoms, including nasal congestion, rhinorrhea, sneezing/itching, and olfactory impairment, persisting for over a year. Specific tests for
vasomotor rhinitis do not exist. A comprehensive medical history remains the best diagnostic tool, enabling subcategorization for differential diagnosis. The prevalence of vasomotor rhinitis ranges from 17% to 52% among individuals with rhinitis. Among patients seeking consultation with an otolaryngologist, 50% are diagnosed with nonallergic rhinitis, while the rest have allergic rhinitis. Our study revealed that, within a year, 126 children with vasomotor rhinitis sought medical attention out of the total number of patients with chronic rhinitis.

**DISCUSSION**

A literature review reveals significant knowledge gaps regarding the pathogenesis of vasomotor rhinitis. No unified theory exists to explain its pathogenesis, and it may represent a group of not fully defined conditions. Similarly, allergic and infectious rhinitis share similar symptomatology and are characterized by nasal hyperreactivity to various irritants. Unlike patients with allergic rhinitis, where the etiology is clearly defined, the etiology and pathophysiology of vasomotor rhinitis in many patients, especially children, remain largely unknown. Although the term "vasomotor" implies increased efferent neuron traffic to the blood vessels supplying the nasal mucosa, this has never been proven.

In all forms of vasomotor rhinitis, there is a variable component of autonomic dysregulation, including adrenergic, cholinergic, and non-adrenergic non-cholinergic innervation of the nose. Patients with vasomotor rhinitis may exhibit abnormal neurological manifestations, an abnormal response to various neurogenic stimuli, increased reactivity to histamine, and cold stimulation of the nasal mucosa, as well as reduced responsiveness to vasoconstrictive stimuli. Half of the examined children reported exacerbating symptoms during the hot summer months. The pathophysiology and the mechanism triggered by temperature-related factors in the environment can be explained as follows: In Uzbekistan, the air temperature during the summer months (June–August) fluctuates between 35 to 45 degrees Celsius. Exposing the nasal mucosa to high temperatures can lead to mucosal desiccation and subsequent drying of cilia, which may disrupt mucociliary clearance and result in mucus drying and crust formation, ultimately leading to irritation and epithelial...
cell trauma when cleaning the nose. The nasal mucosa undergoes frequent temperature and humidity changes due to the constantly changing environment while moving between indoor and outdoor spaces. This study identified nasal congestion as a prominent symptom, with mucosal edema and hypertrophy of the inferior nasal turbinates being significant findings.

The pathological mechanisms of irritants, such as temperature changes inducing rhinitis, remain unclear. It has been hypothesized that these conditions arise from autonomic nervous system imbalances, including adrenergic, cholinergic, and non-adrenergic non-cholinergic innervation of the nose. Symptoms induced by these factors can be explained based on non-IgE-mediated vasoactive mediators and changes in the composition of critical substances in interstitial edema [4,5,10]. Scientific studies have examined the influence of parasitic infestations on the course of allergic rhinitis, suggesting a need to investigate this category of children in the context of vasomotor rhinitis [6]. Changes in critical substances can result directly from the action of irritants or may be mediated by histamines or kinins. Prolonged irritation of the nasal mucosa can lead to rhinitis [7].

The most common irritants include dust and chemicals, with pollution possibly playing a role as well. Increased susceptibility of the nasal mucosa leads to the emergence of rhinitis symptoms such as sneezing, watery rhinorrhea, and nasal congestion. As for physiological nasal irritants, changes in temperature and humidity, physical exercise, types of breathing patterns, or body positioning are well-documented. However, literature on the treatment outcomes of vasomotor rhinitis needs to be improved.

Recommended treatment involves a combination of local intranasal glucocorticosteroids and local antihistamine preparations. On days when symptoms appear, oral anti-edema agents like pseudoephedrine at doses of 30-60 mg can be prescribed. However, specific studies evaluating clinical effectiveness have yet to be conducted. Physical exercises are an essential but often overlooked complement to nonallergic rhinitis therapy. Vigorous exercise reduces nasal congestion by stimulating adrenergic receptors of the nasal mucosa. Nasal irrigation with a saline solution has been shown
to improve nasal function. In severe cases, surgical intervention is recommended to alleviate specific symptoms. Several surgical strategies have been employed in patients with severe chronic vasomotor rhinitis.

CONCLUSION

Based on the above discussion, it is evident that vasomotor rhinitis is a significant component of chronic rhinitis in children, characterized by a diverse clinical presentation. There needs to be more data on the diagnosis and treatment of vasomotor rhinitis in pediatric patients, emphasizing the need for further research to advance our understanding of this condition.

References:


