International Journal of Rheumatic Diseases

WILEY

International Journal of Rheumatic Diseases

ORIGINAL ARTICLE

Burden of Musculoskeletal (MSK) Pain and Arthritis in India: A Community Oriented Program for Control of Rheumatic Diseases (COPCORD—Bone and Joint Decade (BJD)) India Project

Arvind Chopra[1] | Ashish Jacob Mathew[2] | Rohini Handa[3] | Ghorpade Ravi Parshuram[1] | Sarmukaddam Sanjeev[1] | Vaijayanti Lagu-Joshi[1] | Liyakat Gauri[4] | Rahim Asma[5] | Binoy Paul[5] | Datta Kumar[6] | Sarvajeet Pal[6] | Chaturvedi Sarika[7] | Thakuria Bhaskar[8] | Annil Mahajan[9] | Romi Singh[10] | Alakendu Ghosh[11] | Kumar Tapas[11] | C. P. Rajendran[12] | Anuradha Venugopalan[1] | Manjit Saluja[1] | K. Mahendranath[13]

[1]Center for Rheumatic Diseases, Pune, India | [2]Christian Medical College, Vellore, India | [3]All India Institute of Medical Sciences, New Delhi, India | [4]SP Medical College, Bikaner, India | [5]Calicut Medical College, Calicut, India | [6]Advance Rheumatology Clinic, Hyderabad, India | [7]D Y Patil Medical College Hospital and Research Centre, Pune, India | [8]Guwahati Medical College and Hospital, Guwahati, India | [9]Government Medical College, Jammu, India | [10]Regional Institute of Medical Sciences, Imphal, Manipur, India | [11]Institute of Post Graduate Medical Education and Research, Kolkata, India | [12]Madras Medical College, Chennai, India | [13]Rheumatology Clinic, Bangalore, India

Correspondence: Arvind Chopra (crdp5624@gmail.com; arvindchopra60@hotmail.com)

Received: 30 November 2024 | **Revised:** 23 January 2025 | **Accepted:** 25 February 2025

Funding: Funded by the Bone and Joint Decade India National Action Network and Arthritis Research and Care Foundation-Center for Rheumatic Diseases, Pune, India.

Keywords: arthritis | community medicine | COPCORD | disease burden | epidemiology | India | musculoskeletal pain

ABSTRACT

Background: Several countries have participated in WHO COPCORD. The Global Disease Burden program (GBD) reports selected MSK disorders. We used a COPCORD India protocol to estimate the national burden of MSK disorders.

Materials and Methods: Trained paramedics used standard questionnaires to screen the population and identify respondents with current and/or past MSK pain (non-traumatic) in 12 survey sites (8 rural); cross-sectional design and prospective data. Several standard measures were recorded; MSK pain was self-reported (on human manikin). The site rheumatologist examined each respondent and provided a clinical diagnosis. Pooled data (anonymized) from all sites was analyzed using standard statistical software. Standardized point prevalence rates (adjusted to Indian Census) and odds ratios (risk factors) were calculated: 95% confidence intervals in parentheses.

Results: 56 548 population (60% rural, response rate > 70%) was screened; 10 273 respondents (18%, 65% women). The prevalence of MSK pain was 16.14 (14.2, 18.3) and higher in the rural population (20% vs. 10.3%); rheumatoid arthritis 0.34%, undifferentiated inflammatory arthritis 0.22%, spondyloarthritis 0.23%, osteoarthritis 4.39%, Gout 0.05%, chikungunya arthritis 1.2%. Non-specific arthralgias, soft tissue pains, and degenerative arthritis were dominant disorders; 12% of respondents reported inflammatory arthritis. Significant risk factors associated with MSK pain included female gender, poor literacy, non-vegetarian diet, chronic non-MSK illness, past trauma, and tobacco use. Limitations included non-random

Abbreviations: AS, ankylosing spondylitis; CCQ, COPCORD core questionnaire; CDD, crystal deposition disorder; CI, confidence interval; CTD, connective tissue disorder; DALY, disability adjusted life years; GBD, global burden of disease; IA-U, undifferentiated inflammatory arthritis; IDS, ill-defined aches and pains; JIA, juvenile idiopathic arthritis; MCTD, mixed connective tissue disorder; MSK, musculoskeletal; OA, osteoarthritis; OIA, other inflammatory arthritis; OR, odds ratio; PCAR, post-Chikungunya arthritis and rheumatism; PGOA, primary generalized osteoarthritis; PsA, psoriatic arthritis; RA, rheumatoid arthritis; SLE, systemic lupus erythematosus; SpA, spondyloarthritis; SR, symptom related diagnosis; STR, soft tissue rheumatism.

selection, clinical diagnosis, and limited investigations. However, in comparison to GBD, the COPCORD outcome seemed all-inclusive and clinically meaningful.

Conclusion: The high prevalence of MSK pain and arthritis indicates a huge disease burden in India and prioritizes the need for a national control program.

1 | Introduction

Musculoskeletal (MSK) pain and arthritis contributed to 5.9% of the global DALY (Disability adjusted life years) burden and were a leading cause of disability and impaired quality of life [1]. The MSK disease burden increased several fold during the period 1990–2019 [2]. The contribution of arthritis to mortality remained underestimated. Non-communicable diseases (NCD) were increasingly recognized, but MSK pain and arthritis remained neglected in India and the developing World [3–6].

The WHO and International League of Associations for Rheumatology (ILAR) launched a community-oriented program for the control of rheumatic diseases (COPCORD) in Jan 1981. It was focused on MSK pain, disability, and arthritis in developing economies [3]. COPCORD had three stages: population survey (Stage I), health education and risk factors (Stage II), and prevention and control strategies (Stage III). The program encouraged optimum utilization of local resources and a clinical approach to diagnosis [3] Several countries in the Asia Pacific, Latin America, and Africa completed COPCORD surveys [5].

The maiden India COPCORD was carried out in village Bhigwan (district Pune) in 1996 and continued to date [6, 7]. The Bhigwan survey unraveled a huge burden of MSK pain and arthritis, and the data was used by the WHO to project RA and OA in Southeast Asia [6, 8]. This prompted an unmet need to assess MSK pain and arthritis in the Indian population. Further impetus was provided by the global Bone and Joint Decade program 2000–2010 (BJD) in India [9]. The previously validated COPCORD India Bhigwan model was used in the current study to carry out surveys at predetermined sites with a uniform protocol (Figure 1). Some of these surveys were published and contributed data to the Global Burden of Disease (GBD) India project (2015) [4, 10–12].

In this report, we present standardized prevalence rates of MSK pain and arthritis in the Indian population. Some important risk factors are also described. We also present a brief overview of the comparison between the current study and other selected COPCORD surveys (India and global) and also highlight some important features of non-COPCORD surveys (European) and the WHO-Global Burden Disease (GBD) project.

2 | Materials and Methods

2.1 | Study Design

This was an observational study with a cross-sectional design and prospective data. There were multiple study sites (8 rural and 4 urban, Figure 1) selected in a non-random manner. The project was completed during the period 2006–2013.

The COPCORD India Bhigwan model (1996) suitable for the Indian situation, was used [6, 10]. It contained the standard COPCORD Core Questionnaire (CCQ) (Stage I survey) which is enclosed (Data S1) [5]. Each site survey was carried out in 3 concurrent phases: screening the population to identify respondents (Phase 1), self-reported MSK pain, joint swelling, and function, and other relevant data (Phase 2), and clinical evaluation (Phase 3).

Although a formal approval was not required, the principal investigator (PI) at each site presented a project overview and protocol to the local ethics committee and administration prior to beginning the survey. Salient aspects, including the use of coded (anonymous) individual data, were orally explained to each study participant.

2.2 | Survey Sites

The local site PI was responsible for the selection of the site. Some important considerations were a well-defined geographical area, a non-migrant population of about 4–5000 residents, local support (administration and public) and easy road access.

Figure 1 shows the sites and screened population sample size. The urban sites were in the metropolis cities of Pune, Jammu, Chennai and Bikaner. The rural/village sites were Naora-Pargana (Kolkata), Atal-Ballabgarh (Delhi), Kanniparamba-Cheruppa (Calicut), Ottoor-Varkala (Thiruvananthapuram), Kandakur-Rangareddy (Hyderabad), Keinou-Bishnupur (Manipur), Ralegan-Siddhi (Ahmednagar) and Sarpara-Mirza (Guwahati); henceforth referred by the district shown in parenthesis.

2.3 | Participants

The primary inclusion criteria for the Phase 1 population screen were (i) adults aged > 16 years and (ii) bona fide residence in the study site. Exclusions were children, non-resident (site) individuals, and those with migrant/temporary residence.

2.4 | Study Site Team

A dedicated rheumatologist (PI or co-PI) was identified a priori for each survey site. Other members included physician assistants, paramedics (including trained voluntary subjects from the local population), nurses, laboratory technicians, and medical social workers.

Summary

- Musculoskeletal pain (MSK) is a common ailment in a community and can infrequently lead to a moderate to severe impact on daily life.
- Important causes of MSK pain are non-specific arthralgias, soft tissue rheumatism, osteoarthritis, and inflammatory arthritis.
- Some important risk factors that can be controlled and prevented are tobacco use, nature of work, lack of education, and other chronic concurrent illnesses.

