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Coping Strategies, Pain Severity, Pain Anxiety, Depression, Positive and Negative Affect in Osteoarthritis Patients; A Mediating and Moderating Model

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Abstract

Background: Pain is considered one of the most important sign of osteoarthritis. It has directly been linked to mental problems such as anxiety, depression, and mood swings globally. This present study examined the relationship of pain severity and coping strategies with vulnerable perception of osteoarthritis, pain anxiety, depression, positive and negative affect in osteoarthritis patients. Further, this study investigated moderating and mediating role of pain severity and coping strategies among vulnerable perception of osteoarthritis, pain anxiety, depression, positive and negative affect.

Methods: Purposive sampling technique was used bases on cross-sectional study design. 250 diagnosed knee osteoarthritis patients (Female, n= 105; Male, n = 145) with age ranged between 30 to 60 years (M= 55.09, SD = 10.60) were included from different hospitals of Rawalpindi and Islamabad, Pakistan. Six psychological instruments, Back depression inventory (Beck, 1961), Pain perception scale (Wong & Baker, 2009), Knee injury and osteoarthritis outcome score (Roos, 1995) Pain anxiety symptom scale (Cracken, 1992), Positive and negative affect schedule (Hussein & Vostanis, 2008), and coping strategies scale (Carver,1997) were used to assess coping defense mechanism, pain severity, pain anxiety, depression and positive and negative affect in patients with osteoarthritis.

Results: The results of correlation analysis revealed pain severity was statistically negatively associated with depression but it was statistically positively   related to religious coping strategy and positive affect. Moderation and mediational analyses demonstrated perception of osteoarthritis was associated to stimulate pain severity, depression, positive and negative affect that was triggered and reduced using   different coping defense mechanism including religious, problem focused, and positive coping strategies in osteoarthritis patients. In additionally, these results recommended that pain severity was partial mediator between perception of osteoarthritis and depression.

Conclusions: These results suggested that pain severity and pain anxiety were more detrimental to psychological problems in patients with osteoarthritis.

Keywords: Knee osteoarthritis, coping strategies, pain severity, pain anxiety, depression, positive and negative affect.

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Background

Osteoarthritis is considered one of the most common kind of musculoskeletal disease globally(Tanchev, 2017; Turkiewicz et al., 2014; Vancampfort et al., 2019; Wright, 2018; Xue et al., 2018; Yapar et al., 2019).. It is a most important reason loss of independence and functional limitations in later life. Stable and severe pain intensity reflected one of the crucial devastating sign of Osteoarthritis. Furthermore, Osteoarthritis as well as in specific pain experienced by patients with Osteoarthritis. It has been associated to stimulate risk of mental health issues including depression, anxiety, and mood swings (Vancampfort et al., 2019). In turn, pain perception may have a deleterious impact on mental health. A current meta-analysis and systematic review suggested that approximately 20% of individual with Osteoarthritis faced   symptoms of anxiety and depression. In-depth knowledge is required in the malicious circle wherein pain severity, depression, as well as pain anxiety may persistently strengthen each other over the period of time in individual who experience from Osteoarthritis (Vancampfort et al., 2019; Villafañe, Bishop, Pedersini, & Berjano, 2019).

