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Assessment Of Perception Of Pain And Disease Activity In Patients Of Rheumatoid Arthritis Type 2 Diabetes Mellitus Patients And - A Cross-Sectional Study In A Tertiary Care Hospital Of North East India

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Abstract:
Background: *Rheumatoid arthritis (RA) is a chronic autoimmune inflammatory disorder that predominantly affects small peripheral joints, leading to pain, stiffness, and functional impairment. Chronic systemic inflammation in RA contributes to insulin resistance, predisposing patients to type 2 diabetes mellitus (T2DM). Coexistence of these two conditions complicates disease management and adversely impacts quality of life. The Numerical Rating Scale (NRS) is a pain assessment tool commonly used in healthcare settings to measure pain intensity. The Disease activity score 28 (DAS 28 score) enable us to assess the disease status in RA patients.*
Objectives: *1. To assess the level of pain perception using the Numerical Rating Scale (NRS) in the patients of Rheumatoid arthritis with Diabetes Mellitus. 2. To evaluate disease activity using the Disease Activity Score 28 (DAS-28) in the patients of Rheumatoid arthritis with Diabetes Mellitus.*
Materials and Methods: *A hospital-based cross-sectional study was conducted over three months among adult RA patients (>20 years) with T2DM attending the Physical Medicine and Rehabilitation OPD of AGMC & GBP Hospital. Following standard protocol clinically confirmed RA cases were enrolled as per ACR classification criteria with T2DM after obtaining informed consent from the participants. Demographic and clinical data, including height, weight, BMI, NRS, and DAS-28 scores, were recorded. Blood glucose parameters were noted to determine diabetic status. Data were recorded in a predesigned case study format and analysed using SPSS 21. A p-value of <0.05 was considered statistically significant.*
Results:
The study included 50 RA patients with a mean age of 45.04 ± 9.53 years, mean BMI of 26.03 ± 4.87 kg/m², and mean RA duration of 5.48 ± 3.79 years and T2DM duration of 7.44 ± 5.22years. 58% of participants having positive family history and 96 % are on proper medications. The mean pain score (NRS) was 4.18 ± 1.74, and mean ESR was 26.06 ± 15.61 mm/hr. Based on DAS-28, 2 patients (4%) were in remission (<2.6), 5 (10%) had low disease activity (2.6–3.2), 39 (78%) had moderate disease activity (3.2–5.1), and 4 (8%) had high disease activity (>5.1).
Conclusion:
Most patients showed moderate disease activity and pain perception, suggesting that diabetes may influence disease progression and symptom severity.
Keywords: *Rheumatoid arthritis, Type 2 diabetes mellitus, Disease Activity Score (DAS-28), Pain perception, Numerical Rating Scale, Inflammation.*

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I. Introduction

Rheumatoid arthritis (RA) is a chronic systemic autoimmune disease affecting 0.5–1% of the global population and approximately 0.31% in India[1,2]. It primarily involves small peripheral joints, leading to pain, stiffness, and progressive joint deformity that significantly impairs quality of life[3]. The disease is more common in women, with a female-to-male ratio of 3:1, possibly due to hormonal and psychosocial factors influencing pain perception[4].

Recent research suggests that patients with rheumatoid arthritis (RA) may have an elevated risk of developing type 2 diabetes mellitus (T2DM), potentially driven by chronic systemic inflammation. Proinflammatory cytokines such as IL-6, IL-1β, and TNF-α which are elevated in RA can impair insulin signaling and promote β-cell dysfunction[5]. This inflammation-mediated insulin resistance can worsen glycaemic control,

and when combined with RA-specific factors (such as long-term glucocorticoid therapy), the risk of T2DM may increase further. Moreover, because both systemic inflammation and insulin resistance contribute strongly to cardiovascular disease, the coexistence of RA and T2DM may synergistically amplify cardiovascular risk in these patients.[6]

