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Genetic and Clinical Spectrum of Rheumatoid Arthritis in Jammu Division

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Abstract:
Arthritis is a chronic, irreparable disease that affects joints, tendons, ligaments and muscles. It is one of the most common diseases of mankind and is rapidly growing in all parts of the world. There are many types of arthritis and rheumatism, of which osteoarthritis (OA) and rheumatoid arthritis (RA) are the two most common types. The management of either disease is not complete without the use of herbs. There are more than 100 different types of arthritis. According to the reports in the 2020, arthritis was the first most reported health problem after cold and flu. Considering, Jammu Division is a hilly region of northern India; this type of survey on arthritis has been undertaken for the first time. The Jammu division was stratified into high mountainous areas, medium mountainous areas, low elevated hilly areas and plains for this survey. Arthritis is a common complaint in all parts of the world. According to WHO it is estimated that more than 80% of the world's population over the age of 70 years is affected by OA. Generally, OA is more common in women with the ratio of 2:1. OA is the most common age-related articular disease which is seen in large joints of the knees, hands, hips and spinal joints. The prevalence of OA in Jammu & Kashmir was recorded to be 29.3%. RA is an autoimmune disease and is one of the 10 most common selected diseases in terms of global burden of disease.

Keywords: Genetic Susceptibility, Genetic Predisposition, Hereditary Factors, Gene Polymorphism, Joint swelling, Morning Stiffness, Lifestyle Factor, Quality of Life

INTRODUCTION

Arthritis refers to a group of more than 100 chronic diseases characterized by swelling, pain and stiffness in joints. Pain caused by arthritis can spread over the entire body. This may inhibit normal walking and working activities of the people. Radiographic findings are also apparent for some forms of arthritis, e.g. osteoarthritis, rheumatoid arthritis. Modern day lifestyle, food and behaviour have major impact on the cause and cure of arthritis. Majority of the people do not know the existence of this disease until they start feeling its effect. The major aim of this study is to investigate the present status of arthritis in Jammu division, J&K. Understanding various forms of arthritis is a vital step towards understanding disease occurrence and management. Jammu and Kashmir, located in the northernmost belt of Indian sub-continent, is divided into three major regions: the Kashmir valley, the mountainous region of Ladakh and the plains area of the Jammu division, which are dominated by tropical and temperate ecology. Climatic change, lifestyle adopting modernity in villages, mobility due to change jobs, stress, etc, are some of the risk factors for the emergence of modern/common diseases like hypertension, diabetes, etc., along with the ancient ailments such as arthritis, transitional times and various other autoimmune diseases. Along with the predisposing factors, low literacy rates and poor health facilities are aggravating the disease burden of arthritis in Jammu. Arthritis, rheumatic joint disease, degenerative joint disease and osteoarthritis are used interchangeably to describe a group of disorders of the movable joints. A comprehensive study on status of arthritis is very much required for devising strategies for prevention, as well as for the control of the said diseases. Present location of study is Jammu division which is one of the three regions of Jammu and Kashmir, located on the north of India. The Jammu division comprises 10

districts, where in the present study only Jammu district is taken for a detailed investigation on the status of arthritis.

Genetic Factors

Genetic factors play a crucial role in the development of arthritis, influencing the susceptibility and severity of the disease. This section discusses the specific genes and genetic variations that have been associated with different forms of arthritis. Estimates suggest that 50% to 60% of the variation in susceptibility to rheumatoid arthritis is attributable to genetic factors. Recent genetic discoveries and the ensuing research in the field suggest that the inherited risk of developing rheumatoid arthritis is determined by a combination of multiple genes, including HLA genes, non-HLA genes, and genes involved in immune function. The most well-established genetic risk factor for rheumatoid arthritis is an HLA-DRB1 allele encoding the shared epitope, a conserved sequence motif in the class II MHC. This association implicates the adaptive immune system in the etiology of rheumatoid arthritis, prompting investigation of other genes affecting immunity. Common polymorphisms in the KIF5A gene were recently associated with susceptibility to multiple shared epitope positive arthritis phenotypes in genome-wide association studies and a large replication study. Following a prior report of a rare familial mutation in one of the KIF5A isoforms causing hereditary spastic paraparesis, interest arose in whether disturbances in intracellular transport might constitute a general mechanism for brain and joint pathology leading to different neuroarthropathic phenotypes with variable age of onset.

