

## Arthritis: A General Perception on the Prevalence of the Disease in Indian Population

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### Abstract

### Original Research Article

Arthritis is a chronic systemic inflammatory disorder which leads to joint pain, inflammation, functional deformities, and plummets life expectancy. Arthritis can cause permanent joint changes. The worldwide incidence of all geographic and ethnic variations of these diseases is 1%. The prevalence of JA was assumed to be around 1.25 per 1000 children. JA tends to persist well into adulthood with 41% of patients in their study showing persistent tender and swollen joints at a median 16.5 years after diagnosis. The overall prevalence of RA in India was found to be more than 1%. In case of psoriatic arthritis the ratio of male to female (3:1) was very high. Highest incidence was noted in the age group of 20-39 years and the males are more susceptible than females. 80% of the Indian population who shows knee and joint pains are suffering from OA. With highest demographic dividend it is sure that in the next decade Indian youths will be every nooks and corner of the world as the manpower and the work force. It is high time that Indians should change their life style and practice healthy habits.

**Keywords:** Rheumatoid arthritis, Psoriatic arthritis, Osteoarthritis, Juvenile arthritis.**Copyright © 2019:** This is an open-access article distributed under the terms of the Creative Commons Attribution license which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use (NonCommercial, or CC-BY-NC) provided the original author and source are credited.

## INTRODUCTION

The word Arthritis is originated from the Greek word *Arthron*, meaning joint; later English language adapted it as Arthritic and presently it is termed as Arthritis which can be simply defined as the joint inflammation. Arthritis is a chronic systemic inflammatory disorder which leads to joint pain, inflammation, functional deformities, and plummets life expectancy [1, 2]. Common arthritis joint symptoms include inflammation, pain, clumsiness and decreased range of motion. Symptoms may come and go. They can be mild, moderate or severe. They may stay about the same for years, but may progress or get worse over time. Severe arthritis can result in chronic pain, inability to do daily activities and make it difficult to walk or climb stairs [3]. Arthritis can cause permanent joint changes. These changes may be visible, such as knobby finger joints, but often the damage can only be seen on X-ray. Some types of arthritis also affect the heart, eyes, lungs, kidneys and skin as well as

the joints. People often get bamboozled between arthritis and gout. The worldwide incidence of all geographic and ethnic variations of these diseases is 1% [4]. People of all ages, sexes and races can and do have arthritis, and it is the leading cause of disability in America. Arthritis foundation lay down facts saying more than 50 million adults and 300,000 children have some type of arthritis. It is most common among women and occurs more frequently as people get older. The most common arthritis is osteoarthritis, affecting 31 million Americans. By the next couple of decades doctors will diagnose more than 78 million cases. Arthritis in India is a household name just as diabetes. The prevalence of rheumatoid arthritis in India, in adults has been reported to vary from 0.5 to 3.8% in women and from 0.15 to 1.37% in men [5]. There are more than 100 types of arthritis but the most common ones are the gout, rheumatoid arthritis (RA), osteoarthritis (OA), psoriatic arthritis, reactive arthritis, enteropathic arthritis, juvenile arthritis etc [6]. Out of this Osteoarthritis is the most prevailing one which is a

chronic joint disorder characterized by softening and disintegration of articular cartilage. Whereas RA is an auto immune disorderis characterized by proliferative, hypervascularizedsynovitis, resulting in bone erosion, cartilage damage, joint destruction, and long-term disability [7]. The etiology of the disease includes normal wear and tear, age, obesity, joint injury which initiates an imbalance between the joint matrices. The pathophysiology of rheumatoid arthritis is still not obvious. There are many factors which are involved in the pathogenesis of the RA, thus we cannot vividly point out the picture or the individual factor [8]. Osteoarthritis is caused by the disparity between the stress applied to articular cartilage and strength of the articular cartilage. Secondly, obesity is one of the main causes which put stress and load on the knee joints and age is another factor which brings in weak cartilage [9]. Most of the arthritis is treated by the employment of non-steroidal anti-inflammatory drugs (NSAIDs), oral and intravenous glucocorticoids and colchicines. Along with NSAIDs in RA Disease modifying anti-rheumatic drugs (DMARDs) are used in clinical treatment [10]. Drugs such as methotrexate, hydrochloroquine, anti-tumor necrosis factor (TNF- $\alpha$ ) (infliximab, adalimumab), sulfasalazine are commonly used for clinical treatment of all kinds of arthritis.

