A Study to Evaluate the Function of Psychological Flexibility in Pain Resilience, Pain Coping Techniques in Arthritis Sufferers

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Abstract*—Greater lately, psychosocial constructs have started to obtain increasing interest within the Ache literature and newer scientific tactics, including recognition and commitment remedy,Indicates a growing emphasis on the merchandising of mental and physical functioning regardless of on-going ache as none of the most commonly used remedies like clinical, surgical or physiotherapy are sufficient to dispose of ache. If we might be able to perceive such mental variables which might be involved in continual ache, then treatment layout might be clean and running on such variables would sooner or later decorate the affected person's well being. Considering some of these points the existing look at became performed using rising constructs inside the ache literature like psychological flexibility, ache resilience, pain coping strategies and health related fine of lifestyles. To begin with facts became accrued from one hundred fifty arthritis sufferers the use of purposive sampling, but later on due to insufficient pattern size in distinct kind of arthritis agencies, only one hundred fifty sufferers clinically recognized with osteoarthritis have been covered. Sample blanketed 91 ladies and 59 men in the age range of 45 to 65 years. Topics have been assessed on respective scales of various variables used in the look at. Information becomes analyzed using t- check correlation and regression analysis. Consequences found out no large variations in male and female corporations on variables beneath have a look at and the mental flexibility methods are considerably correlated with pain resilience ache coping techniques and health related high-quality of lifestyles. Further, regression evaluation revealed that psychological flexibility approaches notably predicts and accounting for true amount of variance in ache resilience, pain coping strategies and health related pleasant of life in osteoarthritis sufferers. The outcomes and implications are mentioned at length within the study

I. INTRODUCTION

In present times, due to technological evolution, advancement in healthcare facilities and easily accessible services to people, life expectancy has increased. In spite of enhanced longevity, the quality of life or number of healthy years is not ensured. Besides relishing the fruit of technological advancement, the unwarranted emergence of cultural and environmental factors like sedentary lifestyle, pollution, wrong food habits and nutrition deficient diets have emerged as the parallel side effects which lead to the eruption of chronic diseases. As a result, people spend more years in poor health or managing chronic health issues. Such chronic health issues or chronic diseases may lead to chronic pain, which then leads to disability. Chronic pain is also counted among the top causes of disability across the globe. Chronic diseases account for approximately half of the global burden and require management for years or a lifetime (Jordan, 2015). Some chronic diseases are life-threatening, while some are not life-threatening and non-treatable but affect the morbidity and quality of life of the patients. Arthritis is one such non-life-threatening disorder that affects multiple small and large joints. This disorder is generally not completely curable. Therefore, treatment aims at easing the severity of symptoms or slowing down the progression of the disease.

Arthritis

Arthritis is a Greek term meaning "disease of the joints." Arthritis is an acute or chronic inflammation of the joint which usually occurs with structural damage and pain in the joint (Ma et al., 2019). It includes various musculoskeletal problems like

osteoarthritis, rheumatoid arthritis, juvenile arthritis, systemic lupus and gout. The term arthritis has also been extended to include symptoms that arise from the tissue injuries adjacent to joints, but no specific damage to the joint is evident. It has two major categories: one is osteoarthritis and the other is rheumatoid arthritis. Other types of arthritis include gout, lupus, fibromyalgia, septic arthritis and many other sub-types.

Osteoarthritis

The commonest form of arthritis is osteoarthritis (OA), which causes pain and disability in older people (Centre for Disease Control and Prevention, 2010), considered among the top ten reasons of disability in the world (Murray & Lopez, 1997 as cited in Hawker et al., 2011). Felon et al. (2000) proposed chronic pain, stiffness, and limitation in activities as the characteristics of OA. Osteoarthritis usually develops with age and affects body's weight-bearing joints of the body, like the back, hips and knees. OA affects larger as well as smaller joints of the body, like hands, wrists, feet, back, hips and knees, but usually larger joints are affected due to daily wear and tear and injury to the joint. Osteoarthritis starts inflaming the cartilage due to which the cartilage begins to wear and make the two opposing bones less cushioned, which gradually causes the two opposing bones to erode into each other. This causes the bones to abrade against each other during movements, making movement difficult after a long period of immobility. The general characteristics of OA are chronic pain, stiffness, activity limitations and inflammation at the affected joint. Other predominant signs may include swelling on bony prominences, a typical sound during movement at a joint or credits, restrictions in movement, deformity of joints, wasting and weakness of muscles, which may include all the components of the joint, namely bone, cartilage, meniscus and synovial membrane (as cited in Hawker et al., 2021).