2.5 | Respondents

The primary screening question in Phase 1 was 'Have you suffered from pain/swelling/stiffness in the joints or musculoskeletal soft tissues within the last 7 days (current) or sometime in the past?' Participants answering affirmatively were classified as respondents (Phases 2 and 3) [5, 6, 10].

3 | Procedures

3.1 | Training

Study paramedics, physicians, and rheumatologists attended pre-survey training workshops to standardize survey procedures. Rheumatologists discussed the suitable application of standard diagnostic and standardized a clinical approaches for diagnosis based on the earlier Bhigwan experience [5, 6, 13].

3.2 | Survey

The population was systematically screened and monitored. Trained paramedics supervised Phase 1 and Phase 2 surveys. Although self-reported, they provided suitable guidance and assistance to the participants. They also arranged and coordinated the medical examination of respondents by the assistant physicians and rheumatologists in an easy-to-access facility in a central location (Phase 3). Home visits were made to examine subjects with severe disabilities. After three failed attempts (spread over 4 weeks) to contact and screen, the residents/respondents were declared non-respondent.

3.3 | Documents

Standard paper COPCORD India questionnaires (suitably translated) and rheumatology case record forms were used (Appendix 1: Data S1).

The Phase 1 questionnaire included the primary screening question (see above) and the recording of demographics and other health information especially relevant to expected risk factors and self-reported co-morbidity (e.g., diabetes). In Phase 2 questionnaire, respondents recorded their pain sites on a human mannequin and completed a validated India version of the modified Stanford Health Assessment Questionnaire (HAQ) for functional assessment (data not shown) [7]. The case record form (Phase 3) included a standard format for joint examination (68 joints as recommended by the ACR), spine, and soft tissues.

3.4 | Diagnosis and Classification

The diagnosis was essentially clinical. Several apparently non-distinct symptom-based entities, such as non-specific arthralgias (NSA), ill-defined symptoms (IDS), and soft tissue rheumatism (STR) were diagnosed/classified according to the earlier COPCORD Bhigwan experience [5, 6, 8].

3.5 | Statistics and Data

The minimum population of 4000 (non-random sampling) at each site was recommended to be screened and assessed (MSK pain and arthritis) in 24 weeks. A population sample size of 51 741 subjects was finally used to calculate prevalence. Phase 3 data from the Chennai site was disqualified because of the low response (36%) rate in Phase 2 evaluation (respondents).

A central electronic database (CRD, Pune) was used to enter data from each site after comprehensive manual checks. An independent senior DEO and COPCORD investigators (RG, AV, MS) carried out random checks of the electronic database for correctness and consistency. The database program was indigenously designed and created using certified original software programs (Microsoft Visual Basic platform 2004) and had inbuilt checks to identify errors.

Each site data was standardized (direct) for age-gender using India census 2001 [14]. The adjusted data was aggregated (and pooled) into a single master MS Excel file. In the case of an overlap/multiple diagnosis, each diagnosis was counted as a separate entity (prevalence data). Anonymized individual participant data was used for analysis. The final analysis was carried out by a senior biostatistician (SS) and COPCORD investigators (RG, AV).

Both crude and adjusted point prevalence rates (percentage, 95% confidence interval/CI, shown in parenthesis) are shown in the current report. The prevalence was calculated using an exact binomial method (Epi Info 6 version 6.04d -January 2001, Stat Software).

Standard odds ratio (univariate) was shown for the risk factors; data mined from completed Phase 1 questionnaires. Chronic illness (risk factor) included diabetes, hypertension, ischemic heart disease, and stroke. Multivariable logistic regressions were carried out to identify predictors of MSK pain.

Standard statistical software package was used; significant $p < 0.05$, two-tailed.

Check lists showing compliance with the standard STROBE and GATHER statements are enclosed in the Data S1.

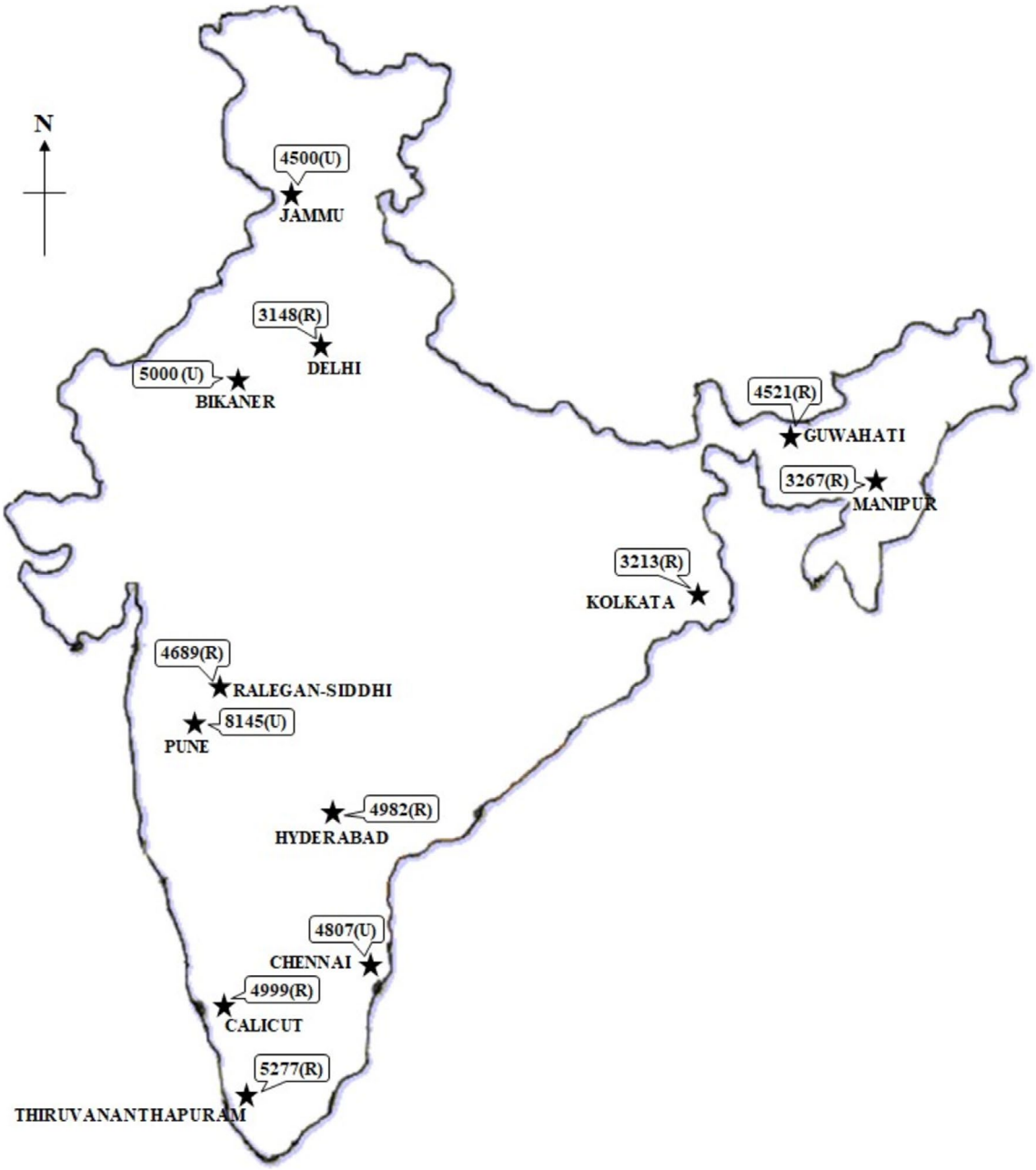

FIGURE 1 | Individual study sites and sample size (Survey Population $N = 56\,548$) in All India COPCORD Survey. R, rural; U, urban.

4 | Results

56 548 population (60% rural, response rate > 70%) was screened (Phase 1). 10 273 respondents with non-traumatic MSK pain (18%, 65% women) were identified; 26.9% urban and 73.1% rural. The site sample size varied from 3148 (Delhi rural) to 8145 (Pune urban; Figure 1).

A minimum of 74% response in Phase 1 and 71% response in Phases 2 and 3 was achieved at each qualified site.

The distribution of age seemed matched with that of the Indian census 2001; the dominant age group was 25–44 years in both populations, but the proportion of 65+ was higher (Figure S1). The median age of the India population sample was 37 years (range 16–103 years) and that of the respondents was 48 years (range 16–100 years; Table S1).

Table 1 shows the gender distribution of the participants and respondents (Phase 1 and 2). There were more women amongst the respondents with 66.6% and 64.5%, respectively, in urban and rural populations.

The adjusted prevalence of MSK pain in the current India population sample was 16.14 (14.2–18.3) respectively (Table 1). The rate was higher in the rural population (20.04% vs. 10.34%), highest in rural Calicut (25.91%) and least in urban Bikaner (6.40%). The frequency of MSK pain sites (human manikin, Phase 2) is shown in Figure S2. The three most frequent pain sites were knees, low back, and ankle-foot in urban and rural

TABLE 1 | COPCORD Stage I, Phases 1 and 2- Distribution of number and frequency (percent) of study subjects reporting musculoskeletal pain at individual sites, in urban and rural areas and all India; Crude and Adjusted point prevalence of MSK pain (95% confidence interval) at each study site shown.