Environmental Factors

This section explores environmental factors associated with arthritis. Understanding environmental influences is essential for identifying cohorts at risk and developing targeted interventions. An extensive systematic review was conducted to assess the association between environmental factors and juvenile idiopathic arthritis (JIA). JIA is a complex disease influenced by both genetics and the environment, with gene-environment interactions likely contributing substantially to disease risk. This review identified environmental factors related to JIA and presented meta-analyses on the effects of emerging and established risks, specifically smoking exposure, pollen exposure, and breast-feeding duration. In addition to genetics, environmental factors shaping the immune system largely during the early pre- and post-natal periods likely significantly influence JIA pathogenesis. Established environmental factors associated with JIA include living in urban areas, maternal smoking, and exposure to drugs during pregnancy. Growing evidence suggests that local environmental exposures such as particulates, pollutants, and allergens may influence the risk of developing JIA. Environmental factors are prevalent in other immune-mediated diseases like multiple sclerosis, type 1 diabetes, and inflammatory bowel disease. Such diseases tend to cluster by location, suggesting that factors present in particular geographical areas may influence the risk of development.

Clinical Features and Symptoms

Arthritis is a debilitating condition that can cause a great deal of suffering for those afflicted. Common arthritis joint symptoms include swelling, pain, stiffness and decreased range of motion. Symptoms may come and go and can be mild, moderate or severe. Depending on the specific kind of arthritis, some joints may be affected and others spared (Begum & Islam, 2019). Symptoms are among the commonest cause of morbidity in the world. There are 100 different varieties of arthritis, and all are given the generic name with the add-on to indicate severity or form; which is why, unlike most diseases, arthritis varieties have become as common as proof of the disease itself. The most familiar kinds or types of arthritis are Osteoarthritis (OA), Rheumatoid Arthritis (RA), systemic lupus erythematosus, childhood or Juvenile Idiopathic Arthritis (JIA), and gout (where sodium rate deposit is on the joints. In general, most people with arthritis will experience joint symptoms that are chronic or persistent. Typical clinical symptoms are pain, particularly over prolonged activity and weight-bearing. This is often related to damage to the

cartilage or synovium and can be appreciated by a gelling phenomenon where early morning stiffness lasts about half-an-hour or more; later in the day relieves pain and stiffness. Latent or chronic clinical signs in the joint may develop; these include joint effusion, spongy feel of the joint, tenderness on palpation, decreased subcutaneous tissue over the joint and limitation of movement of the joint. An arthritis diagnosis often starts when a person sees their primary care physician for a medical history and physical exam. The doctor will ask about signs and symptoms, family and medical history, and specific risk factors, such as age, gender, or previous joint injuries. The doctor will then perform a physical exam looking at the joints and surrounding tissue to check for swelling, redness, warmth, tenderness and range of motion. The doctor may also ask for blood tests and imaging scans such as X-rays, CT scans or MRIs, which may help determine the type of arthritis.

Common Symptoms

Arthritis is among the commonest causes of morbidity in the world. There are many types of arthritis found. Very familiar types are Osteoarthritis (OA), Rheumatoid Arthritis (RA), systemic lupus erythematosus, childhood or Juvenile Idiopathic Arthritis (JIA), gout etc. Common symptoms include swelling, pain, stiffness and decreased range of motion in the joints. Symptoms may come and go, and can be mild, moderate or severe. Symptoms often occur in joints on both sides of the body. Most of the arthritis patients in backward rural areas often failed to visit a doctor because of lack of awareness. Fingers, knees, hips, lower back and neck are the most commonly affected areas. These general clinical manifestations are almost similar for different types of arthritis. Hence, through further study of these clinical manifestations of arthritis, it can be used as visit card for early detection of arthritis and intervention can be taken at an early stage. Early detection of arthritis is important and challenging as it is not possible for those living in backward areas to visit a specialist for necessary tests. A comprehensive understanding of the general clinical symptoms is fundamental for the further study on the detection and classification of arthritis.

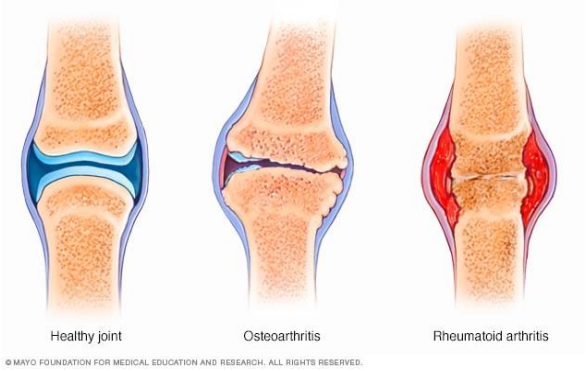

Figure. It shows Healthy Joint, Osteoarthritis and Rheumatoid Arthritis

Specific Symptoms in Jammu Division

The specific symptoms of arthritis in Jammu Division have also been highlighted. All the common symptoms of arthritis are present in this division also. From the interviews with the selected aged people suffering from different types of arthritis, the respondents were asked to present the specific symptoms in terms of local dialects. Some specific symptoms are reported to be present in each area, which are unique and different from the symptoms found in the other areas. The specific symptoms in Jammu division are Toke, PodhROK, Podha, and Puhachkatg. All these symptoms are presented in the details below.

