Quantification of health-related quality of life among patients with rheumatoid arthritis: An institution-based study in Kolkata, West Bengal

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ABSTRACT

Context: Rheumatoid arthritis (RA) is a known chronic debilitating disease accounting for a large percentage of disability globally. Pain and stiffness, decreased work function, depression and emotional state alteration, fatigue, disability, and social handicaps are some patient reported outcomes, which if considered with priority the health-related quality of life (HRQOL) of patients with RA could improve. Aims: This study was conducted with the aim to assess the HRQOL of the patients with RA and the determinants related to it. Settings and Design: This was a cross-sectional study conducted at Rheumatology Department of a tertiary care hospital, Kolkata. Subjects and Methods: A total of 252 patients with RA were selected in this study through systematic random sampling. Statistical Analysis Used: Data were analyzed using appropriate statistical measures with Statistical Package for the Social Sciences (SPSS) version 16.0 (Armonk, NY: IBM Corporation) software program, version 16.0. Univariate and multivariable logistic regression were carried out. Results: In the study, the mean age of the patients was 43.1 years (mean age ±SD: 43.05±10.63 years). The proportion of female subjects was 84.5%. Unsatisfactory QOL was found in 59.9% study participants. In multivariable logistic regression unsatisfactory quality of life was significantly associated to moderate to high functional disability [AOR: 6.04, CI: 2.86, 12.78], disease activity moderate to high [AOR: 5.41, CI: 1.87, 15.69], presence of comorbidity [AOR: 2.90, CI: 1.39, 6.04], extra-articular manifestations [AOR: 3.14, CI: 1.41, 6.96] and delay in starting Disease-Modifying Anti-Rheumatoid Drugs (DMARDs) [AOR: 1.24, CI: 1.08, 1.42]. Conclusion: Findings of this study clearly indicate the presence of high proportion of unsatisfactory QOL among the patients with RA. Early identification and prompt referral are the key strategies to prevent any permanent damage. Regular follow-up of the patients should be carried out to prevent or delay the disability progression and provide high-quality physical and mental health.

Keywords: DAS28 score, functional disability, health-related quality of life, modified health assessment questionnaire (MHAQ), quality of life, rheumatoid arthritis, WHOQOL-BREF

Introduction

Nothing is more miserable than to live a crippled and disabled life. Rheumatoid arthritis (RA) is a known chronic debilitating disease accounting for a large percentage of disability globally. It also creates a poor quality of life (QOL) in every aspect of a person. It is a prolonged multisystem autoimmune disease...
of unknown etiology, which causes erosion of bony cartilages followed by demolition of joints leads to deformity of the joints if left untreated. The first target of the disease is synovium or the membrane, which is the source of synovial fluid in the joints.

The prevalence of RA ranges from 0.3% to 1% globally with an annual incidence rate of 3 per 10,000 adults. In India, estimated prevalence rate of RA is 0.5%–0.75%. Globally, among the 291 disease RA is the 42nd highest contributor to global disability measured in years living with disability (YLDs).

QOL is a wide concept described as a complex phenomenon of person’s physical, psychological, social, personal beliefs, and relationship by which their environment remains stable. It covers overall every aspect of life, whereas health-related QOL (HRQOL) is more specific to dimensions related to disease aspect, which includes physical, social, functional, and psychological health. Pain and stiffness, decreased work function, depression and emotional state alteration, fatigue, disability, and social handicaps are some patient-reported outcomes, which if considered with priority for improvement the QOL of rheumatoid patients would also improve.

RA is a crippling disease with articular, extra-articular as well as systemic complications. Anemia, cardiovascular diseases, lymphoma, cancers, renal disease, endocrinial diseases, infections, lung diseases, and neuropsychiatric disorders are some comorbidities of RA. It causes catastrophic economic losses as well as a notable public health problem. This can be prevented by early diagnosis and regular treatment of the patients having RA. Chronic pain creates social and mental insecurity by increasing absenteeism in workplace and bed occupying days. Patients with rheumatic symptoms are very often misdiagnosed and mismanaged. They frequently come at a late stage in tertiary care center with already forming disability despite the fact that early diagnosis can help patients to lead better QOL. As it needs long-term management, treatment compliance is also very poor among these patients. Comorbidity factors have an additive result on poor QOL of patients with RA.