	Phase-1					Phase-2					MSK pain	
	Male		Female		Total	Male		Female		Total		
Site	*n*	%	*n*	%	*n*	*n*	%	*n*	%	*n*	Crude prevalence % (95% CI)	Adjusted prevalence % (95% CI)*
Urban												
Bikaner ($N=5000$)	2551	51.0	2449	49.0	5000	103	28.9	253	71.1	356	7.12 (6.42–7.87)	6.40 (5.10–7.85)
Chennai ($N=4807$)	2377	49.4	2430	50.6	4807	235	31.8	505	68.2	740	15.39 (14.38–15.45)	14.95 (13.02–16.98)
Jammu ($N=4500$)	2460	54.7	2040	45.3	4500	183	35.1	339	64.9	522	11.60 (10.68–12.57)	12.24 (10.53–14.19)
Pune ($N=8145$)	4010	49.2	4135	50.8	8145	403	35.0	749	65.0	1152	14.14 (13.39–14.92)	11.15 (9.52–13.04)
Rural												
Calicut ($N=4999$)	2467	49.3	2532	50.7	4999	560	38.0	915	62.0	1475	29.51 (28.24–30.79)	25.91 (23.58–28.44)
Delhi ($N=3148$)	1780	56.5	1368	43.5	3148	210	37.1	356	62.9	566	17.98 (16.65–19.37)	20.65 (18.49–22.99)
Guwahati ($N=4521$)	2325	51.4	2196	48.6	4521	101	21.6	366	78.4	467	10.33 (9.46–11.25)	10.23 (8·65–12.04)
Hyderabad ($N=4982$)	2711	54.4	2271	45.6	4982	391	56.0	307	44.0	698	14.01 (13.06–15.01)	13.33 (11.55–15.35)
Kolkata ($N=3213$)	1538	47.9	1675	52.1	3213	288	37.4	482	62.6	770	23.97 (22.50–25.48)	23.40 (21.10–25.80)
Manipur ($N=3267$)	1584	48.5	1683	51.5	3267	266	37.8	438	62.2	704	21.55 (20.15–23.00)	20.44 (18.26–22.74)
Ralegan-Siddhi ($N=5000$)	2221	47.4	2468	52.6	4689	399	32.4	834	67.6	1233	26.30 (25.03–27.58)	22.21 (19.98–24.59)
Thiruvananthapuram ($N=5277$)	2188	41.5	3089	58.5	5277	449	28.2	1141	71.8	1590	30.13 (28.89–31.39)	23.60 (21.32–26.04)
Urban total ($N=22452$)	11398	50.8	11054	49.2	22452	924	33.4	1846	66.6	2770	12.34 (11.91–12.77)	10.34 (8.79–12.07)
Rural total ($N=34096$)	16814	49.3	17282	50.7	34096	2664	35.5	4839	64.5	7503	22.01 (21.61–22.44)	20.04 (17.86–22.37)
Total (All India; $N=56548$)	28212	49.9	28336	50.1	56548	3588	34.9	6685	65.1	10273	18.17 (17.85–18.49)	16.14 (14.19–18.29)

*$p < 0.05$, 2-tailed.

TABLE 2 | COPCORD Stage I, Phases 1 and 2- Distribution of crude and adjusted point prevalence (95% CI) of rheumatic disorders at each study site.

	RA		IA-U		SpA		OA		STR		Back pain	
Site	Crude% (95% CI)	Adjusted* % (95% CI)	Crude% (95% CI)	Adjusted* % (95% CI)	Crude% (95% CI)	Adjusted* % (95% CI)	Crude% (95% CI)	Adjusted* % (95% CI)	Crude% (95% CI)	Adjusted* % (95% CI)	Crude% (95% CI)	Adjusted* % (95% CI)
Urban												
Bikaner	0.82 (0.59–1.11)	0.72 (0.32–1.32)	0.24 (0.12–0.42)	0.25 (0.05–0.68)	NIL	NIL	4.72 (4.15–5.34)	4.17 (3.17–5.43)	0.20 (0.10–0.37)	0.18 (0.02–0.56)	3.60 (3.10–4.15)	3.23 (2.36–4.39)
Jammu	0.31 (0.17–0.52)	0.32 (0.08–0.79)	NIL	NIL	0.04 (0.00–0.16)	0.04 (0.00–0.43)	4.89 (4.28–5.56)	5.41 (4.26–6.82)	0.62 (0.41–0.90)	0.62 (0.27–1.22)	3.80 (3.26–4.40)	3.88 (2.90–5.09)
Pune	0.45 (0.32–0.63)	0.32 (0.24–0.40)	0.37 (0.25–0.53)	0.32 (0.25–0.41)	0.27 (0.17–0.41)	0.27 (0.20–0.35)	6.46 (5.93–7.01)	4.01 (3.74–4.29)	1.30 (1.07–1.57)	1.20 (1.05–1.36)	6.41 (5.89–6.96)	5.19 (4.06–6.56)
Rural												
Calicut	0.20 (0.10–0.37)	0.16 (0.02–0.56)	0.02 (0.00–0.11)	0.02 (0.01–0.03)	0.62 (0.42–0.88)	0.54 (0.22–1.12)	4.48 (3.92–5.09)	3.55 (2.63–4·74)	2.44 (2.03–2.91)	2.14 (1.45–3.13)	6.22 (5.57–6.93)	5.64 (4.47–7.08)
Delhi	0.16 (0.05–0.37)	0.18 (0.02–0.56)	0.13 (0.03–0.33)	0.14 (0.02–0.56)	0.03 (0.00–0.18)	0.03 (0.02–0.04)	9.40 (8.41–10.48)	11.23 (9.59–13.12)	0.25 (0.11–0.50)	0.27 (0.05–0.68)	11.05 (9.98–12.20)	12.75 (10.97–14.69)
Guwahati	0.38 (0.22–0.60)	0.38 (0.13–0.90)	0.22 (0.11–0.41)	0.22 (0.05–0.68)	0.18 (0.08–0.35)	0.17 (0.02–0.56)	2.52 (2.08–3.02)	2.51 (1.71–3.49)	0.73 (0.50–1.02)	0.72 (0.32–1.32)	2.81 (2.35–3.33)	2.78 (1.97–3.85)
Hyderabad	0.32 (0.18–0.52)	0.29 (0.08–0.79)	0.18 (0.08–0.34)	0.16 (0.02–0-56)	0.06 (0.01–0.18)	0.04 (0.03–0.05)	4.38 (3.82–4.98)	3.63 (2.70–4.83)	1.04 (0.78–1.37)	0.94 (0.48–1.62)	0.12 (0.04–0.26)	0.09 (0.00–0.43)
Kolkata	0.40 (0.22–0.69)	0.40 (0.37–0.44)	0.03 (0.00–0.17)	0.03 (0.03–0.05)	0.56 (0.33–0.88)	0.53 (0.22–1.12)	5.23 (4.48–6.06)	5.24 (4.06–6.56)	3.49 (2.88–4.18)	3.37 (2.43–4.47)	7.03 (6.17–7.97)	6.87 (5.52–8.36)
Manipur	0.21 (0.09–0.44)	0.22 (0.05–0.68)	0.15 (0.05–0.36)	0.15 (0.02–0.56)	0.09 (0.02–0.27)	0.10 (0.00–0.43)	3.31 (2.72–3.98)	3.02 (2.16–4.12)	1.81 (1.38–2.32)	1.72 (1.07–2.58)	12.40 (11.29–13.58)	11.74 (10.02–16.62)

(Continues)

TABLE 2 | (Continued)

Site	RA		IA-U		SpA		OA		STR		Back pain	
	Crude% (95% CI)	Adjusted* % (95% CI)	Crude% (95% CI)	Adjusted* % (95% CI)	Crude% (95% CI)	Adjusted* % (95% CI)	Crude% (95% CI)	Adjusted* % (95% CI)	Crude% (95% CI)	Adjusted* % (95% CI)	Crude% (95% CI)	Adjusted* % (95% CI)
Ralegan-Siddhi	0.30 (0.16–0.50)	0.25 (0.04–0.68)	0.87 (0.63–1.18)	0.72 (0.32–1.32)	0.34 (0.19–0.55)	0.32 (0.08–0.79)	7.25 (6.52–8.03)	4.65 (3.58–5.96)	0.62 (0.41–0.89)	0.60 (0.27–1.22)	17.72 (16.64–18.85)	15.53 (13.60–17.64)
Thiruvananthapuram	0.45 (0.29–0.68)	0.38 (0.13–0.90)	0.27 (0.15–0.44)	0.19 (0.02–0.56)	0.40 (0.25–0.61)	0.47 (0.17–1.01)	7.88 (7.17–8.64)	4.96 (3.85–6.31)	4.30 (3.77–4.88)	3.43 (2.49–4.56)	14.06 (13.13–15.03)	11.16 (9.52–13.04)
Urban total	0.52 (0.42–0.64)	0.42 (0.01–0.94)	0.24 (0.17–0.32)	0.22 (0.04–0.63)	0.14 (0.09–0.20)	0.12 (0.02–0.52)	5.57 (5.23–5.91)	3.83 (2.89–4.99)	0.82 (0.69–0.96)	0·72 (0.35–1.33)	4.30 (4.04–4.57)	3.67 (2.76–4.82)
Rural total	0.31 (0.25–0.38)	0.29 (0.09–0.82)	0.25 (0.20–0.31)	0.22 (0.05–0.70)	0.30 (0.24–0.36)	0.28 (0.09–0.82)	5.53 (5.29–5.77)	4.66 (3.54–5.95)	1.88 (1.74–2.03)	1.75 (1.10–2.65)	8.79 (8.49–9.09)	7.97 (6.55–9.63)
Total (All India)	0.38 (0.30–0.44)	0.34 (0.08–0.79)	0.25 (0.20–0.29)	0.22 (0.05–0.68)	0.24 (0.20–0.28)	0.23 (0.05–0.68)	5.54 (5.34–5.74)	4.39 (3.30–5.61)	1.52 (1.42–1.63)	1.39 (0.83–2.20)	7.00 (6.80–7.22)	6.23 (4.95–7.67)

*$p < 0.05$, 2-tailed.