## METHODS

The entire literature search was done on search engines and various sites such as googlescholar, science direct, research gate etc. Combination of following group of keywords was used, arthritis, rheumatoid arthritis, osteoarthritis, India, prevalence, and worldwide. Further, Pubmed and googlescholar were searched using author’s initials and the related articles link for key publications. Moreover additional articles were traced from the reference list of the papers and brainstorm of the articles and publications.

The entire study is based in India as a region divided into two sections that are North and South due to the diversity. Further the study explains the prevalence of the disease in juvenile, elderly, different sex, and as per the different kinds of arthritis, for instance, rheumatoid arthritis, osteoarthritis, psoriatic arthritis etc. this study also compares the prevalence of

arthritis with western countries and the neighboring countries of India.

## RESULTS

### Juvenile arthritis

Aggarwal *et al.* studied 89 patients, 46 had polyarticular type of disease, 30 had pauciarticular type and 13 had systemic onset type. Among patients with oligoarticular type, five had juvenile ankylosing spondylitis whereas none had psoriatic arthritis, the prevalence of JA was assumed to be around 1.25 per 1000 children [11]. JA tends to persist well into adulthood with 41% of patients in their study showing persistent tender and swollen joints at a median 16.5 years after diagnosis. Families who have children diagnosed with JA experience from not only a financial restrain but also a noteworthy impairment of quality of life, caregiver burden as well as higher rates of psycho-emotional disorders. India is growing as a country and will outgrow China in population by 2050 [12]. We can expect this trend to continue and therefore assume that chronic diseases specifically musculoskeletal diseases such as JA would be an important cause of morbidity in the future population of children in the country [13].

### Rheumatoid arthritis

A 1993 study by Malaviya *et al.* shows that a population of 39826 of different age group from 16-65 were studied for rheumatoid arthritis, out of which 29 male subjects were traced as suffering from RA and 270 subject of the opposite sex suffered. The ratio of female to male stands out to be 9.3:1, which signifies that females are more prone than the male. The total number of RA patient was then found to be 299 which show that the age specific prevalence was 0.75% [5] Kar studied in the West Bengal region of the country in about 4800 subjects falling in the age group of 20-40 where he found the prevalence to be 5.2% [14].

Another study by Chopra *et al.* in 2001 shows that in a population of 110 patients in the range of 25-45 years the Female: Male ratio stands out to be 3:2 with a family history of 20–28% [15]. Chandrasekaran studied in elderly men who show that it was polyarticular type of arthritis and the age of onset was  $37.4 \pm 9$  with a prevalence percentage of 0.2-1percent [16].

**Table-1: Prevalence of Rheumatoid Arthritis in Indian Population**

Authors	Age Group	No. of subjects	% Prevalence	Female : Male
Malaviya et al	16-65	39826	0.75	9.3:1
Kar et al	20-40	4800	5.2	—
Chopra et al	25-45	110	—	3:2
Chandrasekaran	Elderly men	—	0.2-1	—

### Psoriatic arthritis

Prevalence of psoriasis varies in different parts of the world. According to published reports, prevalence in different populations varies from 0% to

11.8%. Okhandiar *et al.* [17] collected a comprehensive data from various medical colleges located in Dibrugarh, Calcutta, Patna, Darbhanga, Lucknow, New Delhi and Amritsar. They found that the incidence of

psoriasis among total skin patients ranged between 0.44 and 2.2%, with overall incidence of 1.02%. They noted that the incidence in Amritsar (2.2%) was higher as compared to other centers in Eastern India and speculated that it may be related to different environmental conditions (extremes of temperature), dietary habits, and genetic differences. The ratio of male to female (2.46:1) was very high which could not be clearly accounted for. Highest incidence was noted in the age group of 20-39 years and the mean age of onset in males and females was comparable [20].

In another study from North India, Bedi [18] reported the prevalence of psoriasis to be 0.8% among the skin patients but the sample size of the study was very small. Male to female sex ratio was 2.5:1. In this study, it was observed that females had lower mean age of onset compared to males. In a latter study by Bedi, [19] which included larger number (530) of subjects, prevalence of psoriasis among dermatology outpatients was found to be 2.8% while male to female ratio continued to be the same.

So, it can be inferred that in India the prevalence of psoriasis varies from 0.44 to 2.8%, it is twice more common in males as compared to females, and most of the patients are in their third or fourth decade at the time of presentation.