Pain perception in RA can be assessed using the Numerical Rating Scale (NRS), while disease activity is evaluated using the Disease Activity Score 28 (DAS 28), which has been extensively validated for its use in clinical trials. it incorporates joint counts, ESR, and general health status.[7,8]

Although several groups have conducted different studies across the globe probing the relationship between RA and T2DM, very few studies have been conducted in Northeastern part of India to assess the proportion of Diabetes in RA patients in this area. The geographical and ethnical difference in this part of India calls for an analytical data regarding the co-existence of these two diseases. Also, very few studies have been conducted to evaluate the pain perception in patients with Rheumatoid Arthritis with type II diabetes mellitus. Therefore, this study is taken up to assess the level of pain perception in RA with Diabetes Mellitus patients.

II. Aims & Objectives

1. To assess the level of pain perception using the Numerical Rating Scale (NRS) in the patients of Rheumatoid arthritis with Diabetes Mellitus.
2. To evaluate disease activity using the Disease Activity Score 28 (DAS-28) in the patients of Rheumatoid arthritis with Diabetes Mellitus.

III. Materials And Method

Study type: Observational study

Study design: Hospital based Cross- sectional study

Study duration: Three months

Study area / location: Department of Physiology in collaboration with Department of Physical Medicine and Rehabilitation, Agartala Govt. Medical College (AGMC).

Study population: Adult patients between the age group of >20 years attending Physical Medicine and Rehabilitation clinic of AGMC & GBP Hospital.

Inclusion criteria for cases:
1. Clinically established cases of RA based on ACR Classification criteria[9]
a. Joint Involvement:
1 large joint - 0 points
2-10 large joints - 1 points
1-3 small joints, +/- large joints - 3 points
>10 joints (at least 1 small joint) - 5 points
b. Serology (need at least 1):
Negative RF, negative anti CCP Ab - 0 points
Low positive RF or low positive anti CCP Ab - 2 points
High positive RF or high positive anti CCP Ab - 3 points
c. Acute Phase reactants (need at least 1):
Normal CRP and normal ESR - 0 points
Abnormal CRP or abnormal ESR - 1 points
d. Duration of symptoms:
< 6 weeks - 0 points
≥ 6 weeks - 1 points
≥ 6 of 10 points = definite RA
2. History of Diabetes Mellitus.
3. Patients willing to do the study.

Exclusion criteria for cases:
1. Patient who are not willing to do the study are excluded

Sampling procedure: Convenient sampling

All the RA with T2DM patients attending Physical Medicine and Rehabilitation OPD who will fulfil the inclusion and exclusion criteria during 3 months period of study were included.

Study tools:

- Stadiometer: Bio plus; height -200cm
- Weight Machine (Mechanical EQ-BR -9201): Brand- Equinox, Weight Limit- 130kg
- Case study format
- Numerical Rating Scale (NRS)
- DAS 28 score

Study procedure:

All the study participants were selected consecutively during the study period following the inclusion and exclusion criteria. Data were collected from RA with T2DMpatients attending the Physical Medicine and Rehabilitation OPD of AGMC & GBP Hospital, Agartala. Each participant was personally subjected to a detailed history regarding name, age, sex, occupation, socioeconomic status, educational status, medical history, and clinical features. These findings were recorded in a predesigned and pretested standard questionnaire. Blood sugar level, thyroid level, and other laboratory findings were recorded from previous and current medical documents. Written informed consent was obtained from all participants. Complete physical and obstetric examinations were performed.

