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Original Article

Psychiatry/Mental Health Section

Positive Emotion Induction for Pain Associated with Rheumatoid Arthritis- A Quasi-experimental Study

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ABSTRACT

Introduction: Rheumatoid Arthritis (RA) is a chronic disease and a substantial proportion of patients continue to suffer from chronic pain and disability despite standard pharmacotherapy. A substantial proportion of patients with RA also develop anxiety and depressive symptoms. Positive Emotion Induction (PEI) has been shown to reduce pain symptoms.

Aim: To know the effect of positive emotion induction as an adjunctive intervention on RA associated pain and disability.

Materials and Methods: The longitudinal hospital based study was conducted at the Outpatient Department of Rheumatology and Psychiatry, Jagadguru Sri Shivarathreeshwara Hospital, Mysuru, Karnataka, India, from January 2018 to June 2019, included 85 consecutive participants with RA were recruited and assessed at baseline with Health Assessment Questionnaire scale {HAQ-DI and Visual Analog Scale (VAS)}, Hamilton Anxiety Scale (HAM-A), and Hamilton Depression Scale (HAM-D). Six session of PEI was done using recreating pleasant memory and the same was practiced at home daily by the patient. All participants were reassessed with the same parameter after three months. Paired sample t-test was done to know the change in the score pre and post test on the score of HAQ-DI and VAS, HAM-A, HAM-D. The value of statistical significance was p-value ≤0.05.

Results: The majority of the participants belonged to 40-50 years of age, were married, females, studied to middle school, of low socio-economic status, had a nuclear family. The majority had duration of RA been two to four years, with severe illness and were on regular medication. Statistically significant difference was observed in pre and post test on the score of HAQ-VAS (t=8.23, p<0.05), HAM-A (t=11.40, p<0.05) and HAM-D (t=10.95, p<0.05).

Conclusion: Brief psychological intervention (PEI) may be a useful adjunct intervention in patients with RA. Further study is needed to explore the clinical use of the PEI for intervention in RA.

Keywords: Chronic pain, Deterioration of joint function, Mental health, Mood, Polyarthritis, Serotonergic system

INTRODUCTION

The RA affects one percent of all adult population [1]. As per the American College of Rheumatology/European League Against Rheumatism Classification Criteria for RA, it is characterised by morning stiffness of small joints, positive rheumatoid factor, and anti-CCP antibody [2]. It is an autoimmune disease that affects small joints with a chronic course that often leads to functional disability. Progression of RA invariably associated with increased severity of pain symptoms [3]. Persons with RA are predisposed to develop mental health issues due to distress, cognitive distortion, pain, disability, and adjustment issues [4]. There is accumulating evidence that RA is not only accompanied by other physical illnesses but mental health issues as well. A study revealed that up to 62% of person with RA develops depressive symptoms, and 70% may develop anxiety symptoms [5,6].

Multiple factors appear to mediate the development of mental health issues. As per neuroimmunobiological hypothesis, the serotonergic system which is responsible for mood regulation is disrupted by proinflammatory cytokines, hence patients with RA are prone to develop depressive symptoms or syndrome [7]. Patients with RA develop helplessness, worthlessness, pessimism due to pain and uncertainty, deterioration of joint function, and associated disability. Both mood and anxiety symptoms may hamper the treatment response to pharmacotherapy and hinder coping and living with illness [8].

Currently, the treatment goal of RA primarily remains clinical remission. Pharmacotherapy mainly aims to halt the progress of the disease process. The medications used are analgesic, anti-inflammatory, immunosuppressant, and disease modifying anti-rheumatic drugs. Despite advances in biological treatment about 30-50% of patients experience inadequate response that may require adjunctive treatment [9]. In the last few decades, the possible role of non pharmacological intervention in the management of RA attracted the attention of researchers, particularly if the patient has an associated mental health issue. The context in which mental health issue occurs varies with each affected patient. It may develop as comorbidity, as individuals with RA are predisposed to develop mental health issues. Secondly, it may be the result of the severity and chronicity of illness. Thirdly, the pharmacotherapy of RA (immunosuppressants and disease modifying agents) is often associated with mental health issues [10].

