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ORIGINAL ARTICLE

HORMONAL AND NEUROVASCULAR MECHANISMS OF VASOMOTOR RHINITIS IN WOMEN

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Abstract

Vasomotor rhinitis is a chronic non-allergic disorder of the nasal mucosa characterized by dysregulation of neurovascular control mechanisms resulting in persistent nasal congestion, rhinorrhea, mucosal edema, sneezing, and respiratory discomfort without evidence of infectious or allergic inflammation. Women demonstrate increased susceptibility to vasomotor rhinitis because hormonal fluctuations significantly influence vascular permeability, autonomic nervous system activity, glandular secretion, mucosal blood flow, and neurogenic inflammatory responses within nasal tissues. Estrogen, progesterone, prolactin, thyroid hormones, and endocrine instability associated with menstruation, pregnancy, menopause, and hormonal therapy contribute to chronic nasal hyperreactivity and impaired physiological regulation of respiratory mucosa. Neurovascular dysfunction involving parasympathetic hyperactivity, sensory nerve stimulation, inflammatory neuropeptide release, endothelial dysfunction, and vascular hypersensitivity further intensifies mucosal swelling and chronic respiratory symptoms. Clinical manifestations frequently include persistent nasal obstruction, watery rhinorrhea, recurrent sneezing, headache, sleep disturbances, facial pressure, chronic fatigue, emotional instability, and reduced quality of life. Environmental irritants, emotional stress, tobacco smoke, perfumes, temperature fluctuations, and occupational pollutants additionally aggravate chronic neurovascular dysregulation and worsen respiratory discomfort. The present study investigates hormonal and neurovascular mechanisms, endocrine influences, autonomic dysfunction, diagnostic features, therapeutic strategies, and long-term clinical management of vasomotor rhinitis in women. Modern diagnostic methods including rhinoscopy, nasal endoscopy, rhinomanometry, hormonal analysis, autonomic nervous system assessment, cytological evaluation, and allergy exclusion testing significantly improve diagnostic accuracy and facilitate individualized therapeutic planning. Contemporary management increasingly integrates intranasal corticosteroids, anticholinergic medications, hormonal stabilization, saline irrigation, physiotherapy, stress reduction, neurovascular modulation, lifestyle modification, and minimally invasive procedures aimed at restoring nasal physiological balance and improving respiratory function. Clinical evidence demonstrates that comprehensive individualized treatment significantly improves symptom control and quality of life among women with chronic vasomotor rhinitis.

Keywords: Vasomotor rhinitis, women, hormonal imbalance, neurovascular dysfunction, autonomic nervous system, chronic rhinitis, nasal obstruction, neurogenic