Every person has contributory effect to the economy of the country. Thus, a more satisfactory QOL of a person has positive effect on the economy of the country. It is also very much applicable for the patients with RA.

There is a paucity of studies on QOL among patients with RA in the context of India and West Bengal. This study was conducted with the objective to assess the QOL of the patients with RA and to elicit the determinants of unsatisfactory QOL. Although there are national guidelines for other noncommunicable diseases such as hypertension and diabetes, RA remains a neglected and debilitating disease resulting in poor QOL among the patients with RA. Thus, it is strongly felt that this study may help health policy makers to adopt some effective guidelines for improving the QOL of patients with RA.

**Subjects and Methods**

**Study type and design**

The study was an institution-based, observational study with cross-sectional design. Data collection was performed in the Rheumatology outdoor at SSKM Hospital, Kolkata for 1 year (May 1, 2018 to April 30, 2019).

Adults (≥18 years) suffering from RA for minimum 1 year (diagnosed by American Rheumatism Association 1987 revised criteria for RA classification), attending the outpatient department (OPD) of Department of Rheumatology of I.P.G.M.E. and R and SSKM Hospital, Kolkata were included in the study. Those who were critically ill, mentally challenged, and not willing to participate were excluded from the study.

**Sample size**

Considering the lowest mean of physical domain of HRQOL as 12 of a previous study conducted by Bedi et al. in New Delhi, standard deviation (SD) as 2.8, level of confidence as 95%, and allowable error as 5% (relative error), the sample size “n” was calculated using the formula: 

\[ n = \left( \frac{Z_{\alpha/2}}{\sigma} \right)^2 \times L^2 \]

Where \( Z = 1.96 \), 
\( \sigma = \text{standard deviation} = 2.8 \), 
\( L = \text{allowable error} = 5\% \text{ of } 12 \text{ (mean)} \),

and sample size “n’’ = (1.96)² × (2.8)²/(12 × 0.05)² = 83.639 ≈ 84.

Systematic random sampling had been used for selection of study subjects; a design effect of 3 was considered and thus the estimated sample size (N) was as follows: 

\[ N = 84 \times 3 = 252 \]

**Sampling design**

It was considered that of 52 weeks in a year, after adjusting for holidays, approximately 50 weeks would be effectively available for the data collection period. By review of previous year’s average daily attendance it was assumed that average 70–75 patients with RA usually visit the OPD. In an OPD day of 240 min and considering an average interviewing time of 30 min, it was estimated that six patients could be interviewed in 1 day. Systematic random sampling design was considered for selection of the participants on each day. First number was selected by simple random sampling, then sampling interval (12) was added. So with a random start, a linear systematic sampling was adopted with sampling interval of 12. This was repeated for each day of interview. If any patient refused to participate the next patient was included without altering the interview sequence. Predesigned pretested structured schedule, which included World Health Organization Quality of Life BREF (WHOQOL-BREF) questionnaire, modified health assessment questionnaire (MHAQ), and DAS28, was used for interviewing the study subjects.
**Study technique**

After obtaining permission from the Institutional Ethics Committee (IEC) of All India Institute of Hygiene and Public Health, Kolkata and I.P.G.M.E. and R., SSKM Hospital, the study was started. Informed written consent was taken from all study subjects using a predesigned, pretested structured schedule with the following domains:

1. Sociodemographic characteristics.
2. Disease (RA) profile.
3. Functional disability—elicited by MHAQ.
4. Disease activity—elicited by DAS28.
5. HRQOL—elicited by WHOQOL-BREF.