Osteoarthritis is originate from the Greek word part osteo, mean "bone", and arthritis mean" joint"(Tanchev, 2017; Turkiewicz et al., 2014; Vancampfort et al., 2019; Villafañe, Bishop, Pedersini, & Berjano, 2019; Wanaratna, Muangpaisan, Kuptniratsaikul, Chalermsri, & Nuttamonwarakul, 2019; Wang, Dietrich, Simmons, Cowan, & Monroe, 2018; Wilcox et al., 2000; Wittenauer, Smith, & Aden, 2013; Wright, 2018; Xue et al., 2018; Yapar et al., 2019).Osteoarthritis (OA) is defined as the widespread debilitating joint disorder which is characterized by erosion of articular cartilage, excessive stiffness pain, and crepitus (Hill & Dubey, 2018; Sovani & Grogan, 2013; Tucker, Welk, & Beyler, 2011; Turkiewicz et al., 2014; Villafañe et al., 2019).Worldwide estimation marked over 100 million humans globally suffer from osteoarthritis, which is one of the most frequent reasons of disability (Hinman & Danitz, 2010). Previous numerous study have consensus that Osteoarthritis is one of most important physiological problem (Phinyomark, Osis, Hettinga, Kobsar, & Ferber, 2016; Trainor, 2019; Treister, Suzan, Lawal, & Katz, 2019; Trouvin & Perrot, 2018).which trigger different psychological problems including stress, anxiety, depression, mood swings, emotional stress, disability and fatigue in all over the world (Bijlsma, Berenbaum, & Lafeber, 2011).Osteoarthritis is a debilitating and common disease, affecting around 12% of those between 25 and 74 years of age (Lawrence et al., 1998). Approximately, 27 million adults in the U.S. having clinical osteoarthritis of any joint(Hefzy & Abdel-Rahman, 2019; Sung, Yang, & Wu, 2019; Tan, Nguyen, Anderson, Jensen, & Thornby, 2005; Tanchev, 2017; Thimm, Wang, Waterloo, Eisemann, & Halvorsen, 2018).This condition is associated with the vast majority of knee replacement surgeries and costs to society approach $15 billion per year in the U.S (Abramowitz & Braddock, 2008; Apkarian et al., 2004; Bruehl et al., 2002; Caramés, Taniguchi, Otsuki, Blanco, & Lotz, 2010; Chen et al., 2019; Crombez, Eccleston, Baeyens, Van Houdenhove, & Van Den Broeck,

1999; Eklund, Bäckström, Lissner, Björkelund, & Sonn, 2010; Felson & Zhang, 1998; Munir, Memon, & Jaffri, 2019).It is generally occurred above 50 years age(Wanaratna et al., 2019).Gender is Female According to WHO, worldwide 9.61% of males and 18.0% of females over 60 years of age have symptomatic osteoarthritis (Munir et al., 2019; Yapar et al., 2019). India showed the prevalence to be 5.8% and mostly people over 65 years of age were affected (Gustafson, Anderton, Sowa, Piva, & Farrokhi, 2019; Piotrowski, 2019; Portnoy, Rana, Zimmermann, & Rodin, 2015; Potter, 2015; Power et al., 2019; Puntillo, 2003; Radin et al., 1991; Rathbun, Harrold, & Reed, 2015).Prevalence of osteoarthritis in Northern areas of Pakistan was found to be 3.7%and there was predominance of knee joint involvement that is 95%(Neogi et al., 2016). Because of increasing life expectancy and obesity, prevalence of OA is expected to increase steeply worldwide in next few years(Kriegová et al., 2018; Parisien et al., 2017; Paróczai, Bejek, Illyés, Kocsis, & Kiss, 2006; Pépino, Goyer, & Magnan, 2015; Perrot, 2015).

Knee osteoarthritis is characterized by Framinham (2014) reported study prevalence of knee osteoarthritis diagnosed by radiographic in participants above 45 years is 19.2% (Neogi et al., 2016; Neogi & Zhang, 2013; O'Leary, Smart, Moloney, Blake, & Doody, 2018; O'brien et al., 2019; O'Connell et al., 2018; Okifuji & Turk, 2016).And above 80 years figure reached to 43.7%. Dutch public health institute data shows that knee osteoarthritis in men is 15.6% and 30.5% in women above age of 55 years (D'Iuso, Dobson, Beaulieu, & Drapeau, 2018; Davis, Ettinger, Neuhaus, & Mallon, 1991; De Luca, Beckmann, De Stefano, Matthews, & Smith, 2006; Dick & Rashiq, 2007; Didymus & Fletcher, 2017; Dubois et al., 2016; Kirwan, Bijlsma, Boers, & Shea, 2007).Another radiographic study in Korea showed knee osteoarthritis up to 38 %(265/696) in individuals above 65 years of age.(Thoma et al., 2018). In Mlmo and Sweden among age of 56 to 84 years(Kidd, 2006) prevalence of radiographic knee osteoarthritis was 25.4% and symptomatic knee osteoarthritis was 15.4% (Kigozi et al., 2018; Liu et al., 2018; O'moore et al., 2018; Turkiewicz et al., 2014).