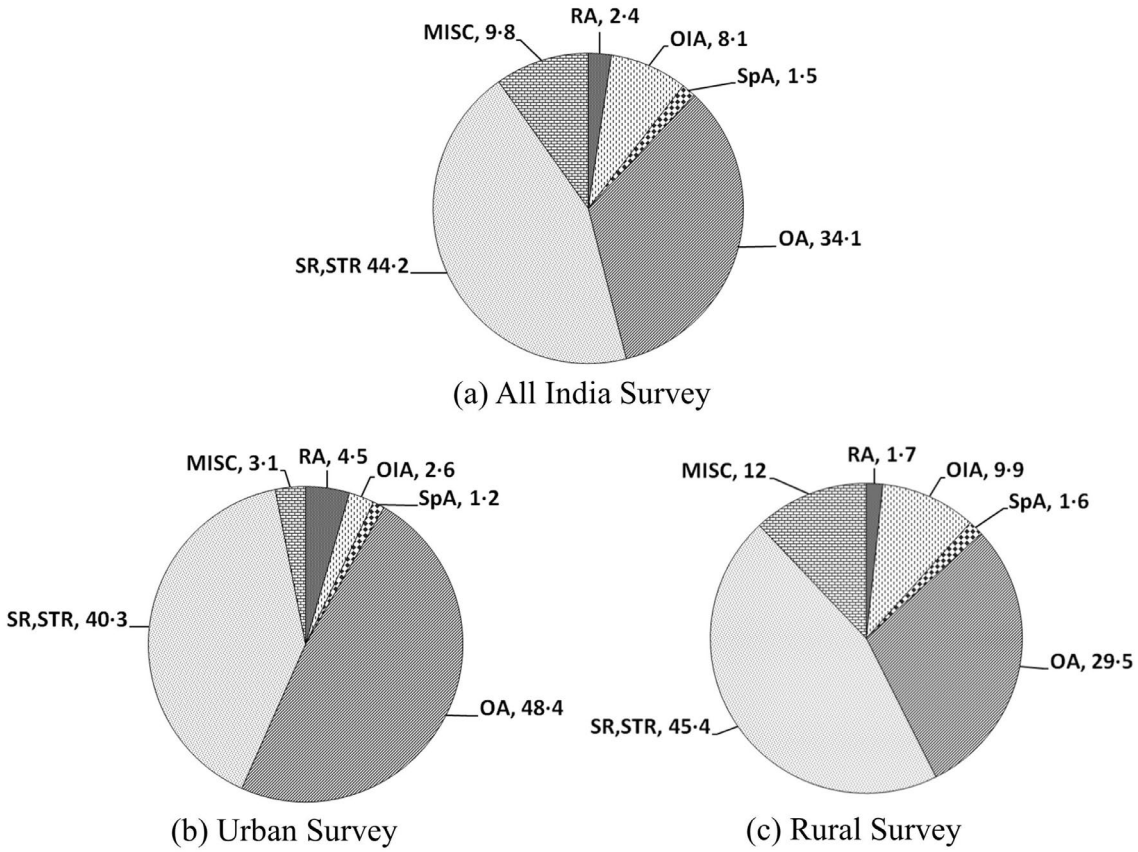

FIGURE 2 | Distribution of broadly classified musculoskeletal and rheumatic disorder in the study cohort: All India, Rural and Urban survey. Misc, miscellaneous; OA, osteoarthritis; OIA, other inflammatory arthritis; RA, rheumatoid arthritis; SpA, spondyloarthritis; SR, symptom related; STR, soft tissue rheumatism.

populations. The adjusted prevalence of back pain (any site; Table 2) was 6.23 (4.95–7.67); higher in the rural population (7.97 vs. 3.67).

4.1 | Phase 3

Figure 2 shows the proportion (percent) of broadly classified diagnosis categories. The pattern was comparable in rural and urban populations. Ill-defined SR disorders/STR were the predominant group (44.2%): urban 40.3%, rural 45.4%. OA was classified in 34.1% of subjects (urban 48.4%, rural 29.5%). Inflammatory arthritis (RA, SpA, OIA) was classified in 12% of subjects (urban 8.3%, rural 13.2%).

A detailed breakup of OIA and the miscellaneous groups (Figure 2) was shown (Table S2). The latter included a large proportion of undifferentiated forms of inflammatory arthritis and which was several fold higher in the rural population. A substantial proportion of post-Chikungunya arthritis (Calicut and Thiruvanthapuram survey sites) was also included.

Table 2 shows the prevalence of rheumatic disorders. The adjusted prevalence was RA 0.34% (0.08–0.79), IA-U 0.22% (0.05–0.68), SpA 0.23% (0.05–0.68), OA 4.39% (3.30–5.61) and STR 1.39% (0.83–2.20); prevalence of OA Knees was 3.34% (2.43–4.47).

The adjusted prevalence of RA varied from 0.16% in rural Calicut to 0.72% in urban Bikaner; 0.42% in the urban and 0.29% in the rural population. 60.9% of RA cases were seropositive for rheumatoid factor (Rural 50%, Urban 68.5%). The male: female ratio was 1:5. The adjusted prevalence (per 100 000 population) of RA in women was 263, 967, and 826, respectively, in the age bands 16–34, 35–54, and 55 years plus; in the age band 25–44 years, the prevalence was 714 in rural and 640 in urban India.

The adjusted prevalence of SpA varied from 0.03% in rural Delhi to 0.54% in rural Calicut.

The adjusted prevalence of OA varied widely from 2.51% in rural Guwahati to 11.23% in rural Delhi: 3.82% urban and 4.66% rural population.

A high prevalence of STR was shown in the rural sites in Kolkata (3.37%), Calicut (2.14%) and Thiruvananthapuram (3.43%).

The adjusted point prevalence of several other MSK disorders is shown in Table S3—gout 0.05% (0.04–0.07), AS 0.03% (0.02–0.05), and PsA 0.01% (0.00–0.02).

4.2 | Risk Factors

Table 3 shows the odds ratio (OR) of the selected risk factors of MSK pain in a univariate and Multiple logistic regression

TABLE 3 | Risk factor analysis of MSK pain using selected variable.

Risk factor variable	Respondent with exposure %	Non respondent with exposure %	Univariate analysis	Multivariate logistic regression	
			OR (95% CI)	OR (95% CI)	Role of the 'predictor'
Age	—	—	—	1.03 (1.03, 1.03)*	Risk
Female gender	63.1	47.0	1.93 (1.85, 2.01)	2.12 (2.00, 2.24)*	Risk
Literacy	73.8	83.4	0.56 (0.53, 0.59)	1.05 (0.98, 1.13)	—
Non-Vegetarian Diet	72.5	65.7	1.38 (1.31, 1.45)	1.14 (1.33, 1.50)*	Risk
Farm work	23.5	16.4	1.56 (1.46, 1.67)	—	—
Heavy nature of work	17.5	16.2	1.10 (1.03, 1.17)	1.01 (0.93, 1.09)	—
Chronic-illness (HTN, Diabetes, Heart, Paralysis)	16.8	9.7	1.87 (1.73, 2.02)	1.91 (1.73, 2.10)*	Risk
Trauma	6.4	1.8	3.77 (3.16, 4.49)	—	Risk
Alcohol-ever	6.7	7.1	0.94 (0.86, 1.02)	0.85 (0.76, 0.95)*	Protective
Tobacco any form-ever	25.1	18.0	1.53 (1.45, 1.61)	1.34 (1.23, 1.42)*	Risk

*Significant $p < 0.05$.

analysis. Female gender, poor literacy (unable to read and write), heavy work, chronic non-MSK illnesses (diabetes, hypertension, ischemic heart disease and stroke), past trauma, and tobacco use were significant adverse risk factors; vegetarian diet and alcohol seemed protective. Some form of tobacco was used by 19.5% of the study population and 25.1% of MSK respondents, as described in Table S4. The highest OR (4.33, 95% CI 3.42–5.48) of tobacco use was among urban women respondents; correspondingly, urban men respondents had 2.61, rural men population 1.77, and rural women population 1.48.

5 | Discussion

The current multisite COPCORD India survey (Figure 1) of 56 548 population sample showed a strikingly high point prevalence (Tables 1 and 2, Figure 2) of MSK pain and arthritis. Non-specific MSK pains (NSA and STR) and OA were the most common disorders in the community. Twelve percent of respondents suffered from RA and other inflammatory arthritis including Post Chikungunya arthritis and rheumatism (PCAR). Several preventable/modifiable risk factors such as tobacco use, poor literacy, heavy manual work, and certain chronic diseases (e.g., diabetes, hypertension) were identified.