1. **Age:** Recorded from birthdays to the nearest completed year.
2. **Standing height:** The height of the participants was measured barefoot in centimetres to the nearest 0.1 cm. Participants were asked to stand straight. Two readings were taken, and the average of both was recorded as the height of the subject.
3. **Weight:** The weight of the participants was recorded to the nearest 0.1 kg. Subjects were asked to stand on the weighing machine without shoes and while wearing only light clothes. Two readings were taken, and their mean was recorded as the weight of the subject.
4. **Numerical Rating Scale:** After explaining the procedure to the participants, the study was performed. It involved a scale where the individual was asked to rate their pain on a numerical scale, with 0 indicating no pain and higher numbers up to 10 representing increasing pain severity.
5. **Disease Activity Score 28 (DAS 28):** It was calculated from four parameters—two subjective (tender joints, range 0–28, and patient's Global Assessment (PGA), range 0–100) and two objectives (swollen joints, range 0–28, and laboratory value ESR).

Data analysis

Data analysis was done using SPSS version 21. All the quantitative variables in the present study, such as age, height, weight, NRS score, and DAS28 score, were analyzed and expressed in terms of descriptive statistics such as mean and standard deviation. All the qualitative variables, such as gender, were summarized in terms of proportions. A probability value less than 0.05 was considered statistically significant.

IV. Results

The study included fifty (50) RA patients with a mean age of 45.04 ± 9.53 years, mean BMI of 26.03 ± 4.87 kg/m², and mean duration of RA and DM (5.48 ± 3.79 and 7.44 ± 5.22) years respectively as mentioned in Table 1. 58% of participants having positive family history and 42% are having negative family history as described in Figure 1. 96 % are on proper medications and 4% are not on medications as described in figure 2. The mean pain score (NRS) was 4.18 ± 1.74, and mean ESR was 26.06 ± 15.61 mm/hr as mentioned in table 2. Based on DAS-28, 2 patients (4%) were in remission (<2.6), 5 (10%) had low disease activity (2.6–3.2), 39 (78%) had moderate disease activity (3.2–5.1), and 4 (8%) had high disease activity (>5.1) as described in Figure 3.

Table 1: Demographic variables of the participant

VARIABLES	MEAN	±STD.DEVIATION
AGE (yrs)	45.04	±9.53
HEIGHT (cm)	151.92	±4.98
WEIGHT (kg)	59.72	±9.27
BMI	26.03	±4.87
RA Duration	5.48	±3.79
DM Duration	7.44	±5.22