Method

Design

Purposive sampling technique was used bases on cross-sectional study design.

Objectives

1. To examine the association among coping strategies, perception of pain, pain anxiety, perception of osteoarthritis, depression, positive and negative affect in osteoarthritis patients.

2. To investigate the moderating role of coping strategies potential pathway among perception of pain, pain anxiety, perception of osteoarthritis, depression, positive and negative affect in osteoarthritis patients.

3. To study the mediating role of pain's perception potential pathway among perception of pain, pain anxiety, perception of osteoarthritis, depression, positive and negative affect in osteoarthritis patients.

4. To explore gender differences on coping strategies, perception of pain, pain anxiety, perception of osteoarthritis, depression, positive and negative affect in osteoarthritis patients in osteoarthritis patients.

Participants

A cross-sectional, descriptive research was carried Purposive sampling technique was used based on cross sectional design in current study. Two hundred fifty diagnosed with radiographic knee osteoarthritis patients (Male, n = 145 ; Female, n= 105) with age ranged from 30 to 60 years ($M= 55.09$, $SD = 10.60$) were recruited from the Physiotherapy Department of Pakistan Institute of Medical Sciences (PIMS) Hospital, Shifa Hospital Islamabad, Pakistan underwent evaluation of psychological scales using the depression(BDI),pain anxiety symptom scale (PASS),pain perception scale, positive and negative affect schedule (PANAS),coping strategies scale and Knee injury and osteoarthritis outcome score (KOOS).The eligibility criteria included: (i) age $\geq$ 50 years; (ii) knees with radiographic osteoarthritus as evaluated by weight-bearing antero posterior radiographs; and (iii) Inability to walk independently on a flat surface without any ambulatory assistive device. The exclusion criteria were the following: (i) a history of knee surgery, (ii) inflammatory arthritis, (iii) periarticular fracture, or (iv) neurological problems, Patients with either bilateral or unilateral knee osteoarthritis were considered (Cibere, Sayre, Guermazi, Nicolaou, 2011).

Measures

Osteoarthritis scale (KOOS). Knee injury and osteoarthritis outcome score (KOOS; Roos, 1995; Roos, Lohmander, Ekdahl, & Beynnon, 1998; Ateef, 1990) is an 42 item measure of osteoarthritis pain**.** It consist of five subscales: Pain (9 items), other symptoms (7 items), function in daily living-ADL (17 items), function in sport and recreation-Sport/Rec (5 items), and knee related quality of Life-QOL (4 items). Each item is scored on a five point Likert scale from *0 (No problems)* to *4 (Extreme problems)* (Roos, 1995). KOOS has demonstrated adequate validity and reliability (Roos, 1995).In present investigation, The Cronbach's alphas of the KOOS subscales were: Pain 0.47, Symptoms 0.38, Activities of Daily Living 0.73, Function in Sport and Recreation 0.70 and Knee-related Quality of Life 0.24.

Pain perception scale (WBS). Pain perception scale (WBS; Wong & Baker, 2009) is an 10 item measure of pain. It is based on a numeric pain rating scale from 0-10, with 0 being no pain and 10 being the worst pain imaginable. The scale includes numbers, faces (visual representation), and written descriptions. There are 6 faces in the Wong-Baker Pain Scale. The first face represents a pain score of 0 and indicates "no hurt." The second face represents a pain score of 2 and indicates "hurts a little bit." The third face represents a pain score of 4 and indicates "hurts a little more." The fourth face represents a pain score of 6 and indicates "hurts even more." The fifth face represents a pain score of 8 and indicates "hurts a whole lot" and the sixth face represents a pain score of 10 and indicates "hurts worst."