Osteoarthritis is highly prevalent in India with major risk factors like age, female sex, obesity, physical labor, joint bending and calcium deficiency within the particular cartilage of the joints. Osteoarthritis develops slowly and gradually after 40 years of age, takes several years to evolve and progress. Osteoarthritis has an increased prevalence with age. A survey of the rural and urban localities of India reported osteoarthritis prevalence to be in the range of 17-60.6% (Sharma et al., 2007; Pal et al., 2016). Prevalence varies in different age groups; in the age group of 45–64 years, it increases from 24 to 30% amongst men and women, and by 65 years, almost everyone has problems related to joints in US (Lawrence et al., 2018). Specter et al. (2022) found that former female athletes had a higher rate of radiological signs of OA on their joints, suggesting that weight bearing sports and activities enhance the risk of OA in female athletes. Higher physical activity also expedites the development of osteoarthritis (Specter et al., 2022). Many people with OA experience persistent pain, resulting in a decrease in physical activities, accounting for limitations while walking and climbing stairs (Felon et al., 2022). Almost 80% OA patients have limited movement and 25% of people with OA cannot perform daily living activities (Woolf & Flagger, 2023). Thus, osteoarthritis has affected almost every sphere of an individual's life or affected the QOL (Doherty et al., 2023). In the management of osteoarthritis, medical and nonmedical modalities of treatment are used. The first aid for most arthritis symptoms is usually medications to lessen pain, swelling and inflammation. Rest, supportive devices, and physiotherapy may be among other treatment modalities opted for. Physiotherapists educate the patients about how to exercise the affected joints. Exercises can lessen the rate of joint worsening with the progression of disease. In most severe cases, surgery may be required with various modalities like joint replacement, spinal bone fusion, and removal of damaged bone chips from the joint to allow realignment at the joint.

Rheumatoid Arthritis

Rheumatoid arthritis (RA) affects about 7 million people in India (Moldavia et al., 2023). Fire stein (2023) contended that rheumatoid arthritis, which is usually prevalent at a young age, is an autoimmune, systemic, chronic, inflammatory poly arthritis which primarily affects smaller joints of the body, such as hands and feet, in a symmetrical pattern. Later, the synovial membrane thickens, inflames and becomes stiff due to attack by white blood cells, which can destroy tissues in and around the joint (Fire stein, 2023). The common risk factors included genetic factors, gender (more in females) and excess use of tobacco. Firstly, RA involves small joints like the

hands, wrists, feet and finger joints, but over time it may include larger joints of the body like the hip, knee, ankle, jaw and shoulder joints. In mild cases, only one joint is affected, but the disease can spread and, in severe cases, affect the heart muscle, blood vessels and tissues beneath the skin, causing destruction of surrounding muscles tissues and bone. The common symptoms of RA include pain, stiffness and inflammation around the joint. Many patients with rheumatoid arthritis experience continuous symptoms while many others may experience up and down flares of relapses and remittances

II. BACKGROUND OF THE STUDY

Almost all types of arthritis lead to debilitating pain, which worsens the morbidity and leads to decreased wellbeing, further leading to economic losses. It has been observed that in all major types of arthritis, one common symptom is pain, which is usually chronic by nature. Pain is "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (International Association for the Study of Pain [IASP], 2018). Epping-Jordan et al. (1998) defined "acute pain" as pain that lasts less than six months' duration, and "chronic pain" lasts for six months or more than six months, and "chronic pain syndrome" having a minimum six-month duration result in a decline in functioning and an increase in disability. Other definitions of "chronic pain" explain the diagnosis as being past the normal amount of time it takes for an individual to heal, which is approximately three to six months (Mersey & Bogus, 1994). Chronic pain may also be defined as pain which is on-going, lasts months or longer, may have causes which are classified as non-threatening to life, may not respond to available treatments and may remain continuous till death (Dunajcik, 2020). However, these definitions have become too vague and lack diagnostic clarity, leaving researchers and clinicians to make their own judgments about acute and chronic pain.