On the other hand, mental health issues may precipitate, exacerbate and hamper the adequate treatment response [11]. Psychological factors such as emotional problems may play a role in disability and immunological parameters [12].

Attempts have been made to evaluate the role of psychological intervention such as mindfulness, relaxation, and Cognitive-Behavioural Therapy (CBT) etc., in RA, however only CBT has been found to be helpful [13]. This intervention is taxing patient time attending regular and prolonged time for intervention. Brief psychiatric interventions are rarely done for pain in RA and there is a dearth of research. There is a report that brief intervention may alleviate acute pain. Mood induction procedure is a feasible option in arthritis [14]. There are various approaches to induce mood in research [15]. One of the methods, that is used for PEI is by recreation of positive memories [16]. Positive emotions seem to diminish the association between pain and negative emotions [17,18]. PEI is one method to induce emotion that elevates the pain threshold and reduces pain perception [19]. In general, positive emotion lowers pain perception, pain tolerance, reduces pain associate disability, modulates inflammation, mediates treatment

response, and improves the quality of life in patients having suffered from chronic pain [20-22]. PEI appears to be a promising area of research in chronic pain, particularly in pain management [23]. To the best of our knowledge, there is no report from India that examined the effect of PEI in RA. Thus, this study aimed to know the effect of PEI on RA associated pain and disability.

MATERIALS AND METHODS

This longitudinal hospital based study was conducted at the Outpatient Department of Rheumatology and Psychiatry Jagadguru Sri Shivarathreeshwara Hospital, Mysuru, Karnataka, India, from January 2018 to June 2019, after obtaining an Institutional Ethics Committee approval (JSSMC/PG/4700/2017-2-18, dated 04/11/2017).

Sample size calculation: Sample size was calculated ($N=\frac{(u+v)^2\ (\sigma_1^2+\sigma_0^2)}{(\mu_1-\mu_0)^2}$) to be 77 with 80% power of the study and 5% alpha error. {N=Number of subjects; μ_1-μ_0=Difference between the means; σ_1, σ_0=Standard deviations; u=one-sided percentage point of the normal distribution corresponding to 100% the power, If the power is 80%, u=0.84; v=percentage point of the normal distribution corresponding to the significance level (e.g., if significance level=5%, v=1.960)}. Considering the possibility of loss to follow-up, another 10% of the subjects were included. Hence, the final sample size was 85.

Inclusion criteria: All participants aged 18-60 years of any gender, with a diagnosis of RA as per American College of Rheumatology and no changes in dose or frequency of antirheumatic medication (including analgesics or anti-inflammatory) for the last two months were consecutively recruited by purposive sampling method after obtaining informed consent were included in this study [2].

Exclusion criteria: History of somatoform disorder, schizophrenia and brief psychotic disorder, dementia, intellectual disability, ongoing any other psychological treatment or on any psychotropic medication, other severe physical illness, or terminal illness were excluded in this study.

Assessment Tools

a) Sociodemographic and clinical proforma: It included age, gender, religion, domicile, education, occupation, age of onset of RA, duration of RA, medical treatment of RA.

b) Mini-International Neuropsychiatric Interview (MINI Plus) for exclusion of patients: This is a brief structured version of diagnostic psychiatric interview that focuses on current diagnoses for screening of axis one disorders. The MINI Plus consists of 16 modules, each item has about 8-10 questions, to assess the specific symptoms of variety of psychiatric disorders. The duration of symptoms experienced covers 15 days to one month and lifetime experience as well for some disorders [24].

c) Health assessment questionnaire: This self rated scale is used to assess patients with pain and disability in the past one week [25]. The HAQ contains the HAQ Disability Index (HAQ-DI), the HAQ visual analog (VAS) pain scale, and the VAS patient global health scale. In HAQ-DI, there are eight sections with two to three questions on each section with section scores ranging from zero (without any difficulty) to three (unable to do).

d) Hamilton depression scale: Seventeen item scale is most widely used to assess depression that captures symptoms of past week [26]. A score of eight or less is considered normal, while nine or more considered clinically significant. Eight items are rated on a 5-point scale while 9 items are rated on 3-point scale. The total score ranges from 0 to 52. Severity scores can be categorised as mild (10-13), mild to moderate (14-17), and moderate to severe (17 or more). Internal reliability on Cronbach's alpha statistics indicated 0.70.