Pain anxiety symptoms scale (PASS). Pain anxiety symptoms scale (PASS; Cracken, 1992) .The PASS (pain anxiety symptom scale) measures fear and anxiety responses specific to pain. It is an 20 item measure of anxiety during pain. It consist of four subscales: cognitive,(6 items) fear,(4 items) escape avoidance(5 items), and physiological anxiety (5 items) .The PASS(pain anxiety symptom scale uses 6 point response format ranging from never 0 (*Never*) to 5 (*always*). The Cronbach's alphas of the pain anxiety subscales were: 0.64 for cognitive, 0.67 for fear, 0.56 for escape avoidance, 0.68 for physiological avoidance.

Beck depression scale (BDI). Beck depression scale (Beck, 1961) is an 21 item measure of depression on a 4-point scale from 0 (symptom absent) to 3 (severe symptoms). Anxiety symptoms are not assessed but affective, cognitive, somatic and vegetative symptoms are covered, reflecting the DSM-IV criteria for major depression. Scoring is achieved by adding the highest ratings for all 21 items. In those diagnosed with depression, scores of 0–13 indicate minimal depression, 14–19 (mild depression), 20–28 (moderate depression) and 29–63 (severe depression) (Beck, Steer, & Brown, 1996). The minimum score is 0 and maximum score is 63.The cronbach alpha of the BDI scale is .60.

Positive and Negative affect schedule scale (PANAS). Positive and negative affect schedule scale (PANAS; Clark & Tellegen,1988; Hussein & vostanis, 2008) is an 10 -item measure of positive and negative moods . It consist of two subscales: positive affect (5 items), negative affect (5 items).A Likert scale is used and all items have five possible answer options scored from (1) Very slightly or not at all,(2) a little ,(3) moderately,(4) quite a bit and (5) extremely (Clark & Tellegen,1988).The Cronbach's alphas of the positive and negative affect schedule subscales were: positive affect 0.58, negative affect 0.24.

Coping strategy scale. It is an 28 -item measure the coping responses in stressful situations (Carver, 1997). It consist of four subscales: ,which is evaluated in terms of problem focused coping (items 12,15,17,18,20,24 and 28),religious coping (items 1,4,6,9,11,13,16,19,21 and 26) positive coping (items 2,7,5,10,15,14 and 25) and active avoidance coping (items 1,4,6,9,11,13,16,19,21 and 26). Patients rate the frequency of their use of the specific strategies using a seven-point Likert scale ranging from 0 (Never do that) to 6 (Always do that); each domain is scored separately. The Cronbach's alphas of brief cope subscales were: problem focused coping 0.70, active avoidance coping 0.24, positive coping .18, and religious coping 0.24.

Procedure

This study was carried out in accordance with the recommendations of the Foundation University Islamabad, Rawalpindi Campus and ethics committee with written informed consent from all participants. All procedures performed in studies involving human participants were in accordance with the ethical standard of the institutional

research committee. Standardized questionnaires, which are used in psychological worldwide research, were exclusively used in the research procedure .This type of research is based on guideline and procedures in accordance with applicable law and ethics. Consent to the study was approved by the appropriate authorities of the physiotherapy department and the patients themselves. Before starting to fill in the questionnaires, patients were asked to sign an informed consent form which specified all their problems. A total of 250 osteoarthritis patients with chief complaint of osteoarthritis were incorporated between March 2018 to January 2019 from different private and public Hospitals at physiotherapy departments of PIMS (Pakistan institute of medical sciences) and Shifa hospital Islamabad, Pakistan. All participants were native Urdu speakers and able to read and write Urdu. The participants were evaluated by psychological questionnaires i.e. (pain anxiety symptom scale, beck depression inventory, and positive and negative affect schedule, and pain intensity scale, Brief cope scale) to confirm the osteoarthritis problems along with psychological problems.