**Operational definition**

Disease activity: Disease activity score 28 (DAS28)\(^\text{[15]}\) uses a 28 tender joint count (TJC), a 28 swollen joint count (SJC), ESR, and visual analog scale (0–100). The 28 joints are metacarpophalangeal (MCP) =10, proximal interphalangeal (PIP) = 10, wrist = 2, elbow = 2, shoulder = 2, and knee = 2. In this case, categories were remission = <2.6, low disease activity = 2.6–<3.2, moderate disease activity = >3.2–≤5.1, and high disease activity = >5.1. In logic regression, the first two categories were merged and last two categories were merged.

Functional disability: MHAQ\(^\text{[16]}\) assesses the limitation of activities of daily living measured by a validated questionnaire with eight questions. Questions are on dressing and grooming, get in and out of bed (arising), lift a full cup or glass (grip), walking, get in and out of vehicle (reach), common daily activities like wash and dry entire body, and bend down and turning taps on and off.

Scale ranges from 0 to 1 as no difficulty (0), with some difficulty (1), much difficulty (2), and unable to do any daily living activities (3). Higher score denotes more disability. Normal = <0.3, mild = 0.3–1.3, moderate = >1.3–1.8, and severe = >1.8.

In logistic regression, the subjects with normal and mild value were considered in one group and the other two were grouped in one category.

Extra-articular manifestations: The other systemic signs and symptoms other than articular one. Constitutional symptoms are such as fever, fatigue, subcutaneous nodule, rheumatoid nodule, dry eyes, interstitial lung disease, purpura, and carpal tunnel syndrome,

Comorbidity: Associated diseases with RA.

Delay in starting disease-modifying anti-rheumatoid drugs (DMARDs): When the medicine started after initiation of symptoms (in months).

Treatment adherence: If the patient took prescribed medicines for last 3 months continuously.

**Results**

In this study, the mean (±SD) age of the subjects was 43.05 (±10.63) years; most 96 (38.1%) of whom belonged to 40–49 years age group. The proportion of female subjects was 84.5%. The ratio of female : male was around 5.4:1. The study population predominantly consisted of Hindus (75.4%). Rest of the respondents were Muslim (25.6%). Mean (SD) per capita income was 2801 (3680) INR with median PCI of 1670 INR. According to Modified B. G. Prasad 2019, 118 (46.8%) of the participants belonged to SES Class IV in both the genders. Among the study participants, 85.7% were currently married, 4.0% never married, and 10.35 were widow and separated. All unmarried, widow, and separated participants were female. Positive family history of RA was present in 25.4% of the study participants [Table 1].

Table 2 shows that 59.9% suffered from unsatisfactory QOL in physical domain, 77.0% in psychological domain, 79.4% in social domain, and 55.2% in environmental domain. In total score, the proportion of unsatisfactory QOL was 59.9%.

Mean (±SD) score of physical domain was 32.29 (±20.88), median 31.00. Mean (SD) score of psychological domain was 35.63 (22.62), median 31.00. Mean (SD) score of social domain was 39.01 (26.74), median 44.00. Mean (SD) of environmental domain was 41.47 (21.06), median 38.00.

Univariate logistic regression showed that with unsatisfactory QOL was significantly related to increasing age (odds ratio [OR], confidence interval [CI] = 1.03 [1.00–1.05]), education below middle (OR [CI] = 2.37 [1.41–3.97]), functional disability moderate to high (OR [CI] = 8.46 [4.70–15.21]), disease activity moderate to high (OR [CI] = 13.97 [5.62–34.76]), presence
of comorbidities (OR [CI] = 2.19 [1.31–3.67]), extra-articular manifestations (OR [CI] = 4.23 [2.30–7.77]), poorly adherent to treatment (OR [CI] = 2.67 [1.55–4.59]), and delay in starting DMARDs (OR [CI] = 1.19 [1.06–1.33]) [Table 3].