- **Toke**: This symptom is commonly found in the Punjab state of India. It is termed as Warh in local dialect and is accompanied by the symptoms of swelling in joints of the limbs with redness. This symptom relates to chronic arthritis.

- **PodhROK**: PodhROK is the local tribal symptom reported to be present in the Rajouri and Poonch districts of Jammu and Kashmir UT. This symptom is accompanied by fracture pain in the joints which can be acute, chronic, or local in nature.
- **Podha**: People in all the five districts of the Jammu division termed Podha in the local dialect. Potha is accompanied by inflammation of limbs and joints and also associated with swelling in skin tissues. This symptom is prevalent in all the five districts including Jammu, Kathua, Samba, Reasi, and Rajouri. The respondents felt that this swelling in joints is not due to any injury or overexertion as in the case of common swelling but due to some factors appear suddenly without any apparent cause.
- **Puhachkatg**: Puhachkatg is another local peculiar symptom reported by the respondents of Rajouri and Poonch districts and found in all tribal peoples. The word Puhachkatg is related to the lizard. The symptoms of Puhachkatg are the horrible calling sounds produced by some unusual factors or evils. These calling sounds disturb the peace and tranquility of the night, making the people unable to sleep properly.

Management and Treatment

Management and treatment of arthritis should encompass both pharmacological and non-pharmacological interventions. The goals are to relieve pain, minimize stiffness and swelling in the joints, and maintain or improve mobility and functional ability. A widespread approach requires educating the patient on the nature of the disease as well as the effects of self-management strategies and medication adherence, thus promoting shared care between the patient and healthcare provider. Patient empowerment should nevertheless not eclipse treatment with anti-arthritic agents. Pharmacological agents available for use are grouped into non-steroidal anti-inflammatory drugs (NSAIDs), disease-modifying anti-rheumatic drugs (DMARDs), corticosteroids, and biological response modifiers. NSAIDs provide symptomatic pain relief, whilst DMARDs modify the underlying disease and subsequently slow disease progression (N. Lindler et al., 2020). There is concern on the side effects of NSAIDs and patients must be monitored when they are used. Herbal medications have shown the potential for safe and effective management of arthritis based on the fact that pro-inflammatory cytokines such as IL-1, IL-6, TNF-α are the key mediators in the pathogenesis of both OA and RA. Several herbs elucidated new mechanisms for OA and RA treatment. Although some herbs have shown promise for OA and RA treatment, more studies and clinical trials are required for determining safety and efficacy. Non-steroidal anti-inflammatory drugs, corticoids, and disease-modifying agents used in arthritis treatment are derived from natural medicines.

Physical Impairment

Physical impairment associated with arthritis has become a leading challenge to which people are responding. Physical impairment due to arthritis limits normal activities performed by an arthritic individual. Participants were asked how much difficulty they had with the following activities due to any health problem (such as arthritis), including the use of special equipment or help from another person, in the past 30 days. The activities were: walking ¼ mile (five blocks); climbing one flight of stairs (10 steps); bending, lifting, or stooping; walking between 20 to 30 minutes continuously; and doing vigorous activities, such as running, swimming, or participating in sports.

In terms of a summary of odds ratio estimates by model, 40.17% people aged 60 or above were estimated to have difficulty walking ¼ mile. It was also seen that people aged 60 years or above were 2.6 times more likely to report difficulty climbing one flight of stairs as compared to people aged less than 40 years. Furthermore, women were at almost two times more risk of reporting difficulty bending, lifting or stooping, walking between 20 to 30 minutes continuously, and doing vigorous activities compared to men. Among the other variables, the illiterate class of the population, and the low K scale group were highlighted as the most affected class with respect to physical impairments.

Public Health Strategies

Arthritis is one of the most serious chronic diseases in the world affecting both rich and poor. The world health organization (WHO) has categorized arthritis as an epidemic chronic disease. It is one of the oldest diseases known to mankind as it has been mentioned in the Bible and by the Egyptians. It is a very common chronic illness among elderly people, though anyone of any age can be affected. The term "Arthritis" refers to inflammation of the joints. But it is commonly used to denote a variety of more than 100 different joint disorders occurring in different parts of the body. Joints are the places where two or more bones are connected. Joints allow movement, flexibility, and weight-bearing. Bone surfaces in a joint (Articular Surface) are covered by cartilage, having a specialized lubricating system and a synovial membrane. These components together form the articular joint.