Based on the current study, prevalence rates and the last India census in 2010 (1.2 billion 195.29 million people (127.13 million women) or roughly one-sixth of the India population suffer from MSK pain and several million from various arthritis (Table 2)—4.22 million RA, 54.44 million OA, and 17.24 million STR. Notably, even low prevalence rates (e.g., gout and AS) in the current study would mean a relatively large disease burden. The new India census (delayed by the COVID pandemic) has not yet begun.

COPCORD was designed as a 'total study of the population' and meant to reveal 'any hidden reservoir of rheumatic complaints' [3]. Towards this end, COPCORD surveys have served well but remain unrecognized (Table 4) [6, 10–12, 15–38]. In addition to specific disorders COPCORD India surveys have consistently demonstrated a huge burden of non-specific MSK soft tissue and joint pains and IA-U.

Chronic MSK pain was estimated to affect 20%–33% of the global population [39]. MSK pain in the current study was assessed in a sizable population sample (non-random) at each study site. This was a challenging task, and MSK pain was likely to be confounded by several factors, including individual perceptions and recall bias [40, 41]. We used experienced and validated COPCORD methods [5, 6, 10]. MSK pain was the dominant self-reported ailment in the community in the current study as compared to other ailments (data not shown) and was similar to earlier COPCORD India surveys [6, 10, 11]. Non-specific MSK pain (and STR) also impacted function (as measured by the Health Assessment Questionnaire) adversely [6, 10, 11]. In our long-drawn experience (COPCORD and community practice), MSK pain was mostly self-managed, and only those with moderate to severe intensity and experiencing difficulty in daily living and livelihood seek organized medical care [6, 7, 40]. MSK pain and arthritis were often neglected in the community and primary care setting [6, 10, 38, 40]. Undoubtedly, more research is required to understand the nuances of MSK pain in the community. Meanwhile, education and awareness need to be imparted to doctors and the community. The emphasis should be on the first medical post

TABLE 4 | Prevalence rates reported by selected COPCORD survey across the World.

Country	Publication year	Sample size	MSK pain	RA	OA	STR	FM	GOUT	SpA	AS	Back pain
Southeast Asia											
India (R)—Current study	Current	34096	20.04	0.29	4.66	1.75	NR	0.07	0.28	0.04	7.97
India (U)—Current study	Current	22452	10.34	0.42	3.83	0.72	NR	0.02	0.12	0.03	3.67
All India (U + R)—Current study	Current	56548	16.14	0.34	4.39	1.39	NR	0.05	0.23	0.03	6.23
India—Bhigwan (R) [6, 10]	2001	4092	17.9	0.67	5·8	3.2	0	0.1	0.25	0.09	13.1
India—Lucknow (R) [15]	2018	5118	15.1	0.16	4.5	NR	4.12	0	0	0	10.66
India—Lucknow (U) [15]	2018	5053	34.1	0.47	10.6	NR	3.24	0.09	0	0	3.65
Bangladesh (R) [16]	2005	2601	26.2	0.7	7·5	2.7	4.4	0	NR	0.04	20.1
Bangladesh (U) [16]	2005	1307	24.9	0.4	9.2	2.5	3.2	0	NR	0.08	18.1
Malaysia (SR) [17]	2007	2594	21.1	0.15	2.97	NR	0.92	NR	NR	0.15	11.6
Vietnam (U) [18]	2003	2119	14.9	0.28	4.1	3.4	NR	0.14	NR	NR	11.2
West Asia											
Iran—Tehran (U) [19]	2008	10291	41.9	0.33	16.6	4.6	0.69	0.13	0.23	0.12	13.4
Iran—Tuyserkan (R) [20]	2009	1565	66.6	0.19	20.5	2.2	0.06	NR	1.1	1.1	23.4
Kuwait (U) [21]	2004	7670	26.8	0.04	0.99	1.69	0.13	0.03	NR	0.01	9.48
Lebanon (R) [22]	2012	3530	32.9	1	4	5.8	1	0.01	0.3	0.1	3.0
East Asia											
China—Shanghai (U) [23]	2003	6584	13.3	0.28	4.1	3.4	NR	0.22	0.11	0.11	5.6
Australia											
Australia Aboriginal (R) [24]	2004	847	33	0	5.5	7.4	0.11	3.8	0.5	0.5	12.5
Africa											
DR Congo (R) [25]	2017	1500	49.5	1.4	36.8	5.2	NR	0.06	3.8	3.8	13.4
Nigeria (PU) [26]	2022	3056	58	0.03	6.1	1.7	0.6	0.3	NR	NR	3.1
Latin America											
Argentina—Rosario (U) [27]	2016	1656	31.2	2.4	4	2.9	0.1	0	NR	NR	19.3
Brazil (U) [28]	2004	3038	30.9	0.46	4.14	NR	2.5	NR	NR	NR	NR
Mexico (U + R) [29]	2011	19213	25.5	1.49	10.24	3.8	0.68	0.35	NR	0.15	5.8
Colombia (U) [30]	2018	6693	48	1.49	10.81	NR	0.72	0.56	0.28	0.11	7.24
Cuba (U) [31]	2009	3155	43.9	1.24	20.4	6.4	0.22	0.38	0.19	0.1	11.6
Ecuador—Cuenca (U + R) [32]	2016	4877	32.5	0.8	9.8	NR	2	0.4	NR	0.08	9.3
Ecuador—Saraguro (R) [33]	2020	2687	46.3	1.3	6.5	5.8	1.8	0.01	NR	0.03	9.3
Guatemala—San Juan (R) [34]	2012	4000	14.45	0.85	30.95	2.13	NR	0.03	NR	NR	0.48
Guatemala—City (U) [34]	2012	4000	9.3	0.53	1.65	1	NR	NR	NR	NR	0.50
Peru (U) [35]	2018	1095	31.7	1.27	4.75	8.86	1.09	0.64	0	0	6.76
Venezuela (U) [36]	2015	3973	22.4	0.4	15	NR	0.2	0.3	0.1	0.05	2.8
Venezuela (R) [37]	2016	1537	32.9	1.1	14.1	NR	0.5	0.3	0.4	0.05	12.4

Abbreviations: AS: ankylosing spondylitis; FM: fibromyalgia; NR: prevalence rates are not reported in publication; OA: osteoarthritis; PU: peri-urban; R: rural; RA: rheumatoid arthritis; SpA: spondyloarthritis; SR: semi-rural; STR: soft tissue rheumatism; U: urban.

(primary care physicians) and the rheumatologists ought to be more proactive.

Although limited by the screening questionnaire, the current study assessed several risk factors of MSK pain (Table 3). Several risk factors such as lack of literacy and tobacco use were modifiable and amenable to change in the future prevention program (COPCORD Stage 3). The current findings (risk factors) were consistent with the earlier COPCORD and GBD reports [2, 4, 6, 10]. However, the supposedly protective roles of vegetarian diet and alcohol (Table 3) need validation and further research. Several other risk factors (MSK pain) such as genetics, environment (including infections), socioeconomics, and individual personality traits ought to be assessed.

It seems reasonable to compare the point prevalence rates of different COPCORD surveys and explore the background information of the population and survey site; rates may not be standardized (Table 4). A uniform standardized community approach and a validated CCQ were used by COPCORD surveys (Table 4) [3, 5, 10, 38]. COPCORD Mexico showed good validation (sensitivity and specificity for specific arthritis) of the CCQ using current MSK pain as the primary variable in a very large population sample [42]. Although not random, COPCORD site/population selection was driven by epidemiology concerns (such as sample size, valid residence, community participation, and a good response rate (> 70%)) [5, 10].

Comparing COPCORD India Surveys (Tables 2 and 4)-Additional Insights: The COPCORD Bhigwan (1996) was followed by COPCORD Lucknow. Altogether, 22 COPCORD surveys were completed from 1996 to 2012. There were 13 sites in the current study (Figure 1) [5, 6, 10–12, 15]. An independent randomized survey (30 000 population in urban–rural sites in 3 regions) based on the COPCORD Bhigwan model was sponsored by the Indian Council of Medical Research (ICMR) and supervised and coordinated by the first author (AC; not published).

The adjusted prevalence of RA in the maiden rural COPCORD Bhigwan (0.67) was reported to be strikingly high. However, a lower rate was found in the subsequent COPCORD Lucknow and evident in the current India study (Table 2). A substantial number of young women seemed to suffer from RA, and this was considered unique to the Indian population. Data from COPCORD India Bhigwan showed a high prevalence (876/100 000 population) of RA in the young women (age band 15–44 years); some corresponding rates reported were USA 308, Norway 150, China 237, South Africa 1042 [8]. A similar RA trend was also observed in the current study (see results). This warrants public health intervention and elaborate research. We speculate that the cause may be related to a gene–environment interaction.