Pain is a condition which is disabling and causes considerable sufferings which negatively impacts the psychological, social and economic QOL of an individual. Individual surviving with chronic pain often concludes pain as a disease, regardless of its cause. Individual pain sensations have unique characteristics such as intensity, timing, and quality. Management of chronic pain is, however, very complex and sophisticated. Even if the disease is under control, some residual pain is still present. Traditional methods of pain coping emphasize the elimination of pain sensations using medical interventions like analgesics, physical therapies, occupational therapies and other psychotherapeutic pain coping strategies like relaxation techniques. Despite using different strategies for controlling or coping with pain, complete pain relief is very rare. Humbler et al. (2013) reported that use of analgesics alone as the treatment strategy often fails to provide relief for various patients. Finer et al. (2015) and Turk et al. (2015) supported the effectiveness of medical treatment in pain management. Several studies in the past, including Benda an et al. (2017), Costa et al. (2011), and Gauthier et al. (2018), supported that reducing pain intensity alone does not improve overall functioning. However, it is the human desire to lead a meaningful life without pain, but more often this is a futile effort. This leads to various unsuccessful attempts of avoiding or controlling pain, it may also aggravate fear, distress and anxiety, which in turn negatively impact the QOL. Therefore, in recent scenario, there is an increased trend of psycho-social interventions in pain and disability management in arthritis patients. The corresponding side effects of arthritis medications provide directions to the researchers for exploring other options or psychological interventions for the treatment. Relaxation techniques and cognitive behavior therapy found to be very efficacious in treatment of the shorter duration rheumatoid arthritis (Astin et al., 2022).

Thus, the inclusion of psychological variables is the need of the hour in chronic pain and related disability management. If researchers could identify the factors or variables engaged in the pain journey, then the designing of interventions specifically engineered to deal with only those aspects of pain would be easy. Through sensitization, we can bring therapeutic change in pain management as well. Generally, attaining total pain relief seems to be non-realistic; therefore, interventions should consider functionality improvement with the help of psychological treatment strategies. In general, it is perceived that if psychological intervention were given along with the

medication and physiotherapy to arthritis patients, it would lead to better treatment outcomes.

Rosita and Robinson (2022) suggested that use of psychological approach in the chronic pain management takes into consideration those interventions which aims to improve self-management, behavioral change and cognitive flexibility rather than directly eliminating the cause of pain. Only a few studies looked into the relationships between psychological flexibility and pain coping, and they found that people with more cognitive flexibility may be better at using coping strategies that reduce distress and improve well-being (Cheng et Thus a possibility of the significance of psychological factors in influencing this relationship, to better understand the long-lasting pain experiences could be suggested. Studies from previous decades, such as Edwards et al. (2024), Linton et al. (2024), and Serrano-Ibáñez et al. (2024), have also pointed towards the significance of psychological factors in better understanding the painful experiences, because commonly used therapies are insufficient to reduce pain or improve physical or emotional wellbeing. Therefore, literature and further studies on chronic pain have been shifted from the biomedical perspective towards the bio-psychosocial perspective. Bio-psychosocial perspective on pain takes into account social, psychological factors and biomedical factors. There have been endeavors and missions of various researchers to identify factors accounting for the start, aggravation and persistence of sufferings related to pain (Fordyce, 2005; Melaka & Wall, 2005). According to the bio-psychosocial perspective, chronic pain patients are considered active information processors, and the psychological factors are supposed to be affected by pain experiences interpretation rather than the characteristics of pain. Based on the bio psychosocial perspective, various psychological models have been developed and described over time.