1. Introduction

Vasomotor rhinitis is one of the most common chronic non-allergic nasal disorders affecting adult populations and represents an important clinical problem because of its recurrent course, multifactorial pathogenesis, and significant negative influence on respiratory function and quality of life. The disease is characterized by abnormal neurovascular regulation of nasal mucosa leading to recurrent or persistent nasal congestion, excessive rhinorrhea, mucosal edema, sneezing, and respiratory discomfort in the absence of allergic sensitization or infectious inflammation. Women are particularly predisposed to development of vasomotor rhinitis because hormonal fluctuations profoundly affect vascular tone, glandular secretion, autonomic nervous system activity, endothelial permeability, and inflammatory responsiveness within upper respiratory tissues. Estrogen and progesterone modulate nasal vascularization and mucosal blood circulation by influencing nitric oxide synthesis, endothelial activity, cholinergic stimulation, and neurogenic inflammatory pathways. Hormonal changes associated with menstrual cycles, pregnancy, menopause, endocrine diseases, oral contraceptive use, and hormonal replacement therapy frequently contribute to worsening of chronic nasal symptoms and increased mucosal hypersensitivity. Neurovascular dysregulation involving parasympathetic hyperactivity, sensory nerve stimulation, neuropeptide release, vascular dilation, and chronic mucosal hyperresponsiveness plays a central role in pathogenesis of vasomotor rhinitis. Excessive cholinergic activity contributes to glandular hypersecretion, edema formation, vascular congestion, and impaired nasal airflow resulting in persistent respiratory discomfort. Environmental triggers including tobacco smoke, strong odors, air pollution, cosmetic chemicals, humidity changes, spicy foods, emotional stress, and occupational irritants additionally aggravate autonomic dysfunction and intensify clinical manifestations. Chronic nasal obstruction and respiratory impairment significantly affect sleep quality, emotional stability, cognitive performance, social activity, and occupational productivity. Persistent symptoms frequently contribute to chronic fatigue, anxiety, irritability, impaired concentration, and reduced psychosocial well-being among affected women. Modern pathophysiological understanding emphasizes the importance of interactions between endocrine regulation, autonomic nervous system imbalance, neurogenic inflammation, vascular hypersensitivity, epithelial barrier dysfunction, and chronic mucosal remodeling in development of vasomotor rhinitis. Differential diagnosis remains critically important because clinical manifestations may resemble allergic rhinitis, chronic sinusitis, infectious rhinitis, medication-induced rhinitis, and structural nasal abnormalities. Accurate diagnosis therefore requires comprehensive clinical evaluation including rhinoscopy, nasal endoscopy, rhinomanometry, hormonal assessment, autonomic nervous system investigation, cytological examination, and exclusion of allergic pathology. Advances in otolaryngology, endocrinology, neuroimmunology, and respiratory medicine have significantly improved understanding of hormonal and neurovascular mechanisms underlying chronic non-allergic rhinitis and facilitated development of individualized therapeutic strategies. Contemporary treatment approaches increasingly emphasize multimodal management involving pharmacological therapy, hormonal correction, neurovascular stabilization, environmental modification, stress reduction, physiotherapy, nasal irrigation, and minimally invasive interventions aimed at restoring physiological respiratory function and improving long-term clinical outcomes. Effective management consequently requires multidisciplinary collaboration between otolaryngologists, endocrinologists, neurologists, allergologists, psychologists, and rehabilitation specialists.

2. Materials and Methods

This study was conducted using clinical, hormonal, otolaryngological, and neurovascular assessment of women diagnosed with vasomotor rhinitis between 2021 and 2025. Comprehensive evaluation included analysis of symptom duration, menstrual and reproductive history, endocrine disorders, environmental triggers, emotional stress factors, occupational exposure, sleep disturbances, and quality-of-life indicators. Physical examination focused on nasal obstruction, mucosal edema, rhinorrhea, vascular changes, respiratory discomfort, and associated upper airway abnormalities.

Diagnostic procedures included anterior rhinoscopy, nasal endoscopy, rhinomanometry, allergy exclusion testing, hormonal profile analysis, autonomic nervous system assessment, cytological examination of nasal secretions, and radiological imaging when clinically indicated. Patients were categorized according to hormonal status, severity of neurovascular dysfunction, and duration of disease. Comparative analysis of therapeutic interventions including intranasal corticosteroids, anticholinergic medications, saline irrigation, hormonal correction, physiotherapy, stress management, and minimally invasive neurovascular procedures was performed to determine treatment effectiveness and long-term clinical outcomes.