The adjusted prevalence of OA in the current study sites ranged from 2.5% to 5.24% (except higher in the Delhi site) which was less compared to Bhigwan and Lucknow surveys. Substantial IA-U was reported from several current sites (especially rural) and Bhigwan but was not reported in the Lucknow study. The prevalence of SpA/AS in rural (0.28) and urban (0.12) India was lower than that in Bhigwan (≤ 0.3) and not reported from Lucknow. Interestingly, a high prevalence of SpA (0.5) was reported from the two sites in South India in the current study, which were surveyed 18 months after the Chikungunya epidemic [11, 12]. The prevalence of gout was uniformly low (≤ 0.15%.) in COPCORD India surveys.

In the ICMR randomized COPCORD study, the crude prevalence of RA, OA, and gout was 0.17–0.62, 3.28–6.5, and 0.03–0.13, respectively (unpublished). Intriguingly, the latter results were not remarkably different from those of the current non-randomized population study.

NSA, STR, and OA were the predominant disorders in the current study (Figure 2) and were much higher in the rural sites, similar to the COPCORD Bhigwan survey. The latter was in sharp contrast to COPCORD Lucknow. The distinction between urban and rural regions is an important consideration in public health in India [10, 40].

IA-U was a heterogeneous group of inflammatory arthritis that could not be diagnosed distinctly as RA or SpA, or PsA. Several cases (IA-U) were believed to be post-infective, and in recent times, PCAR seems to have increased the burden [10, 43, 44]. The current study surveys in Thiruvendran and Calicut (Figure 2) were carried out about 18–24 months after the epidemic and captured a high prevalence and disability (DALY) of PCAR (standardized prevalence 1.17 (0.67, 1.97)) [11, 12, 45]. Several cases of IA-U mimicked seronegative RA and were an important diagnostic dilemma [44].

COPCORD Bhigwan reported an unusually high consumption of tobacco, both in the population and MSK respondents, and it was an important risk factor [6, 40]. The latter was also evident at all current sites (data not shown) and in the pooled current data (Table 3); more in rural sites (24.2% vs. 10.4% urban, Table S4). Several other risk factors in the current study (Table 3) such as female gender, trauma, illiteracy, heavy manual work, and co-morbidity, were also reported in the Bhigwan survey. This encourages a more focused program of prevention in rural India.

Although the current study population and site selection were not randomized, a large population sample from several sites distributed all over India (in no order) was likely to address the issues connected with diversity and representation of the Indian population. India is well known for multifaceted diversity and in particularly related to ethnicity, culture and traditions, and socioeconomics. The rapid modernization and migration of people from villages to towns and cities are bound to influence the epidemiology of MSK and several other diseases. The previous COPCORD India studies (Bhigwan and Lucknow) were based on single-site survey, which cannot be representative of the Indian population. All in all, the current study is likely to be more contemporaneous and a better reflection of the national landscape of MSK pain and arthritis.

5.1 | Comparing Selected Global COPCORD Surveys (Table 4)

Country data (classified into geographical regions) was shown for eyeball comparison, and the reader is encouraged to assess

the country-specific publication for more definitive information [3, 6, 10–12, 16–37]. Several publications prior to 2000 were not included (Philippines, China, Pakistan, Egypt, Indonesia and Australia) and may be accessed on the website [5]. The MSK pain rate in West Asia, Africa, and Latin America seemed higher than in Southeast Asia and China. The prevalence of RA was mostly less than 1% except for Lebanon, DR Congo, Mexico, Colombia, Cuba, Peru, and Argentina. Intriguingly, RA was not reported by the Australian Aboriginal survey. The prevalence of symptomatic OA was strikingly high in Iran (16.6%–20.5%), rural DR Congo (36.8%) and rural Guatemala (30.95%); elsewhere, it was much less. The rate for STR exceeded 10% in several countries. Few COPCORD surveys classified FM, and a prevalence > 1% was reported from India (Lucknow site), Lebanon, Australian Aborigines, DR Congo, Ecuador, and Peru. The prevalence of gout was exceptionally high in the Australian Aboriginals (3.8%) and much less in Asian and other COPCORD surveys; some Latin American countries showed prevalence of 0.3%–0.65%.

Several factors were likely to contribute to the variation in the prevalence of MSK pain and arthritis among COPCORD surveys. The brief description about diversity in India (see above) was also relevant to several developing countries and ancient and ethnic civilizations.

5.2 | Selected European MSK Surveys

Unlike COPCORD, these surveys were mostly retrospective and used electronic data based on different resources such as medical/insurance records, tertiary care hospitals, telephonic surveys, and registries [39, 46–48]. They were selective in nature (target disorders) and some were self-reported. However, except for neck and back pains, several other common community ailments were not identified, as shown in COPCORD surveys (Table 4).

Almost one-third (32%) respondents (more women) reported current MSK pain with wide variation (e.g., Ireland 18% and Finland 44%) [48]. On superficial comparison, most of the European rates seemed higher than those reported by COPCORD surveys (Table 4). 31.9% of adults (≥ 35 years) reported high-impact non-inflammatory chronic MSK pain [47]. The latter was higher in people of African and Asian ethnicity compared to white residents, but the difference was considerably reduced when data was adjusted for income, occupation, and adverse life events [46].

The recent comprehensive Europe MSK Health report (v5) described a wide spectrum of MSK pain and arthritis with a striking variation in prevalence rates like that shown by the COPCORD surveys (Table 4). The RA prevalence varied from 0.2% in North France to 0.66% in South France and was reported nationwide as 0.31%, which otherwise seemed unusually low. The RA prevalence varied from 0.3% (Italy) and 0.66% (Spain) to 0.83% (UK) and 3.14% (The Netherlands). The reason for such a remarkable difference is not clear. A similar situation existed for symptomatic knee OA (Italy 5.39%–29.8%, UK 6.5%, Spain 40.39%). Symptomatic OA hip showed a high prevalence in several European countries but was infrequently reported in COPCORD surveys [10]. The lesser prevalence in the latter Indian survey was speculated to be due to traditional lifestyles of squatting and sitting cross-legged. The prevalence of gout was high in several countries and was in sharp contrast to that shown by COPCORD surveys (except Australia Aboriginals).

GBD: Based on the GBD data, chronic pain and disability was reported as greater in developing countries compared to developed countries [1, 49]. This may not be entirely true. GBD does not obtain chronic MSK pain in totality for analysis as done in the COPCORD (Table 4) [50]. Except for neck and back pain, GBD primarily targets RA, OA, and gout, and everything else was categorized as 'Other MSK' [1, 49, 50]. It is prudent to note that although providing invaluable global MSK disease burden estimates, a major limitation of the GBD project is the heterogeneity and lack of verification of the source data [1, 2, 4, 50, 51].

Ever since inception, the focus of WHO-GBD was on incidence, disability (DALY) and mortality [52]. COPCORD surveys provide prevalence data, and several (in particular India) have used HAQ to record functional disability (Table 4). Recently, the WHO and GBD reports described a shift towards prevalence data (rather than incidence) which is much more meaningful to health policy makers [52]. Some COPCORD data was used recently by the GBD project [4, 50, 51]. Overall, despite being a major source of MSK data in the developing countries, COPCORD remains under-recognized and neglected for global relevance and use [52, 53].

'Other MSK' has been listed amongst the top 20 contributors to global daily and the incidence increased by 123.4% during the period 2009–2019 [50, 51]. Currently, "Other MSK" is a heterogeneous category lacking any meaningful clinical or otherwise description. The emerging huge burden of PCAR in Asian and Latin American countries ought to be quickly recognized and addressed suitably or else it will be another 'Other MSK' (GBD) and escape appropriate attention and addressal [43, 45, 54]. In fact, the method for calculation (Other MSK) was indirect and somewhat uncertain [50]. The latter report stated that in view of the lack of comprehensiveness and quality, the MSK data may be an underestimate. The authors also expressed concern about resetting the GBD analytic process for 'Other MSK' outcome [50]. All in all, this is indeed worrisome from a rheumatology and public health perspective.

5.3 | Other Limitations

Several non-standardized clinical descriptives were used to classify MSK disorders. Although rheumatologists examined every respondent, the lack of laboratory and radiology investigations was often an impediment to making a definite diagnosis in difficult clinical situations such as early arthritis or ill-defined MSK pain. Community surveys and data collection was likely to be biased in several ways—observer and information. There were several unexpected delays due to problematic logistics, deficient skilled manpower, lack of funds, and unanticipated encounters with the Chikungunya epidemic (2006–2009) and Covid pandemic (2020–2022). This was a "prevalence rate" study and we did not calculate the DALY burden except in the case of PCAR [12]. Admittedly, COPCORD was not meant to measure

uncommon rheumatic disorders such as lupus and dermatomyositis, and childhood onset arthritis.

5.4 | Future Direction

There is an urgent need to enhance the COPCORD website and establish an online data repository [54]. The current author (AC) is aware of the ongoing efforts by the APLAR towards the latter project. Wigley et al. (2009) opined on the likelihood of improvement in the standard of living in developing countries if rheumatic diseases are well controlled and proposed that a socioeconomic evaluation (COPCORD Stages II and III) be carried out of the ongoing COPCORD India Bhigwan [55]. A 25-year COPCORD Bhigwan resurvey was completed in 2022–2023 and preliminary data were presented in the APLAR Congress 2023 (unpublished).

All in all, the current COPCORD study outcome remains relevant to the current Indian context of MSK pain and arthritis. Perhaps it is also an incentive for developing countries.