III. NEED FOR THE STUDY

Traditional biological explanation of the ‘pain’ was proposed by Descartes (1596–1650), who proposed that pain is a sensory experience caused by the stimulation of certain noxious receptors that have been physically damaged owing to injury or disease. However common pain sensations may involve events that the medical paradigm cannot explain. A growing awareness of such events has driven a change toward the multidimensional perspective in pain management. First physiological model for pain was based on the gate control theory. Gate control theory was the roused by Melaka and Wall in 2020. They theorized that areas of the brain related to emotions (limbic system) thoughts (frontal cortex) and other regulatory processes (hypothalamus) are responsible for influencing communication of pain to the spinal cord through endogenous opiates, neurotransmitters, and hormones like cortical. All these systems contribute to the way the individual feels and responds to pain (Melaka & Wall 2019). Melaka (2019) also suggested the reason behind the prolonged stress response is that various cognitive, sensory, and emotional inputs disrupt the regulatory patterns of the neurons. Eventually, there is an increase in an individual’s cortical levels, which sequentially increases fatigue in muscle, bone, and neural tissues. All these conditions create the perfect storm for chronic pain to act on and with time, this cycle of limited behavioral activation increases disability (Melaka, 2019). Gate control theory suggests that increasing stimulation in one area decreases the experience of pain due to the excitement of other senses via the PNS and its interaction with the CNS, where pain ultimately communicates with the brain. Gate control theory seeks to explore the biological and cognitive mechanisms underlying the severity of pain. The Gate control theory has been utilized in various types of treatment modalities, such as, transcutaneous electric nerve stimulators, spinal cord stimulators, and psycho-educational interventions. The Gate Control Theory signaled the start of a movement in pain research away from a simply mechanical explanation and toward a multidimensional experience affected by biological, social and psychological factors. With this transition came the opportunity to use psychological ideas in treating chronic pain. To provide more detailed explanation of how psychological factors may affect pain and disability over time a variety of theoretical models have been put forth. Despite the diversity of theoretical perspectives on pain and disability, there are five models that are frequently used in pain psychology studies today. These models are acceptance and commitment or psychological

flexibility model, fear avoidance model, misdirected problem-solving model, self-efficacy model and stress-diathesis model. The first three models are tailored according to chronic pain experiences. The last two models represent theories of health behavior that can be utilized in pain context. This is the model of disability within the chronic pain framework and it seeks to explain pain disability through a cognitive-behavioral aspect. Lethem et al. (2022) first suggested a fear avoidance model to describe how pain avoidance patterns can lead to disability and it has been cited as being one of the leading models of chronic pain disability treatment. In the context to pain, the fear avoidance model describes how fear of anticipated pain after an event is the primary mechanism that perpetuates the chronic pain experience. This may be due to an individual having a novel event in which they suffered pain, leading to the development of a conditioned response. Thus, an individual may try to avoid this novel experience in the future because of the anticipated pain. Once this cognitive-behavioral experience is learned, it often remains as a schema that the individual creates (Vlaeyen et al., 2019). This learned disability lifestyle can inadvertently affect one's muscle strength, coordination and overall physical health. Thus, disability continues to reinforce the pain problem, as suggested in a landmark study where P fingsten et al. (2021) conducted a randomized control trial in which they investigated if future fear of pain would ultimately lead to avoidance. Fear-avoidance model also apply a cognitive-behavioral framework. Dietrich (2020) offers a paradigm for psychological intervention modalities in order to help patients to manage their pain.

IV. OBJECTIVE

The following objectives for the present study have been framed.

1) To assess and compare male and female arthritis patients on the measures of psychological flexibility, pain resilience, pain coping strategies and health related QOL.

2) To study the relationship between psychological flexibility and pain resilience among arthritis patients.

3) To study the relationship between psychological flexibility and pain coping strategies among arthritis patients.

4) To study the relationship between psychological flexibility and health related QOL among arthritis patients.

5) To assess the contribution of psychological flexibility in predicting pain resilience among arthritis patients.

V. HYPOTHESES

1) There would be no gender differences in psychological flexibility, pain resilience, pain coping strategies and health related quality of life among arthritis patients.

2) Psychological flexibility processes would be significantly associated with pain resilience among arthritis patients.

3) Psychological flexibility processes would be significantly associated with pain coping strategies among arthritis patients.

4) Psychological flexibility processes would be significantly associated with health-related quality of life among arthritis patients.

5) Psychological flexibility processes would significantly predict pain resilience among arthritis patients.