Multivariable logistic regression was performed using the significant variables in univariate logistic regression. All the variables retained their significance level except increasing age, education below middle school, and treatment adherence.

The Cox and Snell value was 0.37 and Nagelkerke $R^2$ for the model was 0.51. Hosmer and Lemeshow test was not significant for this model ($P = 0.105$) so the model was fitting well.

**Discussion**

**Status of QOL**

In our study, the mean (±SD) score of physical domain was 32.29 (±20.88), median 31.00. Mean (SD) score of psychological domain was 35.63 (22.62), median 31.00. Mean (SD) score of social domain was 39.01 (26.74), median 44.00. Mean (SD) of environmental domain was 41.47 (21.06), median 38, and mean of total score was 148.4 (±86.20). 59.9% study subjects had unsatisfactory QOL in total score domain.

A study by Haroon et al.[18] in Lucknow Uttar Pradesh showed the mean WHOQOL scores in physical, psychological, social, and environmental domain as 51.7 ± 18.6, 54.3 ± 20.3, 66.4 ± 19.7, and 60.0 ± 15.9, respectively, in the patients.

A study conducted by Bedi et al.[14] in AIIMS New Delhi showed that the mean (SD) HRQOL scores in each domain of WHOQOL-BREF were 12.0 ± 2.8, 13.2 ± 2.7, 14.4 ± 2.9, and 13.3 ± 2.6 in physical, psychological, social, and environmental domain, respectively.

**Determinants of QOL**

In this study, lower education, functional disability, moderate-to-high activity, presence of co-morbidity extra-articular manifestations, and late initiation of treatment were the factors associated with unsatisfactory QOL in different domains.

A study conducted by Goma et al.[19] depicted that every aspects of QOL was impaired by RA specially physical function, physical disability, mental health, social health, environmental health, and even sexual health.

**Table 1: Sociodemographic characteristics of the study participants (n=252)**

| Variables                  | Number (%) |
|----------------------------|------------|
| Age                        |            |
| 20-29                      | 30 (11.9)  |
| 30-39                      | 53 (21.0)  |
| 40-49                      | 96 (38.1)  |
| 50-59                      | 57 (22.6)  |
| ≥60                        | 16 (6.3)   |
| Mean age (±SD) = 43.04 (±10.63) years | |
| Median (IQR) = 44 (35,50) years range = 49 (69-20) years | |
| Gender                     |            |
| Male                       | 39 (15.5)  |
| Female                     | 213 (84.5) |
| Religion                   |            |
| Hindu                      | 189 (75.4) |
| Muslim                     | 63 (25.6)  |
| Education                  |            |
| Illiterate                 | 46 (18.3)  |
| Below primary              | 28 (11.1)  |
| Up to primary              | 70 (27.8)  |
| Up to middle               | 44 (17.5)  |
| Up to secondary            | 27 (10.7)  |
| Higher secondary           | 21 (8.3)   |
| Graduate and above         | 16 (6.3)   |
| Socioeconomic status       |            |
| (Modified B G Prasad Scale, January 2019) | |
| Class I (7008 and above)   | 17 (6.7)   |
| Class II (3504-7007)       | 36 (14.3)  |
| Class III (2102-3503)      | 33 (13.1)  |
| Class IV (1051-2101)       | 118 (46.8) |
| Class V (1050 and below)   | 48 (19.0)  |
| Occupation                 |            |
| Home maker                 | 164 (65.1) |
| Service                    | 7 (2.8)    |
| Business/self-employed     | 21 (8.3)   |
| Skilled worker             | 2 (0.8)    |
| Unskilled worker           | 24 (9.5)   |
| At home/retired            | 18 (7.1)   |
| Never married              | 10 (4.0)   |
| Currently married          | 216 (85.7) |
| Widow/widower              | 10 (4.0)   |
| Separated                  | 16 (6.3)   |
| Family history of RA       |            |
| Yes                        | 64 (25.4)  |
| No                         | 188 (74.6) |