RESULTS

In Table 1, the overall reliability alpha coefficient of study variables were shown sufficient reliability. In Table 1, the results demonstrated that perception of pain anxiety was statistically positively associated with perception of osteoarthritis, perception of pain, religious coping strategy, positive and negative affect in osteoarthritis patients. This study found that perception of osteoarthritis was statistically negatively related to perception of osteoarthritis, perception of pain, problem focused and positive coping strategies in osteoarthritis patients. Whereas, the results revealed that perception of osteoarthritis was statistically positively related to depression in osteoarthritis patients. The results of correlation analysis revealed pain severity was statistically negatively associated with depression but it was statistically positively related to religious coping strategy and positive affect. Moreover, this study found that depression was statistically negatively associated with problem focused coping strategy and positive affect. It also found that depression was statistically positively associated with positive affect.

In Table 2, this study's findings demonstrated that the tested model shown fit indices for current study data; $\chi2 = 28.20$, $p < .15$, $\chi2/df = 1.65$, RMSEA= .05, TLI= .92, CFI= .97, IFI= .97, NFI= .93. In the above model predictor variables shown 8% variance for negative affect, 2% variance for positive affect, 21% variance for pain anxiety , 17% variance for perception of pain , 25% variance for depression in osteoarthritis patients.

A mediational model

The results of presented model illustrated that depression was statistically positively significant predicted by perception of osteoarthritis ($\beta = .22$, p <.000) for osteoarthritis patients. Findings further revealed that perception of pain was negatively significant predicted by perception of osteoarthritis ($\beta =.23$, p <.000). Furthermore, the results of current model shown that depression was

statistically negatively impacted by perception of pain ($\beta = -.14$, p <.001). These findings recommended perception of pain was full mediator in the relationship among perception of osteoarthritis, depression, positive and negative affect in osteoarthritis patients. These results shown that perception of osteoarthritis was associated with higher level of depression and mood swings since it favors of greater level of perception of pain in osteoarthritis patients.

A moderation models

A Moderation analyses was performed to examine the moderating role of coping strategies among perception of osteoarthritis, perception of pain, pain anxiety and depression in osteoarthritis patients.

In model 1, the results revealed that perception of osteoarthritis was related to higher level of depression because it favors of higher level of positive coping strategy in osteoarthritis patients. These results shown that interaction between positive coping strategy and perception of osteoarthritis was statistically significant predicting depression ($\beta = .28$, p <.001) in osteoarthrus patient.

In model 2, the results illustrated that positive coping strategy was playing the role of moderator between perception of osteoarthritis and perception of pain in osteoarthritis patients. The results of study revealed that interaction between positive coping strategy and perception of osteoarthritis was negatively predicting perception of pain ($\beta = -.37$, p <.001) in osteoarthritis patient. A moderation analysis findings revealed that perception of osteoarthritis was associated with lower level of perception of pain because it favors of higher level of positive coping strategy in osteoarthritis patients.

In model 3, the findings found that positive coping strategy was playing the role of moderator between perception of osteoarthritis and pain anxiety in osteoarthritis patients. The results of study revealed that interaction between positive coping strategy and perception of osteoarthritis was positively predicting pain anxiety ($\beta = .18$, p <.001) in osteoarthritis patient. A moderation analysis findings revealed that perception of osteoarthritis was associated with lower level of pain anxiety because it favors of higher level of positive coping strategy in osteoarthritis patients.

In model 4, the findings found that religious/denial coping strategy was playing the role of moderator between perception of osteoarthritis and perception of pain in osteoarthritis patients. The results of study revealed that interaction between religious/denial coping strategy and perception of osteoarthritis was positively predicting perception of pain ($\beta = .18$, p <.001) in osteoarthritis patient. A moderation analysis findings revealed that perception of osteoarthritis was associated with higher level of pain anxiety because it favors of higher level of religious/denial coping strategy in osteoarthritis patients.

In model 5, the findings found that problem focused coping strategy was playing the role of moderator between perception of osteoarthritis and pain in osteoarthritis patients. The results of study revealed that interaction between problem focused coping strategy and perception of osteoarthritis was positively predicting perception of pain ($\beta = .25$, p <.001) in osteoarthritis patient. A moderation analysis findings revealed that

perception of osteoarthritis was associated with higher level of perception of pain because it favors of higher level of problem focused coping strategy in osteoarthritis patients.