e) Hamilton anxiety scale: This 14 items scale is widely used to quantify the severity of anxiety symptoms. The score of each item ranges from 0 (not present) to 4 (severe) [27]. Possible total score ranges from 0-56. The severity of symptoms can be divided into mild (<17 score), mild to moderate severity (18-24 score), and moderate to severe (25-30 score). Reliability measures on intraclass coefficient is 0.74, while on validity measures it has a score of 0.80.

f) Positive emotion induction: After the baseline assessment, a session of PEI for 15 minutes was given as described by Bruehl S et al., [28]. Initially, participants were explained that pleasant emotion can influence the severity of pain perception and such emotion can be induced through rebuilding happy memories. Participants were then instructed to close their eyes and rebuild a memory of a very happy time they enjoyed such as times when they laughed, fun time spent with dear and near ones, eating favorite food etc, and let them relieve that time. The PEI session was conducted every two weeks for a total of six sessions. However, all participants were advised to practice at home twice daily and level of compliance and engagement were ensured with the use of logbook and telephonic calls between the follow-up.

All the participants were followed-up after three months and assessed with all the parameters conducted at the baseline. The procedure did not interfere with pharmacotherapy, and participants were on a stable dose of medication from the rheumatologist.

STATISTICAL ANALYSIS

Statistical analysis was done using Statistical Package for the Social Sciences (SPSS) version 22.0. Descriptive statistical analysis was used for socio-demographic and clinical characteristics. A paired sample t-test was done to know the change in the score pre-posttest on the score of HAQ-DI and VAS, HAM-A, HAM-D. The value of statistical significance was p-value ≤0.05.

RESULTS

The majority of the participants belonged to 40-50 years of age, were married, females, studied to middle school, of low socioeconomic status, had a nuclear family. The majority had duration of RA been two to four years, with severe illness and were on regular medication [Table/Fig-1] [29].

Variables	n	%
Age (years)		
Below 30	6	7.1
30-40	15	17.7
41-50	36	42.3
50 above	28	32.9
Sex		
Female	71	83.5
Male	14	16.5
Education		
Illiterate	21	24.7
Literate	16	18.8
Middle school	40	47.1
Degree	8	9.4
Marital status		
Married	75	88.2
Unmarried	10	11.8
Socio-economic status (As per Kuppuswami scale) [29]		
Low	53	62.3
Middle	32	37.7
Type of family		
Nuclear	41	48.2

Joint	6	7.1
Extended nuclear	38	44.7
Duration of RA		
<2 years	24	28.3
2-4 years	28	32.9
>4-6 years	12	14.1
6 above	21	24.7
Medical treatment		
Regular (missing dose 0-20%)	59	69.4
Irregular (missing dose >20%)	26	30.6

[Table/Fig-1]: Demographic characteristics.
Type of family: Nuclear- parent and children; Extended nuclear- Parent, children, grand parents and uncle aunt; Joint: parent, children, uncle/aunt, couples of next generation, grand children. Medical treatment: Regular- less than 2 dose missing/week for OD dose and leass than 4 dose missing/week for BD dose; Irregular- Missing dose more than described in regular

A paired-samples t-test was conducted to compare the score on HAQ-DI before and after the intervention. The absolute mean difference between HAQ-DI before the intervention (M=1.02, SD=0.52) and after the intervention (t=5.55, p<0.126) was statistically not significant [Table/Fig-2].

Before intervention				After intervention				
HAQ-DI score	n	(%)	Mean±SD	n	(%)	Mean±SD	t	p-value
Mild	45	52.9	1.02±0.52	33	38.8	1.07±0.68	5.55	0.126
Moderate	37	43.6		39	45.9			
Severe disability	3	3.5		13	15.3			

[Table/Fig-2]: HAQ-DI score before and after intervention.

The t-value of HAQ-VAS pain scale was 8.23. A satistically significant group difference was also observed in the score of HAQ-VAS before intervention (M=1.57, SD=0.65) and after intervention (t=8.23, p<0.05) [Table/Fig-3].