**Table 2: Distribution of respondents according to status of QOL (WHOQOL-BREF, domain-wise) (n=252)**

| Domain          | Unsatisfactory QOL number (%) | Satisfactory QOL number (%) | Total number (%) | Mean score (±SD) |
|-----------------|-------------------------------|-----------------------------|------------------|-----------------|
| Physical        | 151 (59.9%)                   | 101 (40.1%)                 | 252 (100)        | 32.29 (±20.88)  |
| Psychological   | 194 (77.0)                    | 58 (23.0%)                  | 252 (100)        | 35.63 (±22.62)  |
| Social          | 200 (79.4)                    | 52 (20.6%)                  | 252 (100)        | 39.01 (±26.74)  |
| Environmental   | 139 (55.2)                    | 113 (44.8%)                 | 252 (100)        | 41.47 (±21.06)  |
| Total score     | 151 (59.9%)                   | 101 (40.1%)                 | 252 (100)        | 148.4 (±86.20)  |
Another study of Katchamart et al.[20] showed that disease severity, functional disability, depression, and anxiety have negative association with QOL of patients with RA.

In Haroon et al.[18] all the domain scores were less than normal healthy individuals. Significant inverse correlation was found between HAQ with physical domain ($r = -0.58$, $P < 0.001$), psychological domain ($r = -0.42$, $P < 0.001$), social domain ($r = -0.25$, $P = 0.004$) and environmental domains ($r = -0.25$, $P = 0.004$), and environmental domain score ($r = -0.21$, $P = 0.01$) of QOL among the patients. DAS 28 scores were inversely correlated with physical domain and psychological domain.

A study conducted by Bedi et al.[14] showed that age, gender, literacy, income, constitutional symptoms, and deformity were not associated with HRQOL. Physical domain was found to be most affected in Indian context. Extra-articular manifestation and increased DAS28 score had negative impact on QOL of patients with RA.

A study conducted by Sri Preethy et al.[1] in Karnataka showed that the newly diagnosed patients with RA with “mild to moderate” disease activity had “good to fine” mental health, whereas the old rheumatoid patients having “moderate to severe” disease activity had “fine to bad” mental health. The patients who had high Morisky’s Medication Adherence score had a better HRQOL.

A study conducted by Barman et al.[21] in Kolkata established that high fatigue level, disability, and pain decreased QOL. Majority of the patients had moderate to higher disease activity. 91.51% patients were in moderate to higher group.

### Table 3: Factors affecting unsatisfactory quality of life (total score) of the study participants: univariate and multivariable logistic regression ($n=252$)