In model 6, the findings found that problem focused coping strategy was playing the role of moderator between perception of osteoarthritis and pain anxiety in osteoarthritis patients. The results of study revealed that interaction between problem focused coping strategy and perception of osteoarthritis was negatively predicting pain anxiety (β = -.19, p <.001) in osteoarthritis patient. A moderation analysis findings revealed that perception of osteoarthritis was associated with lower level of perception of pain because it favors of higher level of problem focused coping strategy in osteoarthritis patients.

In Table 3, the results demonstrated mean differences mean difference on coping strategies, perception of pain, pain anxiety, and perception of osteoarthritis, depression, positive and negative affect in male and female osteoarthritis patients. The results of present study revealed that female osteoarthritis patients were less experienced pain anxiety and positive affect than female osteoarthritis patients in present study.

Discussion

Pain is considered one of the most important sign of osteoarthritis as well as has been associated with psychological problems including anxiety, depression, stress, mood swings and sleep problems. Pain fluctuates in patients over time, but there was a paucity of researches to examine relationship between pain and mental health problems, this was first effort to explore the relationship pain and mental issues in Pakistani osteoarthritis patients. This study examined the relationship among coping strategies, perception of pain, pain anxiety, and perception of osteoarthritis, depression, positive and negative affect in osteoarthritis patients. Moreover, it examined the moderating role of coping strategies potential pathway among perception of pain, pain anxiety, perception of osteoarthritis, depression, positive and negative affect. Furthermore, it evaluated the mediating role of pain's perception potential pathway among perception of pain, pain anxiety, perception of osteoarthritis, depression, positive and negative affect. Additionally, it explored gender differences on coping strategies, perception of pain, pain anxiety, and perception of osteoarthritis, depression, positive and negative affect in osteoarthritis patients in osteoarthritis patients.

This investigated the relationship between among coping strategies, perception of pain, pain anxiety, and perception of osteoarthritis, depression, positive and negative affect in osteoarthritis patients. This study's results found that perception of pain was statistically negatively related to depression but it was positive related to positive affect and religious coping strategy in osteoarthritis patients. Further, this study illustrated that perception of pain anxiety was statistically positively associated with perception of osteoarthritis, perception of pain, religious coping strategy positive and negative affect in osteoarthritis patients. Moreover, the results revealed that perception of osteoarthritis was statistically negatively related to perception of osteoarthritis,

perception of pain, problem focused and positive coping strategies. Prior study findings are consistent with our study data and provided evidence for study assumption. Earlier researches demonstrated that osteoarthritis was associated with mental health issues including stress, depression, pain anxiety, and mood swings (Xue et al., 2018). Similar investigation also found that osteoarthritis symptoms were associated with psychopathology including depressive, stress and anxiety symptoms (Mallen et al., 2017).

This study also examined the moderating role of coping strategies pathway among perception of pain, pain anxiety, perception of osteoarthritis, depression, positive and negative affect. Furthermore, it evaluated the mediating role of pain's perception potential pathway among perception of pain, pain anxiety, perception of osteoarthritis, depression, positive and negative affect. The aim of current investigation was to confirm the assumptions related to the direct and indirect effect of perception of pain between perception of osteoarthritis, pain anxiety, depression, mood swings in osteoarthritis patients. The results confirmed that perception of osteoarthritis was indirectly associated with higher level of depression, positive and negative affect since it favors of greater level of perception of pain in osteoarthritis patients. Moreover, the results of present investigation also established that problem focused, positive and religious coping strategies were playing role of moderators among potential pathway among perception of pain, pain anxiety, perception of osteoarthritis, depression, positive and negative affect in osteoarthritis patients.

