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MIGRAINE AND MODERN APPROACHES TO THERAPY

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ABSTRACT

Migraine is one of the most common primary neurological disorders characterized by recurrent attacks of severe headache accompanied by autonomic and neurological symptoms. According to the World Health Organization, migraine is among the leading causes of disability worldwide. The disease significantly affects the quality of life and working capacity of patients. Recent advances in neuroscience have improved the understanding of migraine pathophysiology and led to the development of new therapeutic strategies. In particular, medications targeting the calcitonin gene-related peptide (CGRP) pathway have demonstrated high effectiveness in migraine prevention. This article reviews modern concepts of migraine epidemiology, pathogenesis, clinical manifestations, diagnostic criteria, and contemporary pharmacological and non-pharmacological approaches to migraine therapy.

Keywords: migraine, headache disorders, CGRP pathway, trigeminovascular system, migraine pathophysiology, migraine triggers, migraine diagnosis, pharmacological therapy, triptans, monoclonal antibodies, CGRP inhibitors, preventive therapy, acute treatment, non-pharmacological therapy, lifestyle modification, neurological disorders

INTRODUCTION

Migraine is a chronic neurological disorder characterized by recurrent attacks of moderate to severe headache. It is considered one of the most common neurological diseases worldwide. Epidemiological studies indicate that approximately 10–15% of the global population suffers from migraine.

Migraine occurs more frequently in women than in men, which may be associated with hormonal factors and genetic predisposition. The disease usually begins during adolescence or early adulthood and may persist for many years.

Migraine attacks significantly impair patients' quality of life. Severe pain, nausea, photophobia, and phonophobia can limit daily activities and reduce professional productivity. In addition, recurrent migraine attacks may lead to psychological distress, anxiety, and decreased social functioning.

Despite decades of research, migraine remains a complex and multifactorial neurological disorder. Modern studies emphasize the role of the trigeminovascular system, cortical spreading depression, and neuropeptide release in migraine pathophysiology.

The aim of this study is to analyze modern concepts of migraine pathogenesis and evaluate contemporary approaches to its treatment

Epidemiology of Migraine

Migraine represents a major public health problem worldwide. According to global epidemiological studies, migraine is among the leading causes of disability in individuals under the age of 50.

The highest prevalence of migraine is observed in people between the ages of 25 and 55 years. Women are affected approximately three times more frequently than men.

The global burden of migraine includes not only the medical impact of the disease but also its economic consequences. Migraine leads to significant healthcare costs and loss of productivity due to work absenteeism.

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In addition, migraine is frequently underdiagnosed and undertreated, particularly in developing countries, which further increases its social and economic burden.

Risk Factors and Triggers

Migraine attacks may be provoked by various environmental, physiological, and psychological factors. These factors are commonly referred to as migraine triggers.

Common migraine triggers include:

emotional stress
sleep disturbances
hormonal changes
alcohol consumption
certain foods
bright light and loud sounds

Some patients report that specific foods such as chocolate, aged cheese, and foods containing nitrates may provoke migraine attacks. However, trigger sensitivity varies among individuals.

Lifestyle factors such as irregular sleep patterns, dehydration, and excessive workload may also contribute to migraine onset.

Pathophysiology of Migraine

Modern understanding of migraine pathophysiology is based on the interaction between neuronal and vascular mechanisms. One of the central processes involved in migraine development is the activation of the trigeminovascular system.

Activation of this system leads to the release of several neuropeptides, including calcitonin gene-related peptide (CGRP), substance P, and neurokinin A.

CGRP plays a particularly important role in migraine development by promoting vasodilation of cerebral blood vessels and contributing to neurogenic inflammation.

Another important mechanism is cortical spreading depression, which represents a wave of neuronal depolarization that spreads across the cerebral cortex. This phenomenon is believed to be responsible for migraine aura.