Before intervention				After intervention				
HAQ-VAS score	n	(%)	Mean±SD	n	(%)	Mean±SD	t	p-value
0-1	17	20.0	1.57±0.65	20	23.5	1.34 ± 0.56	8.23	0.01
1-2	45	52.9		59	69.4			
2-3	23	27.1		6	7.1			

[Table/Fig-3]: HAQ-VAS pain scale score before and after intervention.

When a paired-samples t-test was conducted to compare the score on HAM-D before and after the intervention, a statistically significant group difference was observed (t=10.95, p<0.05) [Table/Fig-4]. A similar observation was also seen on the score of HAM-A before and after intervention (t=11.40, p<0.05) [Table/Fig-5].

Before intervention				After intervention				
HAM-D score	n	(%)	Mean±SD	n	(%)	Mean±SD	t	p-value
Below 10	28	32.9	12.47±4.90	49	57.7	10.36±4.40	10.95	0.003
10-15	44	51.8		25	29.4			
15 above	13	15.3		11	12.9			

[Table/Fig-4]: HAM-D score before and after intervention.

Before intervention				After intervention				
HAM-A score	n	(%)	Mean±SD	n	(%)	Mean±SD	t	p-value
Below 10	53	62.4	9.31±4.99	74	87.1	7.40± 4.41	11.40	0.008
10-15	24	28.2		5	5.8			
15 above	8	9.4		6	7.1			

[Table/Fig-5]: HAM-A score before and after the intervention.

DISCUSSION

The RA is commonly accompanied by chronic pain and psychological interventions along with pharmacotherapy has been examined to ameliorate it. PEI has shown to improve acute pain [30], wile its role in chronic pain such as RA is unknown. Thus, the current study was undertaken to know the efficacy of PEI in pain and disability associated with RA. It was predicted that PEI would reduce the severity of pain and disability. There are multiple advantages of using PEI such as brief duration of sessions, technique is simple and can be used in day to day clinical practice on an outpatient basis. Also, the emotional factors that play an important role in precipitation and exacerbation of symptoms as well as optimising treatment response, can be better addressed with PEI.

The study found a statistically significant improvement in pain and but did not reduce the associated disability in RA after three months of practice of PEI. In general, positive emotional states lower the intensity of persisting pain, improve pain tolerance, diminishes pain associated disability, and improves the quality of life [20]. It also attenuates pain perception and negative affective response to pain in chronic pain states [21]. In terms of neurobiology, positive affect modulates pain at spinal and supraspinal level and alters the inflammatory process in chronic inflammatory condition [18]. On the contrary, induction of depressed mood results in significantly reduce pain threshold and lower pain tolerance [22].

This study also found a statistically significant change in the score of both HAM-A and HAM-D following PEI after three months. The role of mood induction on anxiety and depression is less studied, however, there appears to be a role in reducing the severity of symptoms. Nelson LD and Stern SL, found that positive mood inducing procedure brings about changes in depression, and some procedures even modify the associated cognition [30]. So far, no explanation is offered as to how such a procedure may bring about changes, except for the assumption that PEI may neutralise the negative mood of depression. Another important factor was the context of depression in relation to RA. If depressive symptoms were secondary to RA, it can be assumed that improvement in pain may have a role in the improvement of depressive symptoms. Similarly, Zbozinek TD et al., found that positive mood induction reduces threat response of anxiety and helps in adopting fear response in non clinical population [31]. The role of positive mood in alleviating anxiety symptoms is less clear. Dysregulation of positive mood is observed in anxiety disorder; thus, mood disorder often accompanies anxiety disorder [32]. PEI may indirectly affect the anxiety symptoms through regulation of positive mood associated with anxiety. It should be noted that both anxiety and depressive symptoms are an obstacle to achieve an optimum response of pharmacotherapy [8]. The procedure may have facilitated the treatment response that in turn reduced the severity of pain, hence affect the severity of affective and anxiety symptoms. However, one should keep in mind that anxiety and depressive symptoms may change spontaneously overtime.

Limitation(s)

The finding of this study should be cautiously interpreted as the applicability was limited to the patients attending tertiary care. The limitations of this study were no blinding, no control group, and no exclusion of any therapeutic factors at the patient's environment at home.

CONCLUSION(S)

With the finding of this study, it can be concluded that PEI may alleviate pain and associated depressive and anxiety symptoms. However further study is needed to confirm it usefulness RA.

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