3. Results

Clinical evaluation demonstrated that women with vasomotor rhinitis most frequently experienced persistent nasal congestion, watery rhinorrhea, recurrent sneezing, mucosal swelling, facial pressure, headache, sleep disturbances, emotional instability, chronic fatigue, and impaired concentration. Symptoms were commonly aggravated during menstrual periods, pregnancy, menopausal hormonal transitions, emotional stress, temperature fluctuations, tobacco smoke exposure, and contact with strong odors or cosmetic substances. Women presenting endocrine instability including thyroid dysfunction, menstrual irregularities, and menopausal hormonal changes demonstrated significantly greater severity of nasal obstruction and respiratory discomfort compared with patients without hormonal disturbances. Rhinoscopic and endoscopic examination revealed pale edematous mucosa, vascular dilation, excessive nasal secretions, intermittent hyperemia, and pronounced mucosal swelling without evidence of infectious or allergic inflammatory pathology. Rhinomanometry demonstrated increased nasal resistance and impaired respiratory airflow among patients with severe autonomic dysregulation. Cytological investigation showed predominance of nonspecific inflammatory and neurovascular changes without eosinophilic allergic infiltration. Hormonal analysis identified significant associations between elevated estrogen fluctuations, progesterone imbalance, and chronic nasal hyperreactivity. Autonomic nervous system assessment demonstrated increased parasympathetic activity and neurovascular instability among patients with severe chronic symptoms. Psychological evaluation revealed strong correlation between chronic stress, anxiety disorders, sleep disturbances, and worsening of respiratory manifestations. Clinical investigation demonstrated that women with vasomotor rhinitis most frequently presented with persistent nasal congestion, excessive watery rhinorrhea, recurrent sneezing attacks, chronic mucosal edema, facial pressure, headache, sleep disturbances, emotional irritability, fatigue, and impaired concentration. Severity of respiratory symptoms was significantly greater among women experiencing endocrine instability including menstrual irregularities, menopausal transitions, thyroid dysfunction, and hormonal imbalance. Many patients reported worsening of nasal obstruction and respiratory discomfort during menstruation, pregnancy, emotional stress, climatic changes, and exposure to environmental irritants such as cigarette smoke, perfumes, cosmetic substances, industrial dust, and strong chemical odors. Rhinoscopic examination revealed pale edematous mucosa with vascular congestion, excessive secretions, intermittent hyperemia, and signs of chronic mucosal hypersensitivity without evidence of infectious or allergic inflammation. Nasal endoscopy confirmed persistent swelling of inferior nasal turbinates and impaired physiological airflow within nasal passages. Rhinomanometric analysis demonstrated significantly elevated nasal airway resistance and reduced respiratory airflow among patients with pronounced autonomic dysfunction. Cytological examination identified predominance of nonspecific neurovascular inflammatory changes without eosinophilic infiltration characteristic of allergic pathology. Hormonal analysis revealed associations between fluctuations in estrogen and progesterone levels and increased severity of mucosal edema and rhinorrhea. Autonomic nervous system assessment demonstrated parasympathetic predominance and neurovascular instability in patients with severe chronic manifestations. Psychological evaluation additionally confirmed strong correlation between emotional stress, anxiety disorders, sleep impairment, and worsening of respiratory symptoms. Therapeutic management involving intranasal corticosteroids, saline irrigation, hormonal stabilization, anticholinergic medications, stress reduction programs, physiotherapy, and lifestyle modification significantly reduced severity of nasal obstruction, rhinorrhea, mucosal swelling, headache, and sleep disturbances. Patients receiving individualized комплексное treatment demonstrated marked improvement in respiratory comfort, emotional well-being, social adaptation, and quality-of-life indicators during prolonged follow-up observation.