| Variables                        | Quality of life | Odds ratio (95% CI) | Adjusted odds ratio (AOR) (95% CI) |
|----------------------------------|-----------------|---------------------|-----------------------------------|
|                                  | Unsatisfactory  | Satisfactory        | $P$                               | $P$                              |
|                                  | Number (%)      | Number (%)          |                                   |                                  |
| Age in years                     | -               | -                   | 1.03 (1.00-1.05), 0.024             | 1.01 (0.98-1.04), 0.615           |
| Gender                           |                |                     |                                   |                                  |
| Female                           | 132 (62.0)      | 81 (38.0)           | 1.72 (0.86-3.41), 0.123            | -                                 |
| Male                             | 19 (48.7)       | 20 (51.3)           | 1                                  |                                   |
| Religion                         |                |                     |                                   |                                  |
| Muslim                           | 38 (61.3)       | 24 (38.7)           | 1.08 (0.60-1.94), 0.800            | -                                 |
| Hindu                            | 113 (59.5)      | 77 (40.56)          | 1                                  |                                   |
| Caste                            |                |                     |                                   |                                  |
| SC/OBC                           | 65 (67.0)       | 32 (33.0)           | 1.63 (0.96-2.77), 0.070            | -                                 |
| Others                           | 86 (55.5)       | 69 (45.5)           | 1                                  |                                   |
| Education                        |                |                     |                                   |                                  |
| Below middle                     | 99 (68.8)       | 45 (31.2)           | 2.37 (1.41-3.97), 0.001            | 1.67 (0.79-3.53), 0.177           |
| Middle and above                 | 52 (48.1)       | 56 (51.9)           | 1                                  |                                   |
| Type of family                   |                |                     |                                   |                                  |
| Joint                            | 92 (64.3)       | 51 (35.7)           | 1.53 (0.91-2.54), 0.102            | -                                 |
| Nuclear                          | 59 (54.1)       | 50 (45.9)           | 1                                  |                                   |
| Per capita income                |                |                     |                                   |                                  |
| <3000 (<75th quartile)           | 49 (68.1)       | 22 (31.9)           | 1.62 (0.91-2.76), 0.097            | -                                 |
| ≥3000 (≥75th quartile)           | 102 (56.7)      | 78 (43.3)           | 1                                  |                                   |
| Functional disability (by MHAQ score) |            |                     |                                   |                                  |
| Moderate to high                 | 106 (82.8)      | 22 (17.2)           | 8.46 (4.70-15.21), <0.001          | 6.04 (2.86-12.78), 0.001*         |
| Normal to low                    | 45 (36.3)       | 79 (63.7)           | 1                                  | 1                                 |
| Disease activity (by DAS28 score) |                |                     |                                   |                                  |
| Moderate to high                 | 145 (69.4)      | 64 (30.6)           | 13.97 (5.62-34.76), <0.001         | 5.41 (1.87-15.69), 0.002*         |
| Remission to low                 | 6 (14.0)        | 37 (86.0)           | 1                                  | 1                                 |
| Comorbidity                      |                |                     |                                   |                                  |
| Present                          | 95 (68.3)       | 44 (31.7)           | 2.20 (1.32-3.67), 0.003            | 2.90 (1.39-6.04), 0.004*          |
| Absent                           | 56 (49.6)       | 57 (50.4)           | 1                                  | 1                                 |
| Extra-articular manifestation     |                |                     |                                   |                                  |
| Yes                              | 130 (68.4)      | 60 (31.6)           | 4.23 (2.30-7.77), <0.001           | 3.14 (1.41-6.96), 0.005*          |
| No                               | 21 (33.9)       | 41 (66.1)           | 1                                  | 1                                 |
| Delay in months for starting DMRDs| -              | -                   | 1.19 (1.06-1.33), 0.003            | 1.24 (1.08-1.42), 0.002*          |
| Treatment adherence              |                |                     |                                   |                                  |
| Poorly adherent                  | 115 (67.6)      | 55 (32.4)           | 2.67 (1.55-4.59), <0.001           | 1.97 (0.92-4.22), 0.080           |
| Adherent                         | 36 (43.9)       | 46 (56.1)           | 1                                  | 1                                 |

$P < 0.05$ was taken as statistically significant; Hosmer-Lemeshow goodness of fit: 0.104; Nagelkerke R$^2$: 0.310; Cox and Snell R$^2$: 0.277
A study conducted by Mathew et al. in Kerala showed that all 58 patients had moderate DAS 28 score ranging between 3.2 and 5.1 (patients in the remission phase or highly active stage were excluded); 79.3% patients were exposed to complementary and alternative medicine (CAM) therapy before presenting to the hospital.

A study conducted by Gong et al. in China depicted that lower self-efficacy, level of fatigue, increased level of functional disability, poor social support, unemployment, highly active disease stage, presence of co-morbidities, low socioeconomic condition, female gender, rural residence, and increased age were somehow found significant and negatively related to HRQOL.