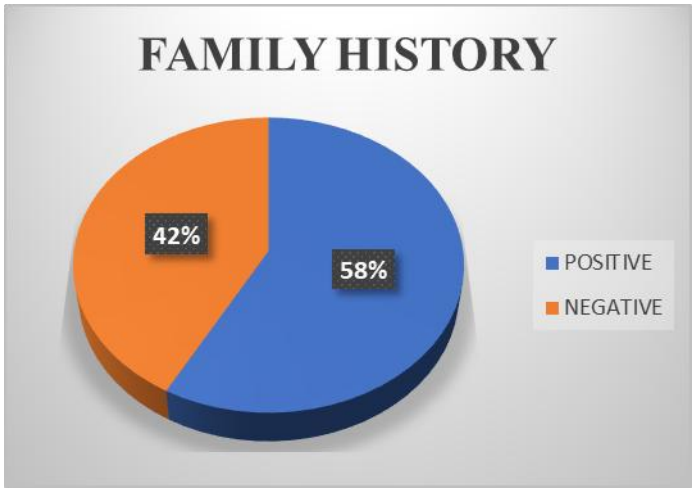

Fig.1: Family history of having diseases among study participants

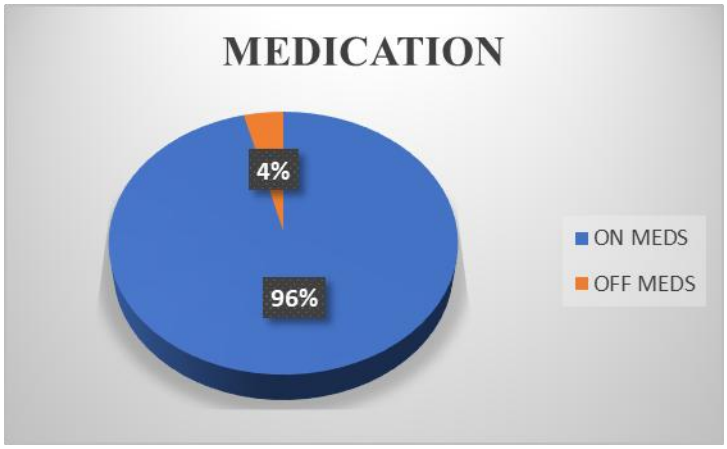

Fig.2: Medication history among study participants

Table 2: Mean and Std. deviation of pain score

VARIABLES	Mean	±Std. Deviation
NRS	4.18	±1.74
ESR	26.06	±15.61
GH	2.94	±1.49
SJC	2.08	±1.68
TJC	4.08	±2.08

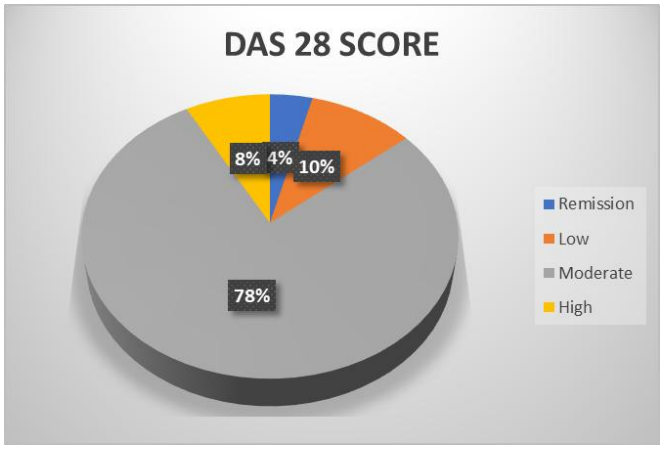

Fig.3: Das 28 score among study participants

V. Discussion

The present cross-sectional study assessed the perception of pain and disease activity using the Numerical Rating Scale (NRS) and Disease Activity Score 28 (DAS 28) among patients with Rheumatoid Arthritis (RA) with Type 2 Diabetes Mellitus (T2DM). Our findings suggest a clinically relevant association between chronic inflammation in RA and metabolic derangements in T2DM.

The mean age of participants was 45.04 ± 9.53 years, comparable to previous findings by Han et al. and Emamifar et al.[10,11] The mean BMI (26.03 ± 4.87 kg/m²) suggested an overweight trend, consistent with Ursini et al., who reported obesity and insulin resistance as major contributors to diabetes risk in RA.[12] The mean NRS pain score of 4.18 ± 1.74 denoted moderate pain, in agreement with Hjermstad et al[13]. Most participants (78%) exhibited moderate disease activity by DAS 28, similar to results from Gomes et al.[14].

A cross-sectional study by Ye et al. in untreated, very early RA patients (mean age ~49) found that HOMA-IR was significantly correlated with DAS28, CRP, and disease duration, and that DAS28, CRP, and age were independent predictors of insulin resistance. These findings reinforce our results: even early in RA, before starting treatment, systemic inflammation appears to drive insulin resistance, supporting the idea that metabolic dysfunction in RA–T2DM comorbidity may be rooted in intrinsic inflammatory activity rather than only arising from long-term disease or therapy.[15]

Inflammatory cytokines such as TNF-α, IL-1β, and IL-6 promote insulin resistance and β-cell apoptosis, explaining the higher diabetes prevalence among RA patients observed by Tian et al.[16] The coexistence of RA and T2DM may also alter pain perception and complicate disease management. Houge et al. reported higher mortality in individuals with either condition, underlining the need for early metabolic screening and multidisciplinary care. Although DAS 28 may slightly overestimate disease activity in some cases, it remains a useful composite index for evaluating treatment response.[17]

VI. Conclusion

Most patients showed moderate disease activity and pain perception, suggesting that diabetes may influence disease progression and symptom severity.

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