4. Discussion

The findings confirm that vasomotor rhinitis in women represents a complex multifactorial respiratory disorder strongly associated with hormonal imbalance, neurovascular instability, autonomic nervous system dysfunction, and chronic mucosal hypersensitivity. Female hormonal fluctuations substantially influence vascular permeability, mucosal circulation, glandular secretion, endothelial activity, and autonomic regulation thereby increasing susceptibility to persistent nasal hyperreactivity and chronic respiratory dysfunction. Estrogen and progesterone appear to play central roles in modulation of vascular tone and neurogenic inflammatory activity within nasal tissues. The study additionally demonstrates that emotional stress, endocrine disorders, environmental irritants, and parasympathetic hyperactivity significantly aggravate severity of clinical manifestations and negatively affect psychosocial well-being and quality of life. Neurogenic inflammation involving sensory nerve activation and inflammatory neuropeptide release further contributes to chronic vascular instability and exaggerated mucosal responsiveness. Excessive cholinergic stimulation appears to represent a major pathogenic mechanism responsible for persistent rhinorrhea, mucosal edema, and impaired nasal airflow. The findings emphasize the importance of comprehensive differential diagnosis for exclusion of allergic, infectious, structural, and medication-related nasal disorders. Modern diagnostic technologies significantly improve identification of hormonal and neurovascular factors contributing to chronic nasal dysfunction and facilitate development of individualized therapeutic strategies. Intranasal corticosteroids, saline irrigation, hormonal stabilization, anticholinergic therapy, physiotherapy, psychological support, and lifestyle modification remain highly effective components of long-term disease management. Environmental trigger avoidance and stress reduction additionally contribute to stabilization of autonomic regulation and improvement of respiratory comfort. Despite significant advances in therapeutic approaches, several important challenges persist including chronic symptom recurrence, delayed diagnosis, endocrine instability, emotional stress-related exacerbations, and incomplete therapeutic response in severe cases. Future scientific investigations increasingly focus on molecular neuroimmunological mechanisms, autonomic nervous system modulation, precision hormonal therapy, regenerative mucosal treatment, and minimally invasive neuromodulatory interventions aimed at improving long-term control of chronic vasomotor rhinitis. Multidisciplinary integration of otolaryngology, endocrinology, neurology, allergology, psychology, and rehabilitation medicine therefore remains essential for effective management of women with chronic non-allergic respiratory dysfunction.

5. Conclusion

Vasomotor rhinitis in women is a chronic multifactorial respiratory disorder associated with hormonal imbalance, neurovascular dysfunction, autonomic instability, and chronic mucosal hypersensitivity. Persistent nasal congestion, rhinorrhea, mucosal edema, sleep disturbances, emotional instability, and respiratory discomfort significantly impair quality of life and daily functional activity. Hormonal fluctuations, emotional stress, environmental irritants, and autonomic nervous system imbalance substantially influence severity and progression of clinical manifestations. Comprehensive diagnostic evaluation and individualized multimodal treatment significantly improve respiratory function, symptom control, emotional well-being, and long-term clinical outcomes. Contemporary therapeutic approaches including intranasal corticosteroids, saline irrigation, hormonal stabilization, anticholinergic therapy, physiotherapy, stress management, and minimally invasive neurovascular interventions effectively reduce chronic symptoms and restore physiological nasal balance. Continued advances in neuroimmunology, endocrinology, otolaryngology, and respiratory medicine will further improve understanding and management of vasomotor rhinitis in women. Vasomotor rhinitis in women is a chronic multifactorial respiratory disorder associated with hormonal imbalance, autonomic nervous system dysfunction, neurovascular instability, and persistent mucosal hypersensitivity. Chronic nasal congestion, rhinorrhea, mucosal edema, sleep disturbances, emotional instability, and respiratory discomfort significantly impair physical well-being, psychosocial adaptation, and quality of life. Hormonal fluctuations, environmental irritants, neurogenic inflammation, and parasympathetic hyperactivity substantially influence severity and progression of clinical manifestations. Comprehensive diagnostic evaluation and individualized multimodal treatment significantly improve respiratory function, symptom control, emotional stability, and long-term therapeutic outcomes. Contemporary management approaches including intranasal corticosteroids,

saline irrigation, hormonal stabilization, anticholinergic therapy, stress reduction, physiotherapy, and minimally invasive neurovascular interventions effectively restore physiological nasal regulation and reduce chronic respiratory symptoms. Continued advances in endocrinology, neuroimmunology, otolaryngology, and respiratory medicine will further improve understanding and management of vasomotor rhinitis in women.

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