6 | Conclusion

This WHO COPCORD population survey demonstrated a high prevalence of MSK pain and arthritis in the Indian population, and particularly in the rural sites. A wide spectrum of MSK disorders, including the recently recognized post-Chikungunya pain and arthritis, was described. Several risk factors of MSK pain were reported, and several, such as tobacco use, were potentially modifiable. Non-specific arthralgias, soft-tissue rheumatism, and OA were the dominant community ailments, although the burden of inflammatory arthritis was substantial. An alarming proportion of RA was described in young women. Our study calls upon the Government of India to launch a national control program for MSK pain and arthritis as a priority.

Author Contributions

Concept and Plan: A.C., A.V., M.S., K.M. First Draft: A.C., S.S., G.R.P., K.M. Draft revisions and Final Draft: A.C., A.J.M., R.H., A.V., M.S., K.M. Data input and site revisions: V.L.-J., L.G., R.A., B.P., D.K., S.P., C.S., T.B., A.M., R.S., A.G., K.T., C.P.R. All the authors read and approved the final draft (current revision). The authors of the first and final drafts vouch for the veracity and correctness of the data and other references used in the preparation of the manuscript.

Acknowledgments

We are indebted to the numerous colleagues and personnel, both medical and non-medical, from the participating centres and allied institutes who contributed magnanimously to the current India BJD –COPCORD project in whatsoever manner. Several general practitioners, local administrative personnel, and volunteers from the survey site participated in the surveys and assisted in the collection of data. We are especially indebted to Late Dr. H.S. Tandale, who was a father figure to COPCORD India and played a proactive role at the Bhigwan and Pune sites. Several other colleagues from the participating centres actively participated in the pre-survey workshops and assisted in supervising and monitoring the survey, namely Dr. Gajalaxmi (Chennai), Dr. Harbeer Ahedi (Pune), Dr. Adhir Tandale (Pune), Dr. Bharat Randive (Ralegan-Sidhi), Dr. Wangjam Kunjabasi (Manipur), Dr. Bina Thomas (Calicut), and Dr. Satyajyoti Kanjilal (Delhi). We are indebted to the board members of BJD India (especially Late Dr. Shanmuganandan, Late Dr. Dinesh Mohan, Dr. Ambrish Mithal, Dr. S. Babhulkar, Dr. K.H. Sancheti, and Dr. H.K.T. Raza) and Arthritis Research Care Foundation–CRD (especially Late Mr. P.C. Nahar, Mr. J. Sukhadwalla, Mrs. Rashna Daruwalla, Mrs. Mehernaz Chopra, Dr. R. Rane) for approving financial aid and continuous guidance and support. We acknowledge with eternal gratitude the overwhelming support from the community at each survey site and wholehearted cooperation from the survey participants. Participating Centres: Centre for Rheumatic Diseases, Pune, Government Medical College Hospital, Trivandrum, S.P. Medical College, Bikaner, Calicut Medical College, Calicut, Advance Rheumatology Clinic, Hyderabad, Foundation for Research in Community Health, Pune, Guwahati Medical College & Hospital, Guwahati, Government Medical College, Jammu, Regional Institute of Medical Sciences, Imphal, Manipur, Institute of Post Graduate Medical Education and Research, Kolkata, All India Institute of Medical Sciences, New Delhi, Madras Medical College, Chennai, Rheumatology clinic, Bangalore.

Disclosure

Role of the Funding Source: The funder of the study had no role in the study design, data collection, data analysis, data interpretation, or writing of the report.

Role of Public and Study Participants: No member of the public or any of the study survey resident participants was ever involved in the current study at any stage—planning, protocol, surveys, data processing and analysis, report writing, and manuscript submission for publication.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The electronic database of the current study data is available for conditional access at the Centre for Rheumatic Diseases, Pune, India. However, a personal application can be made to the corresponding author of the current paper for further processing of the request to access the latter database. The application should be accompanied by the CV, current and past 5-year employability, and the purpose of data access. The study database is not available for any commercial use.

References

1. GBD 2019 Diseases and Injuries Collaborators, "Global Burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019," *Lancet* 396 (2020): 1204–1222.

2. S. Liu, B. Wang, S. Fan, Y. Wang, Y. Zhan, and D. Ye, "Global Burden of Musculoskeletal Disorders and Attributable Factors in 204 Countries and Territories: A Secondary Analysis of the Global Burden of Disease 2019 Study," *BMJ Open* 12, no. 6 (2022): e062183.

3. K. D. Muirden, "The Origins, Evolution, and Future of COPCORD," *APLAR Journal of Rheumatology* V1 (1997): 44–48.

4. India State-Level Disease Burden Initiative Collaborators, "Nations Within a Nation: Variations in Epidemiological Transition Across the States of India, 1990–2016 in the Global Burden of Disease Study," *Lancet* 390 (2017): 2437–2460.

5. accessed January 21, 2025, https://www.copcord.org/tools.asp.

6. A. Chopra, J. Patil, V. Billampelly, et al., "Prevalence of Rheumatic Diseases in a Rural Population in Western India: A WHO-ILAR

COPCORD Study," *Journal of the Association of Physicians of India* 49, no. 2 (2001): 240–246.

7. A. Chopra and M. Saluja, "Validation and Usefulness of Indian Version (CRD Pune) Health Assessment Questionnaire: Drug Trials, Community Practice and COPCORD Bhigwan Population Study (1994–2012)," *Indian Journal of Rheumatology* 7, no. 2 (2012): 74–82.

8. WHO Scientific Group on the Burden of Musculoskeletal Conditions at the Start of the New Millennium, *The Burden of Musculoskeletal Conditions at the Start of the New Millennium: Report of a WHO Scientific Group* (World Health Organization, 2003), https://iris.who.int/handle/10665/42721.

9. L. Lidgren, "The Bone and Joint Decade 2000–2010," *Bulletin of the World Health Organization* 81, no. 9 (2003): 629.

10. V. L. Joshi and A. Chopra, "Is There an Urban-Rural Divide? Population Surveys of Rheumatic Musculoskeletal Disorders in the Pune Region of India Using the COPCORD Bhigwan Model," *Journal of Rheumatology* 36, no. 3 (2009): 614–622.

11. A. J. Mathew, V. Goyal, E. George, et al., "A Rheumatic-Musculoskeletal Pain and Disorders in A Naive Group of Individuals 15 Months Following a Chikungunya Viral Epidemic in South India: A Population Based Observational Study," *International Journal of Clinical Practice* 65, no. 12 (2011): 1306–1312.

12. B. J. Paul, A. A. Rahim, B. Thomas, et al., "Prevalence and Factors Related to Rheumatic Musculoskeletal Disorders in Rural South India: WHO-ILAR-COPCORD–BJD India Calicut Study," *International Journal of Rheumatic Diseases* 16, no. 4 (2013): 392–397.

13. accessed January 21, 2025, https://rheumatology.org/criteria.

14. Office of the Registrar General, Government of India, *Report and Tables on Age (Series 1). Census of India 2001* (Controller of Publications, 2004).

15. P. Kumar, R. Alok, S. K. Das, et al., "Distribution of Rheumatological Diseases in Rural and Urban Areas: An Adapted COPCORD Stage I Phase III Survey of Lucknow District in North India," *International Journal of Rheumatic Diseases* (2018): 1–6.

16. S. A. Haq, J. Darmawan, M. N. Islam, et al., "Prevalence of Rheumatic Diseases and Associated Outcomes in Rural and Urban Communities in Bangladesh: A COPCORD Study," *Journal of Rheumatology* 32 (2005): 348–353.

17. K. Veerapen, R. D. Wigley, and H. Valkenburg, "Musculoskeletal Pain in Malaysia: A COPCORD Survey," *Journal of Rheumatology* 34 (2007): 207–213.

18. T. T. M. Hoa, J. Darmawan, S. L. Chen, et al., "Prevalence of the Rheumatic Diseases in Urban Vietnam: A WHO-ILAR COPCORD Study," *Journal of Rheumatology* 30, no. 10 (2003): 2252–2256.

19. F. Davatchi, A. R. Jamshidi, A. T. Banihashemi, et al., "WHO-ILAR COPCORD Study (Stage 1, Urban Study) in Iran," *Journal of Rheumatology* 35, no. 7 (2008): 1384–1390.

20. F. Davatchi, A. T. Banihashemi, J. Gholami, et al., "The Prevalence of Musculoskeletal Complaints in a Rural Area in Iran: A WHO-ILAR COPCORD Study (Stage I, Rural Study) in Iran," *Clinical Rheumatology* 28 (2009): 1267–1274.

21. A. M. Al-Awadhi, S. O. Olusi, M. Moussa, et al., "Musculoskeletal Pain, Disability and Health-Seeking Behavior in Adult Kuwaitis Using a Validated Arabic Version of the WHO-ILAR COPCORD Core Questionnaire," *Clinical and Experimental Rheumatology* 22, no. 2 (2004): 177–183.

22. M. Chaaya, Z. N. Slim, R. R. Habib, et al., "High Burden of Rheumatic Diseases in Lebanon: A COPCORD Study," *International Journal of Rheumatic Diseases* 15, no. 2 (2012): 136–143.

23. S. M. Dai, X. H. Han, D. B. Zhao, et al., "Prevalence of Rheumatic Symptoms, Rheumatoid Arthritis, Ankylosing Spondylitis, and Gout in Shanghai, China: A COPCORD Study," *Journal of Rheumatology* 30 (2003): 2245–2251.