6) Psychological flexibility processes would significantly predict pain coping strategies among arthritis patients.

7) Psychological flexibility processes would significantly predict health-related quality of life among arthritis patients.

VI. REVIEW OF LITERETURE

Arthritis is found to be more prevalent in females (Blagojevic et al., 2010; Felson et al., 1987; Felson et al., 1995; Glass et al., 2014; O'Connor, 2006; Srikanth, 2005). Previous studies have also pointed that female show lower threshold and lower tolerance to a variety of noxious stimuli such as pain thus exhibit more pain sensitivity and pain perception as compared to males (Akhani, 2014; Bartley & Fillingim, 2013; Fillingim et al., 2009; Fillingim & Maixner, 1995; Jones & Zachariae, 2002; Paller, 2009; Popescu et al., 2010; Riley, 1998; Wiesenfeld-Hallin, 2015). A study by Plataforma SINC (2024)

reported that men and women are similar in pain tolerance. To verify the first hypothesis, mean comparisons were carried out to assess gender differences in psychological flexibility, pain resilience, pain coping strategies and HRQOL. And the results of the analysis verify the first hypothesis which states "there would be no gender differences in psychological flexibility, pain resilience, pain coping strategies and health related quality of life among arthritis patients." Although literature supporting gender differences in psychological flexibility, pain resilience, pain coping and health related quality of life especially in chronic pain patients is very scarce. But few studies related to gender differences in psychological flexibility, pain resilience, pain coping and HRQOL were found in normal as well as in chronic pain population.

Unruh et al. (1999) and Ramrez-Maestre & Esteve (2014). But Grossi et al. (2000) and Jensen et al. (1994) contradicted the findings of current investigation as they found that women with chronic musculoskeletal pain report higher catastrophizing as compared to men. There are studies which reported gender differences in the perception, coping and catastrophization of pain (Leung, 2012; Zavarize & Wechsler, 2016). The results of the present study found no significant gender differences in praying or hoping, another pain coping strategy. Grossi et al. (2000) contradicted the findings of current investigation as in their study women with musculoskeletal pain reported higher praying or hoping as compared to men. Keefe et al. (2004) reported significant gender differences in the use of problem focused coping by women as compared to men with knee osteoarthritis. Olarogba et al. (2014) reported higher use of passive coping strategies by men as compared to women with osteoarthritis. Problem focused coping and passive strategies are similar to maladaptive strategies (catastrophisoing and praying/hoping). These studies contradict our findings (Keefe et al., 2004; Olarogba et al., 2014).

Values, another psychological flexibility process, was found to significantly and positively associated with cognitive positivity and behavioral perseverance among arthritis patients. Values significantly predicted cognitive positivity. Gentili et al. (2019) reported similar findings. The findings of Yadav and Hooda (2020) study also provid support to the present investigation as they observed a significant positive correlation between values and pain resilience in chronic pain patients. Jennings et al. (2017) also found significant recovery and improvement in the nurse's ability to engage in values-based action after resilience training. This indicates the role of values-based actions in resilience. Murrell et al. (2018) also supported the present study findings and reported that consistent behavior based on values predicts resilience in bereaved college students. Empirical studies indicate the role of values in resilience, but specific literature related to values and resilience in context of chronic pain need to be explored further.

VII. METHODOLOGY

Participants

Chapter highlights the design and methodology that have been used in the present study. Selection of the sample has been made according to the study design. After making the design, a description of the questionnaires which were used in the study is given. Data analysis has been done in sections, namely descriptive statistics and group comparison analysis, correlation and regression analysis. In study I, psychological flexibility, pain resilience, pain coping strategies and health related QOL in arthritis patients were assessed and all the variables were compared between males and females using a two-group design. The correlation design was employed in Study II to investigate the relationship between psychological flexibility, pain resilience, pain coping strategies and health-related QOL in arthritis patients.

Design

The present investigation has two studies:

Study- I:

A two-group design was used to assess gender differences in psychological flexibility, pain resilience, pain coping strategies and health related quality of life among arthritis patients.

Study – II:

A correlation design was used to explore the relationship of psychological flexibility with pain resilience, pain coping strategies and health-related quality of life among patients with arthritis.