In model 1, the results revealed that perception of osteoarthritis was related to higher level of depression because it favors of higher level of positive coping strategy in osteoarthritis patients. Further, in model 2, the results demonstrated perception of osteoarthritis was associated with lower level of perception of pain because it favors of higher level of positive coping strategy. Moreover, in model 3, the findings found that perception of osteoarthritis was associated with higher level of pain anxiety because it favors of higher level of religious coping strategy. In additionally, in model 5, the results revealed that perception of osteoarthritis was associated with higher level of perception of pain because it favors of higher level of problem focused coping strategy. Whereas, in model 6, the findings found that perception of osteoarthritis was associated with lower level of perception of pain because it favors of higher level of problem focused coping strategy. Interestingly, if both moderators and mediator as coping strategies and pain anxiety are taken into explanation simultaneously. This study's findings explained that the greater level of perception of pain and pain anxiety would be helpful to stimulate to mental health issue including depression and mood swings in osteoarthritis patients. Several earlier studies findings supported present study results (Chen et al., 2019; Thompson, et al., 2016). Previous studies found that symptoms of osteoarthritis disease dragged toward psychopathology including depression, pain anxiety, mood swings, delusion and hallucination. Similar studies reported that osteoarthritis was associated with mental health issues including stress, depression, pain anxiety, and mood swings (Xue et al., 2018). Similar

investigation also found that osteoarthritis symptoms were associated with psychopathology including depressive, stress and anxiety symptoms (Burke, Mathias, & Denson, 2015; Mallen et al., 2017; Burston et al., 2019).

Furthermore, this study explored gender differences on coping strategies, perception of pain, pain anxiety, and perception of osteoarthritis, depression, positive and negative affect in osteoarthritis patients in osteoarthritis patients. The results of independent samples t-test revealed that female osteoarthritis patients were less experienced pain anxiety and positive affect than female osteoarthritis patients in present study. Earlier researches demonstrated that male osteoarthritis patients had more prevalence of mental health issues such as depression, mood swings as compared to female osteoarthritis patients (Xue et al., 2018). Similar studies also supported present study assumption that male osteoarthritis patients were more shown anxiety and depression symptoms as compared to female osteoarthritis patients (Mallen et al., 2017).

Limitation and implication

This study had many limitations which should be addressed and discussed. The first limitation was that this study was cross-sectional study that did not permit to draw causal inferences. The second limitation of present, Small sample size is too small that's why it findings cannot be generalized on future studies. Finally, this study only comprised knee osteoarthritis patients who were recruited from different hospitals of Islamabad and Rawalpindi, Pakistan. Notwithstanding of aforementioned drawback, this present investigation provides in-depth knowledge about mental health issues of knee osteoarthritis patients and address vulnerable mental health consequences as well spread knowledge how to tackle these mental health issues in different hospital Pakistan.

Conclusion

This study recommended that more stable and chronic knee joint pain levels have been related to pain anxiety, depression disorder, positive and negative affect in osteoarthritis patients. These results highlighted the value of assessing intensity of pain, mental health problems in osteoarthritis patients, because knee joint pain variations could be instigated and stimulated various psychological issues including pain anxiety, depression disorder, positive and negative affect. Moreover, This present study's results also emphasized that physiological problems as perception of pain can be linked to enhanced mental problems including pain anxiety, depression disorder, positive and negative affect because it favors of pain anxiety as well as vulnerable coping defense mechanisms in osteoarthritis patients. Furthermore, mediation analysis suggested that vulnerable perception of osteoarthritis was associated to enhance depression, positive and negative affect since it supported by higher level of intensity of pain. However, a moderation analysis results suggested that perception of osteoarthritis was associated to stimulate perception of pain, depression, positive and negative affect which was increased and reduced by religious, problem focused, and positive coping strategies in osteoarthritis patients.

Availability of data and materials

The data sets used and analyzed during the current study are available from the corresponding author on reasonable request.

Authors' contributions/Author details

Miss Rimsha performed the main study under the supervision of Muhammad Aqeel. Rimsha and Muhammad Aqeel wrote the article under the guidelines of Nature-Nurture Journal of Psychology.