### Osteoarthritis

Among the chronic rheumatic diseases, hip and knee osteoarthritis (OA) is the most prevalent and is a leading cause of pain and disability in most

countries worldwide. Its prevalence increases with age and generally affects women more frequently than men. OA is strongly associated with aging and heavy physical occupational activity. The study was done across five sites in India. The total sample size was 5000 subjects, overall prevalence of knee OA was found to be 28.7%. The associated factors were found to be female gender (prevalence of 31.6%) ( $P = 0.007$ ), obesity ( $P = 0.04$ ), age ( $P = 0.001$ ) and sedentary work ( $P = 0.001$ ) (21).

80% of the Indian population who shows knee and joint pains are suffering from OA. Studies conducted by different research enthusiast in different parts of the country are as follows:

Hakmaosa A *et al.* [22] studied in a population of Assam which shows 43% morbidity out of which 54.1% are female and 26.8% male elderly person suffer from oosteoarthritis. In the western part of the country Maharashtra shows a prevalence of 10.2% OA among which the ratio of female subjects were more i.e. 11.0% and that of male is 7.0% a study depicted by Ganvir SD *et al.* [23].

The prevalence In Delhi [24], Bihar [25], Uttar Pradesh [26], Uttarakhand [27] and West Bengal [28] is 47.3%, 21.2%, 78.27%, 21.2% and 49.8% respectively. All these studies in the recent years show that there is an increase in the prevalence of OA in the elderly population of India and effects mostly the females in comparison.

**Table-2: State wise representation of OA on the basis of sexual distribution**

States	Total prevalence (%)	% OA Female	% OA Male
Assam	43.0	54.1	26.8
Maharashtra	10.2	11.0	7.0
Delhi	47.3	—	—
Bihar	21.5	5.0	16.2
Uttar Pradesh	78.27	—	—
Uttarakhand	21.2	14.0	12.8
West Bengal	49.8	—	—

### Sex ratio in context to arthritis

3/4<sup>th</sup> of the arthritis is suffered by the females due to the involvement of hormones in its etiology. The prevalence of rheumatoid arthritis in India, in adults has been reported to vary from 0.5 to 3.8% in women and from 0.15 to 1.37% in men [6]. 80% of Indian adult who suffer from knee joint pain are diagnosed with OA and this is highly prevalent in females [30]. In terms of psoriasis patients, 67% were men and 33% were women, male to female ratio being 2.03:1. Women had slightly lower mean age of onset (27.6 years) compared to the men (30.9 years) [20]. It was noticed that the ratio in case of psoriatic arthritis turn flip side where the prevalence among male are more than the female. In case of Rheumatoid arthritis approximately 2.5 times more women than men are affected [29].

### Comparison of India with West

The mean age of onset of arthritis in Indian population is late 35 while in the west the average age of onset is late 30s to early 40s [9]. In Europe and North America, main presentation is oligoarticular, where as in India presentation is predominantly polyarticular. The ratio of Female: Male in India is 3:2 and that of West is 3:1. Europe and America reflect highest percentage of OA 9.6% men and 18% women. There is a general concept that Europeans and Americans are more susceptible to the disease and are in severe condition.

**Current treatments**

Current clinical guidelines recommend a combination of small-molecule disease-modifying anti-rheumatic drugs (DMARDs) such as methotrexate as a first-line therapy. Such regimens are effective in easing symptoms but their ability to suppress disease progression and joint destruction is limited for a substantial proportion of patients. The arrival of targeted biologics was a major advance in the treatment of RA, with greater success in disease remission and protection against joint destruction [33]. Biological DMARDs work by blocking the activity of key inflammatory mediators that give rise to the main characteristics of RA. These include inhibitors of tumour necrosis factor (TNF) (a pro-inflammatory cytokine known to mediate most of the joint damage) such as infliximab, adalimumab, etanercept, golimumab and certolizumabpegol [32]. Several other biological

response modifiers include abatacept, which is a fusion protein composed of the Fc region of the immunoglobulin IgG1, linked to the extracellular domain of the checkpoint inhibitor cytotoxic T lymphocyte-associated protein 4 (CTLA4). By dampening T cell co-stimulation, it inhibits the production of inflammatory cytokines such as TNF, interferon- $\gamma$  and interleukin-2 (IL-2). Tocilizumab targets IL-6, a pleiotropic cytokine with a pivotal role in the pathophysiology of RA. These costly biologics are often reserved as later-line agents for patients with an inadequate response to conventional DMARDs. Tofacitinib (Xeljanz; Pfizer) became the first oral small-molecule DMARD to be approved by the FDA in more than a decade in 2012. It is a first-in-class inhibitor of Janus kinase 1 (JAK1) and JAK3, which mediate cytokine signal transduction [31].

