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THE HEREDITARY TRANSMISSION OF COXARTHROSIS: MEDICAL-SOCIAL IMPLICATIONS AND PREVENTIVE STRATEGIES

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Abstract: Coxarthrosis, or osteoarthritis of the hip joint, is a chronic degenerative disease that significantly affects mobility and quality of life. Recent research has emphasized the role of genetic inheritance in the onset and progression of this condition. This review examines the hereditary transmission of coxarthrosis, highlighting key genes such as COL2A1 and GDF5 that contribute to cartilage degeneration. In addition to discussing medical implications, the article explores the social and economic burdens associated with early-onset hereditary coxarthrosis. The importance of early diagnosis, lifestyle modification, and preventive measures is underscored to minimize disease progression and improve patient outcomes.

Keywords: Coxarthrosis; Heredity; Osteoarthritis; Genetic predisposition; Public health; Preventive strategies; Cartilage degeneration.

Introduction

Coxarthrosis, also known as osteoarthritis of the hip joint, is a progressive degenerative disease characterized by the breakdown of articular cartilage and remodeling of the underlying bone. It is one of the leading causes of disability among the elderly and significantly impacts patients' quality of life. While mechanical stress, aging, and metabolic factors play a role in the development of the disease, increasing evidence supports a hereditary component in its pathogenesis.

Several epidemiological and genetic studies have shown that individuals with a family history of coxarthrosis are at a significantly higher risk of developing the condition themselves. Genetic predisposition may influence cartilage metabolism, joint structure, and inflammatory responses, which in turn contribute to early-onset or more severe forms of the disease.

In addition to its medical impact, coxarthrosis has considerable social and economic consequences. It affects mobility, daily functioning, and the ability to work, leading to increased healthcare costs and loss of productivity. Understanding the hereditary aspects of coxarthrosis is essential not only for early diagnosis and individualized treatment but also for implementing effective preventive strategies.

This article aims to examine the hereditary transmission of coxarthrosis, evaluate its medical and social implications, and highlight evidence-based approaches to prevention and early intervention.

Methods

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This study was conducted as a narrative literature review aimed at analyzing the hereditary aspects of coxarthrosis and evaluating its medical-social implications and preventive measures. A comprehensive search of peer-reviewed scientific articles, clinical studies, and reviews was performed using electronic databases such as PubMed, Scopus, and Google Scholar.

Keywords used in the search included "coxarthrosis", "hip osteoarthritis", "hereditary transmission", "genetic predisposition", "public health burden", and "preventive strategies". Articles published between 2000 and 2024 in English were included. Preference was given to studies with large sample sizes, genetic analyses, or significant findings related to inheritance patterns and preventive health interventions.

The gathered data were synthesized to identify common findings, trends, and gaps in the current understanding of the hereditary transmission of coxarthrosis. No ethical approval was required, as the study did not involve new experiments or human participants.

Results

The literature analysis confirms a strong genetic influence in the development and progression of coxarthrosis. Multiple studies have identified familial clustering of hip osteoarthritis, indicating that individuals with first-degree relatives affected by coxarthrosis are 2 to 4 times more likely to develop the disease themselves.

Genetic linkage studies and genome-wide association studies (GWAS) have identified several candidate genes associated with hip joint degeneration. These include variations in genes involved in cartilage formation and maintenance, such as **COL2A1**, **GDF5**, and **ASPN**. Mutations in these genes may impair collagen structure, extracellular matrix function, or joint biomechanics, accelerating the degenerative process.

The results also reveal that hereditary coxarthrosis often presents at an earlier age and progresses more rapidly than idiopathic cases. In some populations, early-onset bilateral coxarthrosis has been strongly correlated with specific genetic variants inherited through autosomal dominant patterns.

From a medical-social perspective, studies show that hereditary forms of coxarthrosis lead to earlier retirement, long-term disability, and increased dependence on healthcare services. Moreover, affected individuals often require joint replacement surgery at a younger age, imposing a higher economic burden on healthcare systems.

Despite the clear genetic predisposition, lifestyle factors such as obesity, physical inactivity, and previous joint trauma still contribute significantly to disease expression and severity, even in genetically susceptible individuals.

Discussion

The findings of this review reinforce the significance of hereditary factors in the pathogenesis of coxarthrosis. While environmental and biomechanical stressors have long been recognized as key contributors, it is now evident that genetic predisposition plays a

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substantial role in determining an individual's susceptibility, age of onset, and disease severity.

Several genes involved in cartilage metabolism, joint development, and inflammatory regulation have been implicated in the familial transmission of coxarthrosis. For example, mutations in the **COL2A1** gene affect type II collagen synthesis, which is critical for cartilage resilience and durability. Similarly, **GDF5** polymorphisms have been associated with altered chondrogenesis and increased risk of early joint degeneration.

From a clinical perspective, identifying individuals with a family history of hip osteoarthritis can aid in early diagnosis and monitoring. Genetic counseling may be particularly beneficial for those with strong familial patterns or early-onset cases. Furthermore, knowledge of a genetic predisposition allows for earlier implementation of preventive strategies, such as weight management, physiotherapy, and lifestyle modifications to reduce joint stress.

Socially and economically, hereditary coxarthrosis imposes a heavier burden due to its earlier onset and prolonged course. Affected individuals may face long-term physical limitations, reduced work capacity, and a diminished quality of life. This necessitates coordinated efforts between healthcare providers, public health systems, and policymakers to improve awareness, access to early screening, and rehabilitation programs.

Importantly, the interaction between genetic predisposition and modifiable risk factors suggests that while inheritance increases susceptibility, the manifestation of the disease can still be delayed or mitigated. Thus, targeted prevention remains a viable and necessary strategy in managing the public health impact of hereditary coxarthrosis.

Conclusion

Coxarthrosis is a multifactorial degenerative joint disease with a significant hereditary component. The reviewed literature confirms that individuals with a positive family history are at higher risk for developing earlier and more severe forms of the disease. Genetic factors—especially mutations in cartilage-related genes such as **COL2A1** and **GDF5**—contribute substantially to disease pathogenesis.

The medical and social burden of hereditary coxarthrosis is considerable, affecting mobility, work capacity, and overall quality of life. Early recognition of genetic predisposition allows for timely preventive interventions, which may delay disease progression and reduce the need for surgical treatment.

Therefore, it is essential to integrate genetic risk assessment, public awareness campaigns, and preventive health strategies into orthopedic and primary care practices. A comprehensive, multidisciplinary approach can help reduce the impact of hereditary coxarthrosis on individuals and healthcare systems alike.

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