Genetic factors also contribute to migraine susceptibility. Several genes involved in neuronal excitability and vascular regulation have been associated with migraine.

Clinical Manifestations

Migraine attacks are characterized by recurrent episodes of headache that are typically unilateral and pulsating in nature. The pain intensity ranges from moderate to severe and may worsen with physical activity.

Common associated symptoms include:

Nausea]
Vomiting
Photophobia
Phonophobia
fatigue

In some patients migraine occurs with aura. Aura consists of transient neurological symptoms that precede the headache phase. The most common aura manifestations include visual disturbances such as flashing lights, zigzag patterns, or partial visual loss.

Migraine attacks usually last from 4 to 72 hours.

Classification of Migraine

According to the International Classification of Headache Disorders, migraine can be divided into several types.

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The most common forms include:

Migraine without aura – the most frequent form characterized by recurrent headaches without neurological symptoms.

Migraine with aura – characterized by reversible neurological symptoms preceding the headache.

Chronic migraine – defined as headache occurring on at least 15 days per month for more than three months.

Other rare forms include hemiplegic migraine and retinal migraine.

Diagnosis of Migraine

Diagnosis of migraine is mainly based on clinical evaluation and patient history. The International Headache Society has developed standardized diagnostic criteria for migraine.

The main diagnostic features include:

at least five headache attacks
duration of attacks between 4 and 72 hours
pulsating headache
moderate or severe pain intensity
aggravation by physical activity
associated symptoms such as nausea or sensitivity to light and sound

Neuroimaging studies such as magnetic resonance imaging are usually performed only when secondary causes of headache are suspected.

Pharmacological Treatment

Treatment of migraine includes acute therapy and preventive therapy.

Acute therapy aims to relieve pain during migraine attacks. Nonsteroidal anti-inflammatory drugs such as ibuprofen and naproxen are commonly used for mild to moderate migraine attacks.

Triptans represent a specific class of anti-migraine medications. These drugs act as serotonin receptor agonists and reduce neurogenic inflammation and vasodilation.

Common triptans include:

Sumatriptan
Zolmitriptan
Rizatriptan
eletriptan

Preventive pharmacological therapy is recommended for patients with frequent or severe migraine attacks.

Common preventive medications include:

beta blockers (propranolol, metoprolol)
anticonvulsants (topiramate, valproate)
antidepressants (amitriptyline)

Modern Biological Therapies

Recent advances in migraine treatment include the development of monoclonal antibodies targeting the CGRP pathway.

These medications include:

Erenumab
Fremanezumab
Galcanezumab
eptinezumab

Clinical trials have shown that these drugs significantly reduce the number of migraine days per month in many patients.

These therapies are generally well tolerated and represent an important breakthrough in migraine prevention.

Non-Pharmacological Treatment

Non-pharmacological strategies are an important part of migraine management.

These approaches include:

maintaining regular sleep patterns
stress reduction
regular physical activity
cognitive behavioral therapy
relaxation techniques

Lifestyle modification and identification of individual triggers can significantly reduce the frequency of migraine attacks.

DISCUSSION

Modern research has significantly expanded our understanding of migraine pathophysiology. Advances in neurobiology have allowed the development of targeted therapies aimed at specific molecular mechanisms involved in migraine.

The introduction of CGRP-targeted therapies represents one of the most important developments in migraine treatment in recent years.

However, migraine management should involve a comprehensive approach combining pharmacological therapy, lifestyle modification, and patient education.

CONCLUSION

Migraine remains a highly prevalent neurological disorder that significantly affects patients' quality of life. Modern research has improved understanding of migraine mechanisms and contributed to the development of new therapeutic strategies.

Effective migraine management requires a combination of pharmacological and non-pharmacological approaches. The development of CGRP-targeted therapies offers promising opportunities for improving migraine prevention and patient outcomes.

Further research is necessary to develop personalized treatment strategies and improve the quality of life of patients suffering from migraine.

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