24. M. Nicola, S. Steven, P. Jonathan, et al., "Rheumatic Disease in an Australian Aboriginal Community in North Queensland, Australia. A WHO-ILAR COPCORD Survey," *Journal of Rheumatology* 31 (2004): 965–972.

25. J. P. Divengi-Nzambi, J. J. Malemba, L. P. Lebughe, et al., "The Epidemiology of Rheumatic Disorders in a Rural Area of the Democratic Republic of Congo (DRC): A COPCORD Study," *African Journal of Rheumatology* 5 (2017): 1.

26. A. Olufemi, O. B. Hakeem, W. K. Olalade, et al., "Epidemiology of Rheumatic and Musculoskeletal Diseases in a Nigerian Peri-Urban Community: Results of a Cross-Sectional Survey Using The COPCORD Stage 1 Model," *Reumatologia* 60, no. 6 (2022): 366–375.

27. R. Quintana, A. M. R. Silvestre, M. Goñi, et al., "Prevalence of Musculoskeletal Disorders and Rheumatic Diseases in the Indigenous Qom Population of Rosario, Argentina," *Clinical Rheumatology* 35, no. 1 (2016): 5–14.

28. R. S. Érika, L. P. Ana, D. Barros, et al., "Prevalence of Rheumatic Diseases in Brazil: A Study Using the COPCORD Approach," *Journal of Rheumatology* 31 (2004): 594–597.

29. I. Peláez-Ballestas, L. H. Sanin, J. Moreno-Montoya, et al., "Epidemiology of the Rheumatic Diseases in Mexico. A Study of 5 Regions Based on the COPCORD Methodology," *Journal of Rheumatology* 38, no. 86 (2011): 3–8.

30. J. Londoño, I. Peláez Ballestas, F. Cuervo, et al., "Prevalence of Rheumatic Disease in Colombia According to the Colombian Rheumatology Association (COPCORD) Strategy. Prevalence study of Rheumatic Disease in Colombian Population Older Than 18 Years," *Revista Colombiana de Reumatologica* 25, no. 4 (2018): 245–256.

31. G. A. Reyes-Llerena, M. Guibert-Toledano, A. Penedo-Coello, et al., "Community-Based Study to Estimate Prevalence and Burden of Illness of Rheumatic Diseases in Cuba: A COPCORD Study," *Journal of Clinical Rheumatology* 15, no. 2 (2009): 51–55.

32. S. Guevara-Pacheco, A. Feicán-Alvarado, L. H. Sanín, et al., "Prevalence of Musculoskeletal Disorders and Rheumatic Diseases in Cuenca, Ecuador: a WHO-ILAR COPCORD Study," *Rheumatology International* 36, no. 9 (2016): 1195–1204.

33. S. V. Guevara-Pacheco, A. Feican-Alvarado, I. Peláez, et al., "Prevalence of Rheumatic Diseases and Quality of Life in the Saraguro Indigenous People, Ecuador," *Journal of Clinical Rheumatology* 26, no. 7S Suppl 2 (2020): S139–S147.

34. O. P. Ariel, I. Isa, G. F. Helga, et al., "Prevalence of Musculoskeletal Diseases in Gautemala, Central America the COPCORD Study of 2 Populations," *Journal of Clinical Rheumatology* 18, no. 4 (2012): 170–174.

35. O. Vega-Hinojosa, M. H. Cardiel, and P. Ochoa-Miranda, "Prevalence of Musculoskeletal Manifestations and Related Disabilities in a Peruvian Urban Population Living at High Altitude. COPCORD Study. Stage I," *Reumatologia Clinica* 14, no. 5 (2018): 278–284.

36. Y. Granados, L. Cedeño, C. Rosillo, et al., "Prevalence of Musculoskeletal Disorders and Rheumatic Diseases in an Urban Community in Monagas State, Venezuela: A COPCORD Study," *Clinical Rheumatology* 34 (2015): 871–877.

37. Y. Granados, C. Rosillo, L. Cedeño, et al., "Prevalence of Musculoskeletal Disorders and Rheumatic Disease in the Warao, Kari'na, and Chaima Indigenous Populations of Monagas State, Venezuela," *Clinical Rheumatology* 35, no. 1 (2016): S53–S61.

38. A. Chopra, "COPCORD--An Unrecognized Fountainhead of Community Rheumatology in Developing Countries," *Journal of Rheumatology* 31, no. 12 (2004): 2320–2322.

39. WHO, *Musculoskeletal Conditions* (World Health Organization, 2019). https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions.

40. A. Chopra, "Community Rheumatology in India: A COPCORD Driven Perspective," *Indian Journal of Rheumatology* 4, no. 3 (2009): 119–126.

41. S. E. E. Mills, K. P. Nicolson, and B. H. Smith, "Chronic Pain: A Review of its Epidemiology and Associated Factors in Population-Based Studies," *British Journal of Anaesthesia* 123, no. 2 (2019): e273–e283, https://doi.org/10.1016/j.bja.2019.03.023.

42. M. V. Goycochea-Robles, L. H. Sanin, J. Moreno-Montoya, et al., "Validity of the COPCORD Core Questionnaire as a Classification Tool for Rheumatic Diseases," *Journal of Rheumatology. Supplement* 86 (2011): 31–35, https://doi.org/10.3899/jrheum.100955.

43. A. Chopra, V. Anuradha, V. Lagoo-Joshi, V. Kunjir, S. Salvi, and M. Saluja, "Chikungunya Virus Aches and Pains: An Emerging Challenge," *Arthritis and Rheumatism* 58, no. 9 (2008): 2921–2922.

44. A. Chopra, "A Perspective From India on the 2010 Rheumatoid Arthritis Classification Criteria: Comment on the Article by Aletaha et al.," *Arthritis and Rheumatism* 63, no. 2 (2011): 570; author reply 570-1, https://doi.org/10.1002/art.30168.

45. A. Rahim and A. J. Mathew, "Perennial Impression of an Emerging Arbovirus on the Epidemiology of Rheumatic Diseases in South India: Insights From the COPCORD Study," *Journal of Postgraduate Medicine* 57 (2011): 226–228.

46. G. J. Macfarlane, M. Beasley, B. H. Smith, G. T. Jones, and T. V. Macfarlane, "Can Large Surveys Conducted on Highly Selected Populations Provide Valid Information on the Epidemiology of Common Health Conditions? An Analysis of UK Biobank Data on Musculoskeletal Pain," *British Journal of Pain* 9, no. 4 (2015): 203–212, https://doi.org/10.1177/2049463715569806.

47. D. Yu, G. Peat, K. P. Jordan, et al., "Estimating the Population Health Burden of Musculoskeletal Conditions Using Primary Care Electronic Health Records," *Rheumatology* 60, no. 10 (2021): 4832–4843, https://doi.org/10.1093/rheumatology/keab109.

48. "Europe MSK Health report (v5)," accessed January 15, 2025, https://www.eumusc.net/myUploadData/files/Musculoskeletal%20Health%20in%20Europe%20Report%20v5.pdf.

49. T. Vos, S. S. Lim, C. Abbafati, et al., "Global Burden of 369 Diseases and Injuries in 204 Countries and Territories, 1990–2019: A Systematic Analysis for the Global Burden of Disease Study 2019," *Lancet* 396 (2020): 1204–1222.

50. GBD 2021 Other Musculoskeletal Disorders Collaborators, "Global, Regional, and National Burden of Other Musculoskeletal Disorders, 1990–2020, and Projections to 2050: A Systematic Analysis of the Global Burden of Disease Study 2021," *Lancet Rheumatology* 5 (2023): e670–e682.

51. GBD 2021 Diseases and Injuries Collaborators, "Global Incidence, Prevalence, Years Lived With Disability (YLDs), Disability-Adjusted Life-Years (DALYs), and Healthy Life Expectancy (HALE) for 371 Diseases and Injuries in 204 Countries and Territories and 811 Subnational Locations, 1990–2021: A Systematic Analysis for the Global Burden of Disease Study 2021," *Lancet* 403, no. 10440 (2024): 2133–2161, https://doi.org/10.1016/S0140-6736(24)00757-8.

52. WHO, "Global Health Estimates Technical PAPER/DDI/DNA/GHE/2020.3," accessed August 12, 2024, www.who.int/gho/mortalityburdendisease/en/index.html.

53. A. Chopra, "The COPCORD World of Musculoskeletal Pain and Arthritis," *Rheumatology* 52, no. 11 (2013): 1925–1928, https://doi.org/10.1093/rheumatology/ket222.

54. A. Chopra, "The WHO-ILAR COPCORD Bhigwan (India) Model: Foundation for a Future COPCORD Design and Data Repository," *Clinical Rheumatology* 25, no. 4 (2006): 443–447, https://doi.org/10.1007/s10067-006-0273-7.

55. R. D. Wigley, A. Chopra, S. Wigley, and A. Akkoyunlu-Wigley, "Does Control of Rheumatic Disease Raise the Standard of Living in Developed Countries?," *Clinical Rheumatology* 28 (2009): 621–622, https://doi.org/10.1007/s10067-009-1133-z.

Supporting Information

Additional supporting information can be found online in the Supporting Information section.