Sample

A purposive sample of 150 clinically diagnosed arthritis patients was selected. The sample had 147 patients suffering from osteoarthritis/arthritis, 2 were

diagnosed patients of rheumatoid arthritis, and 1 had gout. Also, these three patients other than osteoarthritis were below 45 years of age and remaining sample falls in the range of 45 to 65 years of age (average age = 61.007 years and standard deviation = 3.484). Therefore, to maintain the homogeneity, scores of these three patients (2 rheumatoid arthritis patient and 1gout) were not included in the analysis. And additional data (three patients of osteoarthritis) was collected and finally the study was conducted over 150 patients who were clinically diagnosed with osteoarthritis. Those 150 clinically diagnosed osteoarthritis patients included 91 females and 59 males. The sample was chosen from a variety of public hospitals, private hospitals, physiotherapy clinics, occupational therapy clinics, and community sports clubs/complexes. The inclusion and exclusion criterion used for selecting the sample selection were as follows:

Inclusion criteria

1) Patients who were literate at least up to senior secondary level.

2) Patients between the ages of 45 and 65 years.

3) Patients diagnosed with arthritis (with or without co morbid conditions) for at least “last two years from the time of formal diagnosis.”

4) Patients who were on ‘medications or ‘physiotherapy’ or ‘both medications and physiotherapy’ for arthritis treatment.

Exclusion criteria

1) Patients recently diagnosed with arthritis (less than two years ago) were not included in the sample.

2) Patients under the age of 35 and patients over 65 years were excluded from the sample.

3) Patients with arthritis who also had other severe medical diseases, such as cancer, a recent injury, or serious mental illnesses, were not included in the sample.

4) Illiterate patients were not included in the sample.

5) Patients suffering from or having an acute disease during the preceding month were not included in the sample.

Tools

For measuring psychological flexibility processes (six processes namely acceptance, mindfulness, values, cognitive diffusion, self as context and committed action), pain resilience, pain coping strategies and health related QOL in arthritis patients, the following measures were utilized:

Procedure

An investigation was done to study the role of psychological flexibility in pain resilience, pain coping strategies and health related QOL in arthritis patients. To serve the purpose, a purposive sample of 150 clinically diagnosed arthritis patients included 91 females and 59 males who meet the inclusion-exclusion criteria were selected for the present study. The participants were selected from a number of public hospitals, private hospitals, physiotherapy clinics occupational therapy clinics and community sports clubs/complexes. The respondents were contacted personally in small groups of 2-3 or individually. Rapport was developed with participants so as to make them comfortable. Investigator introduced herself and briefed the participants about the study as follows "I am a research scholar of department of nursing, DBU university mandi Punjab pursuing research on psychological aspects of pain, health, coping and QOL in arthritis patients. Your response would help in understanding these pain related issues and would enrich the knowledge and literature on pain". The patients who consented and volunteered to participate were briefed about the questionnaires and following instructions were given, "I am going to provide you set of questionnaires regarding personal information, health, pain and its coping. All the scales are paper-pencil tests and detailed instructions are given on each questionnaire separately. You are requested to answer frankly and honestly as the information provided by you would be kept confidential and would only to be used for research purposes." After giving the general instructions regarding the scales and it was ensured that participant has clearly understood the mode of reply the selected scales were administered. At the time of administration instructions regarding each scale were explained separately and clearly. After administering all the questionnaires, it was ensured that participants have completed the questionnaires and responded all the items; the questionnaires were taken back and participants were duly thanked. The participants were again assured regarding the confidentiality of their information, and ensured that information would only be used in research activities and would not affect the therapeutic procedures they were undergoing. The data of all the participants was collected in the same manner. After data collection, all the responses on the

questionnaires were scored according to the manuals as provided by the concerned authors. The data was then subjected to statistical analysis.

Statistical Analyses

Statistical Package for Social Sciences was used for the analysis. In Study I, descriptive analysis and mean comparison was done using t-test. In Study II, correlation and regression analysis was applied.

VIII. MAJOR FINDING OF THE STUDY

The results of t-test revealed no significant gender differences in psychological flexibility, pain resilience; pain coping strategies and health related quality of life.