A study conducted by Taylor et al. in New Zealand found significant association with educational level, blood pressure state, marital status, monthly income, duration of treatment, source of the treatment, and type of the treatment, residence ownership in various domains of QOL. Comorbidity affected physical component of disease the most. Significant correlation was found with all the four WHOQOL-BREF domains and HAQ disability index. Increased physical disability was correlated with poor QOL among rheumatoid patients.

Lack of awareness and ignorance toward seeking medical help resulted in delay in starting the effective treatment resulted in occurrence of more disability and hence poorer QOL, thereby influencing it. Functional disability and disease activity were some explanatory determinants of QOL of patients with RA. Presence of extra articular manifestations as well as comorbidities are not only debilitating for the patients but also significantly enhances the cost of treatment, thus affecting the physical, economic, and mental wellbeing of the patients.

Limitations
This was an institution-based study; hence, findings could not be externally generalized. As it was a cross-sectional in nature, temporal association or cause effect relationship could not be established. Categorization of scores as satisfactory and unsatisfactory was arbitrary.

Conclusion and Recommendations
The findings of this study clearly indicate the presence of a high proportion of unsatisfactory QOL among the patients with RA. The physical, personal, social, and emotional wellbeing are very much hampered due to the disease progression. Regular follow-up of the patients should be performed to prevent or delay the disability progression. Early identification at primary stage and prompt referral are the key strategies to prevent permanent damage due to the disease. Health workers can be made aware of the symptoms so that they can identify the cases at primary level. They can use the MHAQ and DAS28 to identify the disability status and disease activity at primary level and refer the patients to appropriate health care facility accordingly. The front line health workers can quantify the QOL of the patients with RA using this WHOQOL-BREF questionnaire and provide the patients a basic primary health care to improve the QOL. Social security should be made available to those who are abandoned by their families due to the disease. Special vocational training measures should be adopted for the patients with RA who became disabled due to the disease. Keeping in mind the miserable consequences of the disease, management of RA should be included under the program of noncommunicable diseases. Provision of financial support and subsidies for treatment expenditure due to the disease may be explored. Public private partnership model can be used to curtail the expenditure for investigations purpose and provisions of DMARDs.

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There was no conflicts of interest in the study.

References
1. Sri Preethy NN, Churi S, Subramanium R, Joseph J, Tejaswini G, Rakshitha KR, et al. Study of health related quality of life in rheumatoid arthritis patients. J Pharm Res 2015;9:194-200.
2. Sangha O. Epidemiology of rheumatic diseases. Rheumatology 2000;39(Suppl 2):S12-12.
3. Mc Innes IB, Schett G. The pathogenesis of rheumatoid arthritis. N Engl J Med 2011;365:2205-19.
4. Mc Cain JA Jr. Unmet needs in the treatment of rheumatoid arthritis. Managed Care 2009;18(Suppl 5):1-6.
5. World Health Organization Chronic diseases and health promotion. Chronic rheumatic conditions. Available from: http://www.who.int/chp/topics/rheumatic/en/. [Last accessed on 2017 Apr 12].
6. Fakhouri W, Lopez-Romero P, Antonelli S, Losi S, Rogai V, Buda S, Sangiorgi D, Perrone V, Degli Esposti L. Treatment patterns, health care resource utilization and costs of rheumatoid arthritis patients in Italy: findings from a retrospective administrative database analysis. Open Access Rheumatol 2018 Aug 10;10:103-111. doi: 10.2147/OARRR. S164738. PMID: 30127649; PMCID: PMC6091254.
7. Malaviya AN, Kapoor SK, Singh RR, Kumar A, Pande I. Prevalence of rheumatoid arthritis in the adult Indian population. Rheumatol Int 1993;13:131-4.
8. Cross M, Smith E, Hoy D, Carmona L, Wolfe F, Vos T, et al. The global burden of rheumatoid arthritis: Estimates from the global burden of disease 2010 study. Ann Rheum Dis 2014;73:1316-22.
9. Dougdados M, Soubrier M, Antunez A, Balint P, Balsa A, Buch MH, et al. Prevalence of comorbidities in rheumatoid arthritis and evaluation of their monitoring: Results of an international, cross-sectional study (COMORA). Ann Rheum Dis 2014;73:62-8.
10. Maradit-Kremers H, Crowson CS, Nicola PJ, Ballman KV,
Roger VL, Jacobsen SJ, et al. Increased unrecognized coronary heart disease and sudden deaths in rheumatoid arthritis: A population-based cohort study. Arthritis Rheum 2005;52:402-11.