**Table-3: List of drugs used for the treatment**

Drug	Developer(s)	Mode of action	Status
JAK Inhibitors			
Baricitinib	Incyte Corp., Eli Lilly	JAK1/2 inhibitor	Pre-registration
Filgotinib	Galapagos NV	JAK 1 inhibitor	Phase II
ABT-494	AbbVie	JAK1/2/3 inhibitor	Phase II
IL-6 inhibitors			
Sarilumab	Sanofi	IL-6R antagonist	Pre-registration
Sirukumab	Centocor, Janssen Biotech	IL-6 inhibitor	Phase III
ALX 0061	Ablynx,AbbVie	IL-6R antagonist	Phase II
Clazakizumab	Alder Biopharmaceuticals	IL-6 inhibitor	Phase II
Others			
Denosumab	Daiichi Sankyo	RANKL inhibitor	Phase III
mavrilimumab	MedImmune	GM-CSF antagonist	Phase II

**CONCLUSION**

India is one of the powerful countries of the world and is the youngest nation with an average age of 24. With highest demographic dividend it is sure that in the next decade Indian youths will be every nooks and corner of the world as the manpower and the work force. With that being said it's noticed that arthritis is one of the disease that attacks the working group of the country and the average age of onset is mid-30s. It is high time that Indians should change their life style and practice healthy habits. It is possible that the younger section of the country may get affected by the disorder and it's noticed that the prevalence is increasing every year. Say it juvenile arthritis, osteoarthritis which is on top affecting the knee joints of the adults and old, or the auto immune rheumatoid arthritis all are affecting the population of the country. The female are prone to most arthritis in terms of ratio but in case of psoriatic arthritis male are more prevalent. The disease conditions affect the moral of the family members and create an environment of disdain and financial crises. The lower socio-economic section of the society suffers the most.

**REFERENCES**

- Boutry N, Morel M, Flipo RM, Demondion X, Cotten A. Early rheumatoid arthritis: a review of MRI and sonographic findings. *American journal of roentgenology*. 2007 Dec;189(6):1502-9.
- Katchamart W, Johnson S, Lin HJ, Phumethum V, Salliot C, Bombardier C. Predictors for remission in rheumatoid arthritis patients: a systematic review. *Arthritis care & research*. 2010 Aug;62(8):1128-43.
- Lee DM, Weinblatt ME. Rheumatoid arthritis. *Lancet*. 2001;358:903-11.
- Kuo CF, Tsai WP, Liou LB. Rare copresent rheumatoid arthritis and gout: comparison with pure rheumatoid arthritis and a literature review. *Clinical rheumatology*. 2008 Feb 1;27(2):231-5.
- Malaviya AN, Kapoor SK, Singh RR, Kumar A, Pande I. Prevalence of rheumatoid arthritis in the adult Indian population. *Rheumatology international*. 1993 Nov 1;13(4):131-4.
- Khanna D, Sethi G, Ahn KS, Pandey MK, Kunnammakkara AB, Sung B, Aggarwal A, Aggarwal BB. Natural products as a gold mine for arthritis treatment. *Current opinion in pharmacology*. 2007 Jun 1;7(3):344-51.