- Psychological flexibility processes had significant association with pain resilience, pain coping strategies and health-related quality of life among arthritis patients.
- Activity engagement significantly and positively correlated with pain resilience. Activity engagement significantly and positively correlated with all the adaptive pain coping strategies. Activity engagement significantly and positively correlated with health related QOL (physical health and mental health).
- Pain willingness significantly but negatively correlated with pain resilience (cognitive positivity and behavioral perseverance). Pain willingness significantly but negatively correlated with four out of five adaptive pain coping strategies and maladaptive pain coping strategy. Pain willingness significantly and positively correlated with health related QOL.
- State mindfulness significantly and positively correlated with two adaptive pain coping strategies and negatively correlated with both the maladaptive pain coping strategies.
- Trait mindfulness significantly and positively correlated with pain resilience. Trait mindfulness significantly and positively correlated with three out of five adaptive pains coping strategies and negatively correlated with praying or hoping maladaptive pain coping strategy.
- Values significantly and positively correlated with pain resilience. Values significantly and positively correlated with all the adaptive pain coping strategies and negatively correlated with a maladaptive pain coping strategy. Values significantly and positively correlated with health related QOL.
- Cognitive diffusion significantly and positively correlated with pain resilience. Cognitive diffusion significantly and positively correlated with adaptive pain coping strategies and negatively correlated with mal-adaptive pain coping strategies. Cognitive diffusion significantly and positively correlated with health related QOL.
- Self as context significantly and positively correlated with pain. Self as context significantly and positively correlated with all the adaptive pain coping strategies. Self as context significantly and positively correlated with health related QOL.
- Committed action significantly and positively correlated with pain resilience. Committed action significantly and positively correlated with all the five adaptive pain coping strategies and negatively correlated with maladaptive pain coping strategies and praying or hoping. Committed action significantly and positively correlated with health related QOL.

Regression analysis was applied to identify psychological flexibility processes as predictors of pain resilience, pain coping strategies and health related QOL.

1) Activity engagement positively predicted pain resilience (behavioral perseverance and cognitive positivity), pain coping strategies (coping self statements and praying or hoping) and health related quality of life.

2) Pain willingness negatively predicted pain coping strategies and positively predicted health related quality of life (physical and mental health).

3) State mindfulness positively predicted one adaptive pain coping strategy i.e. coping self-statement.

4) Trait mindfulness positively predicted diverting attention pain coping strategy.

5) Values positively predicted pain resilience pain coping strategies (diverting attention, reinterpreting sensations, ignoring sensations, coping self-statements and behavioral activities) and health related quality of life.

6) Cognitive diffusion positively predicted pain resilience and negatively predicts maladaptive pain coping strategy. Cognitive diffusion positively predicts health related quality of life.

7) Self as context positively predicted pain resilience (behavioral perseverance and cognitive positivity),

adaptive pain coping strategies and mental health related quality of life.

8) Committed action positively predicted adaptive pain coping strategies (behavioral activities, diverting attention and coping self-statements) and negatively predicts and praying/hoping type of maladaptive pain coping strategies. Committed action positively predicted mental health related quality of life. Therefore, it can be inferred that psychological flexibility processes significantly predict various components of pain resilience, pain coping strategies and health-related QOL in arthritis patients. Based on the above findings, it can be inferred that different psychological flexibility processes are related to different components of pain resilience, pain coping strategies and health related quality of life among arthritis patients. These findings may help in designing disease-specific acceptance and commitment therapy modules or intervention programmed focusing on improving patient's specific psychological flexibility processes in order to build pain resilience and modify the maladaptive strategies of pain coping to adaptive pain coping strategies in order to enhance health and quality of life. These findings may also have implications for disease specific psychosocial awareness and self-management behavior in chronic pain patients.

IX. CONCLUSIONS AND IMPLICATIONS

 No gender differences exist in psychological flexibility, pain resilience, pain coping strategies and HRQOL among arthritis patients. Thus, it provides an important insight that there is no need for gender specific interventions based on psychological flexibility to address pain resilience, pain coping and health related quality of life.