11. Listing J, Gerhold K, Zink A. The risk of infections associated with rheumatoid arthritis, with its comorbidity and treatment. Rheumatology 2012;52:53-61.

12. Smitten AL, Simon TA, Hochberg MC, Suissa S. A meta-analysis of the incidence of malignancy in adult patients with rheumatoid arthritis. Arthritis Res Ther 2008;10:R45.

13. Lin MC, Guo HR, Lu MC, Livneh H, Lai NS, Tsai TY. Increased risk of depression in patients with rheumatoid arthritis: A seven-year population-based cohort study. Clinics 2015;70:91-6.

14. Bedi GS, Gupta N, Handa R, Pal H, Pandey RM. Quality of life in Indian patients with rheumatoid arthritis. Qual Life Res 2005;14:1953-8.

15. Kumar BS, Suneetha P, Mohan A, Kumar DP, Sarma KV. Comparison of disease activity score in 28 joints with ESR (DAS28), Clinical disease activity index (CDAI), Health assessment questionnaire disability index (HAQ-DI) and Routine assessment of patient index data with 3 measures (RAPID3) for assessing disease activity in patients with rheumatoid arthritis at initial presentation. Indian J Med Res 2017;146(Suppl S2):57-62.

16. Maska L, Anderson J, Michaud K. Measures of functional status and quality of life in rheumatoid arthritis: Health assessment questionnaire disability index (HAQ), Modified health assessment questionnaire (MHAQ), Multidimensional health assessment questionnaire (MDHAQ), Health assessment questionnaire II (HAQ-II), Improved health assessment questionnaire (Improved HAQ), and Rheumatoid arthritis quality of life (RAQoL). Arthritis Care Res 2011;63(S11):S4-13.

17. The World health organization quality of life assessment (WHOQOL): Position paper from the World Health Organization. Soc Sci Med 1995;41:1403-9.

18. Haroon N, Aggarwal A, Lawrence A, Agarwal V, Misra R. Impact of rheumatoid arthritis on quality of life. Mod Rheumatol 2007;17:290-5.

19. Goma SH, Razek MR, Abdelbary NM. Impact of rheumatoid arthritis on the quality of life and its relation to disease activity. Egypt Rheumatol Rehabil 2019;46:304-12.

20. Katchamart W, Narongroeknawin P, Chanapai W, et al. Health-related quality of life in patients with rheumatoid arthritis. BMC Rheumatol 2019;3:34.

21. Barman A, Chatterjee A, Das KM, Mandal PK, Ghosh A, Ballav A. Fatigue, physical function and quality of life in relation to disease activity in established rheumatoid arthritis. Indian J Phys Med Rehabil 2010;21:15-21.

22. Mathew AJ, Antony J, Eremenco S, Paul BV, Jayakumar B, Philip J. Health-related quality of life in rheumatoid arthritis patients in South India. Singapore Med J 2009;50:800.

23. Gong G, Mao J. Health-related quality of life among Chinese patients with rheumatoid arthritis: The predictive roles of fatigue, functional disability, self-efficacy, and social support. Nurs Res 2016;65:55-67.

24. Taylor WJ, Myers J, Simpson RT, McPherson KM, Weatherrall M. Quality of life of people with rheumatoid arthritis as measured by the World Health Organization Quality Of Life Instrument, Short Form (WHOQOL-BREF): Score distributions and psychometric properties. Arthritis Rheum 2004;51:350-7.