Preventive measures regarding arthritis were studied. Mass education of the people to improve the awareness of the disease process, risk factors, and symptoms of arthritis has to be enhanced. The disease should be detected early with appropriate treatment initiated. Regular physical exercise has to be promoted. Walking, swimming, and cycling would be good low-impact exercises. Posture and body mechanics must be taught, especially lifting, pushing, or pulling heavy weights which may stress the joints. The community also has to take some health sector initiatives to meet the norms of the basic health Service Package phrased by the Joint Community Health Directorate. A good number of proper health facilities endowed with educated manpower to man the establishments would ensure better healthcare within the accessible range of the community. Efforts should also be made to construct utility roads wherever necessary to connect remote localities with the growth centers.

Preventive Measures

Preventive measures are any action taken to avert the onset or progression of arthritis. Avoiding risk factors may reduce the risk of developing arthritis or slow disease progression, while activities promoting health skills wellness can reduce effects and/or improve response to the disease.

Healthcare Infrastructure in Jammu Division

A sound healthcare infrastructure is an essential prerequisite for promoting health and, thereby, boosting the quality of life of the people. It, therefore, needs to be viewed as an important component of overall development. Health is a social good and cannot, therefore, be left to the exponents of the market force. Jammu Division is comprised of 122 health block level units, which cater to a population averaging 110,000. Patients tend to either visit OPD units on supervisory control or prefer going to private hospitals. The patients availing facilities at PHC or CHC did not prefer visiting them due to various reasons, chief among them being the lack of medical and technical staff in the sampled health units. There is a consensus that all the 11 sampled health units are not able to provide the minimum required health services to the targeted health blocks, and there is a need to strengthen these health units in terms of manpower and facilities. The deficiency of the medical officers is 80%, the paramedical staff is 80%, and non-paramedical staff is 83%. There are 15 CHC units in Jammu Division, catering to an average population of about 20,000. A majority of the CHC (Community Health Centre) do not have regular services of Gynecologist, Surgeon, Pediatrician, and Anesthetist.

The developed countries of the world have access to modern infrastructure of health care facilities like well-equipped hospitals, nursing homes, health centers, clinics, allopathic pharmacies, polyclinics, etc. Unfortunately, these facilities have not yet reached even remote parts of vast developing countries like India. Intake of health services by the people is grossly dependent on the facilities available in the concerned locality. Consequently, people residing in towns, cities, and urbanized localities enjoy the benefit of modern health services. On the other hand, the people residing in rural areas of backward and remote places, far-off from essential health facilities, have to face hardships in receiving health care

services. It is due to poor availability of medical infrastructure, lack of awareness of modern medical treatment, and illiteracy. Far-flung areas of Jammu Division do not have access to hospitals and other health facilities and have to travel five to six days barefoot to reach Jammu city for medical treatment. No effort has been made to improve this difficult situation. To assess the health care infrastructure in Jammu Division, users of health care services were taken for conducting a study of health care facilities. Of eight units surveyed, five are in Block Mohareen (Chandhara, Jagwal, Mohareen, Mansar, Bansar) and three units are in Block Naugan (Naugan, Nainasher, Barote) of District Udhampur. There are two Community Health Centers (CHC), viz Sangani and Zarmar, Tanda, and Kandi of District Reasi. Each health care unit is surveyed at four health facilities – Tanda (Block Kandi, District Reasi), Jagwal (Block Mohareen, District Udhampur), Naugan (District Udhampur), and Zarmar (Block Sangani, District Ramban) of Jammu Division. A twenty-seven-item interview schedule was prepared for this purpose, of which sixteen items were related to primary information on health care services, five items comprised a secondary record of doctor-patient ratio and growth of health infrastructure employed for the study, and six items pertaining to the knowledge of modern health care and socio-economic status of the respondents.

Emerging Therapies

Emerging therapies on treatment approaches in arthritis have gained substantial attention among researchers and clinicians. With the recent advancements in understanding the pathogenesis of arthritis, mounting focus is on the growing therapeutic alternatives that can be designed and formulated that can plausibly, safely, and suitably be administered trans dermally with an aim of effectively controlling the signs and symptoms and hampering the progress of the disease.

Community-based Interventions

Collaborative approaches are significant and should be addressed at the community level. Community engagement should occur from the planning stage using participative interventions and should build on local knowledge. The community involvement encourages community members to discuss openly the problems faced by them with reference to arthritis and facilitate the involvement of a wider pool of stakeholders beyond health professionals at local government or district levels in the process of strategy development. All community stakeholders are involved in identifying priority problems and allocating resources from the community to address these problems.

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