 The psychological flexibility processes predict pain resilience, pain coping strategies and health-related quality of life among arthritis patients. The important conclusions and implications drawn are:

1. Pain acceptance (activity engagement and pain willingness) plays a role in pain resilience, pain coping and health related quality of life. Activity engagement positively predicts pain resilience (behavioral perseverance and cognitive positivity), pain coping strategies (coping self-statements and praying/hoping) and health related quality of life (physical and mental). Pain willingness negatively predicts pain coping strategies. Pain willingness positively predicts physical and mental health related quality of life. Pain willingness does not predict pain resilience.

2. Mindfulness does not play a role in pain resilience, and health related quality of life. State mindfulness plays a role only in one adaptive coping strategy i.e. coping self-statements. Trait mindfulness predicts one out of the five adaptive coping strategies i.e. diverting attention.

3. Values positively predict pain resilience (cognitive positivity), adaptive pain coping strategies (diverting attention, reinterpreting pain sensations, ignoring sensations, coping self-statements and behavioral activities) and health related quality of life (physical and mental health) of arthritis patients.

4. Cognitive diffusion positively predicts pain resilience (behavioral perseverance and cognitive positivity) and health related quality of life (physical and mental health) among arthritis patients. It also negatively predicts maladaptive pain coping strategy.

5. Self as context positively predicts pain resilience (behavioral perseverance and cognitive positivity). It also positively predicts four out of five types of adaptive pain coping strategies (diverting attention, reinterpreting pain sensations, ignoring sensations and behavioral activities). Self as context positively predicts the mental health.

6. Committed action positively predicts pain coping strategies (behavioral activities, diverting attention and coping self-statements) and negatively predicts maladaptive pain coping strategies and praying/hoping. Committed action positively predicts the mental health among arthritis patients.

 These findings emphasize the need to focus on enhancing the core processes of psychological flexibility through acceptance and commitment therapy in order to improve pain resilience, pain coping and health related QOL among arthritis patients.

 These findings would also be helpful in designing or modifying intervention and developing disease-specific ACT modules to enhance specific psychological flexibility processes, which in turn will improve pain resilience, pain coping strategies and health-related QOL.

 The present study identified specific psychological flexibility processes as predictors for pain resilience, pain coping and HRQOL. This would provide

guidelines for developing brief modules of therapy focusing on identified psychological flexibility processes for targeting specifically pain resilience or pain coping or quality of life among arthritis patients.

X. LIMITATIONS AND SUGGESTIONS

Every effort was made to conduct the investigation in a well thought out and precedent-setting manner; however, some limitations could not be avoided. Here are some of the limitations and suggestions coming from the study, which may form the basis for methodological refinements and guidelines to be considered while designing future research in this area.

- A convenient sampling technique was used in the study, as only the volunteered respondents were included in this research. This makes the implications of the study very limited. Therefore, for better generalization of research findings, it is worthwhile to select samples using a random sampling technique.
- Some of the patients with arthritis were suffering from other diseases also (co morbid conditions) and this situation could not be avoided for the present study. Different diseases in the co morbid conditions made it difficult to form groups on the basis of co-morbid conditions or diseases. In future research, it would be worthwhile to compare co-morbid disease groups as the results may provide better insight.
- The present study did not take into account demographic variables such as age, locality, family type, socio-economic status, education, etc. These variables may affect the relationship between the variables under study. So, considering these variables and making group comparisons may generate more information and help in better generalization of the findings.
- Mainly osteoarthritis patients were taken for the present investigation. Therefore, these research findings cannot be generalized beyond the studied group. Thus, it is felt that research should be conducted on severe osteoarthritis patients, rheumatoid arthritis patients, gout patients and patients with other disorders or diseases like headaches, migraines, neurogenic pain, PCOD, PCOS, ulcers, cancer and HIV to explore the role of psychological flexibility in pain resilience, coping and QOL.
- Self-reported questionnaires were used as assessment tools in the present study. It would be worthwhile if future studies use objective measures of variables under study.
- The current findings highlight the need of conducting intervention studies that would focus on examining the effectiveness of psychological flexibility processes in improving pain resilience, pain coping and health related QOL among pain patients.

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