7. McInnes IB, Schett G. Pathogenetic insights from the treatment of rheumatoid arthritis. *The Lancet*. 2017 Jun 10;389(10086):2328-37.
8. Harris Jr ED. Rheumatoid arthritis: pathophysiology and implications for therapy. *New England Journal of Medicine*. 1990 May 3;322(18):1277-89.
9. Akhter E, Bilal S, Haque U. Prevalence of arthritis in India and Pakistan: a review. *Rheumatology international*. 2011 Jul 1;31(7):849-55.
10. Pasma A, van Spijker A, Hazes JMW, Busschbach, Luime JJ. Factors associated with adherence to pharmaceutical treatment for rheumatoid arthritis patients: A systematic review. *Semin Arthritis Rheum*. 2013;43:18-28.
11. Aggarwal A, Misra R. Juvenile chronic arthritis in India: is it different from that seen in Western countries?. *Rheumatology international*. 1994 Aug 1;14(2):53-6.
12. Gare BA. Juvenile arthritis—who gets it, where and when? A review of current data on incidence and prevalence. *Clin Exp Rheumatol*. 1999 May 1;17(3):367-74.
13. Kumar S. Need for determining the incidence and prevalence of JIA in developing countries: the Indian predicament. *Rheumatology*. 2010 Mar 31;49(8):1598-9.
14. Kar N. A short communication on occurrence of rheumatic diseases attending hospital. *Indian journal of public health*. 1994;38(3):115-8.
15. Chopra A, Patil J, Billempelly V, Relwani J, Tandle HS. Prevalence of rheumatic diseases in a rural population in western India: a WHO-ILAR COPCORD Study. *The Journal of the Association of Physicians of India*. 2001 Feb;49:240-6.
16. Chandrasekaran AN, Radhakrishna B. Rheumatoid arthritis and connective tissue disorders: India and South-East Asia. *Bailliere's clinical rheumatology*. 1995 Feb 1;9(1):45-57.
17. Okhandiar RP, Banerjee BN. Psoriasis in the Tropics: An Epidemiological Survey. *Journal of the Indian Medical Association*. 1963 Dec 1;41:550.
18. Shenoj SD, Prabhu S. Role of cultural factors in the biopsychosocial model of psychosomatic skin diseases: an Indian perspective. *Clinics in dermatology*. 2013 Jan 1;31(1):62-5.
19. Bedi TR. Clinical profile of psoriasis in North India. *Indian Journal of Dermatology, Venereology, and Leprology*. 1995 Jul 1;61(4):202.
20. Dogra S, Yadav S. Psoriasis in India: Prevalence and pattern. *Indian Journal of Dermatology, Venereology, and Leprology*. 2010 Nov 1;76(6):595.
21. Pal CP, Singh P, Chaturvedi S, Pruthi KK, Vij A. Epidemiology of knee osteoarthritis in India and related factors. *Indian journal of orthopaedics*. 2016 Sep;50(5):518.
22. Hakmaosa A, Baruah KK, Hajong S. A community based cross sectional study on morbidity pattern of elderly in Rani block, Kamrup (rural) district, Assam. *Indian Journal of Basic and Applied Medical Research*. 2014;3(4):72-9.
23. Ganvir SD, Zambare BR. Prevalence and identification of risk factors for knee osteoarthritis among elderly men and women. *Sch J Appl Med Sci*. 2013;1(6):700-3.
24. Salve H, Gupta V, Palanivel C, Yadav K, Singh B. Prevalence of knee osteoarthritis amongst perimenopausal women in an urban resettlement colony in South Delhi. *Indian journal of public health*. 2010 Jul 1;54(3):155.
25. Barman SK, Lata K, Ram R, Ghosh N, Sarker G, Shahnawaz K. A study of morbidity profile of geriatric population in an urban community of Kishanganj, Bihar, India. *Global Journal of Medicine and Public Health*. GJMEDPH. 2014;3:1.
26. Sood A, Sood A. Prevalence of Knee Osteoarthritis in Elderly Persons in a District Of Central Uttar Pradesh: A Cross Sectional Study. *Physreva*. 2015;32:428-9.
27. VS J, VD M, Gaikwad AV, Doibale MK, Kulkarni AP. A study of morbidity profile of geriatric population in the field practice area of rural health training centre, Paithan of Govt. Medical College, Aurangabad.
28. Manda PK, Debadatta C, Nirmalya M, Sarmila M, Chitra C. Disability among geriatric females: an uncared agenda in rural India. *Sudanese Journal of Public Health*. 2009;4(4):376-82.
29. Rubbert-Roth A, Finckh A. Treatment options in patients with rheumatoid arthritis failing initial TNF inhibitor therapy: a critical review. *Arthritis research & therapy*. 2009 Apr;11(1):S1.
30. ASPECT AE. Chandra Shekhar Azad1. Alok Kumar Singh1., Poorti Pandey1., Manish Singh2., Pritee Chaudhary1., Neelam Tia1., Amit Rastogi3 and Indrajeet Singh Gambhir1.
31. American College of Rheumatology Subcommittee on Rheumatoid Arthritis Guidelines. Guidelines for the management of rheumatoid arthritis: 2002 update. *Arthritis & Rheumatism*. 2002 Feb;46(2):328-46.
32. Nesbitt AM, Stephens S, Chartash EK. Certolizumab pegol: a PEGylated anti-tumour necrosis factor alpha biological agent. In *PEGylated Protein Drugs: Basic Science and Clinical Applications*. 2009:229-254. Birkhäuser Basel.
33. <https://www.rheumatology.org/> (accessed 28 May 2019).