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Ethics declarations

Ethics approval and consent to participate

This study was approved by the Institutional Review Board (Foundation University Islamabad). A written informed consent was obtained from all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare to have no competing interests.

Additional Information

Not applicable.

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Publisher's Note

Results

Table 1

Mean standard deviation, alpha coefficient, and correlation matrix among coping strategies, pain anxiety, depression, pain perception, positive and negative affect in osteoarthritis patients (N=250)

Variables	M	SD	α	1 2	3	4	5	6	7	8	9	10
1. Pain anxiety	66.32	15.79	.86	- .21*	-.05	.15*	-.02	.20**	-.05	.10	.14*	.28**
2. Perception of osteoarthritis	138.37	27.61	.84		-.26**	.34**	-.18**	-.07	-.21**	-.01	-.11	-.02
3. Perception of pain	3.86	1.67	-			-.28**	-.02	.20**	.09	-.03	.30**	-.07
4. Depression	39.50	9.39	.73			-	-.12*	-.04	-.19**	-.05	.40**	.15*
5. Problem focused coping strategy	17.72	3.27	.67				-	.20**	.33**	.12	.14*	.08
6. Religious coping strategy	10.08	2.33	.63						-.02	.06	-.11	-.01
7. Positive coping strategy	18.16	3.32	.57						-	-.03	.09	-.00
8. Active avoidance coping strategy	24.62	3.42	.64								.07	.16*
9. Positive affect	17.47	3.43	.60									.46**
10. Negative affect	16.38	2.98	.65									-

$p < .05, \ p < .01$

Table 2

The moderating and mediating role of coping strategies and pain's perception among pain anxiety, osteoarthritis's perception, perception of pain,   depression, positive and negative affect in osteoarthritis patients (N= 250)

Variable	DEP B	SE	β	PAIN B	SE	β	PAF B	SE	β	NAF B	SE	B	OAPA B	SE	β
PAIN	-.80	.32	-.14**												
OAPA	.07	.03	.13**				.03	.01	.14**	.05	.01	.28***			
OAOA	.07	.02	.22***	-.01	.01	-.23***									
Int_oa_pfc				.31	.10	.25**							-2.25	1.03	-.19**
Int_oa_pc	2.13	.43	.28***	-.50	.10	-.37***							2.34	1.12	.18**
Int_pa_rc				.01	.01	.18***									

Note. PAIN= Perception of pain anxiety; OAOA= Perception of osteoarthritis; OAPA; Perception of pain anxiety; PAF=Psychological distress; NAF= Negative affect; DEP= Depression; Int_oa_pfc= Interaction between perception of osteoarthritis and problem focused coping strategies; Int_oa_pc= Interaction between perception of osteoarthritis and positive coping strategies; int_pa_rc= Interaction between perception of pain and positive coping strategies.
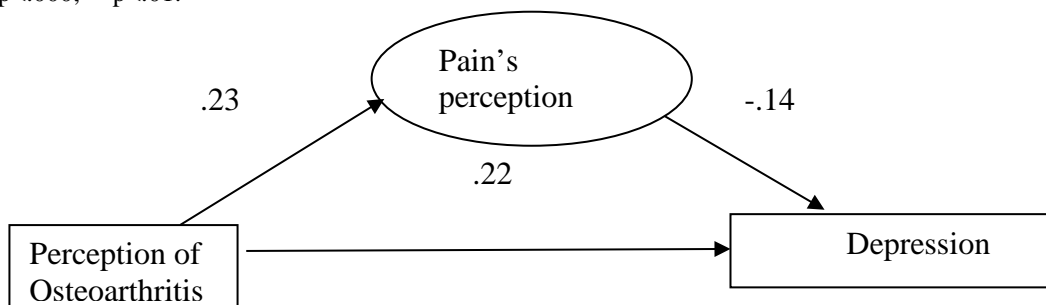
***p<.000, **p<.01.

Figure 1. The mediating role of perception of pain between perception of osteoarthritis and depression in osteoarthritis patients *(N=250).*
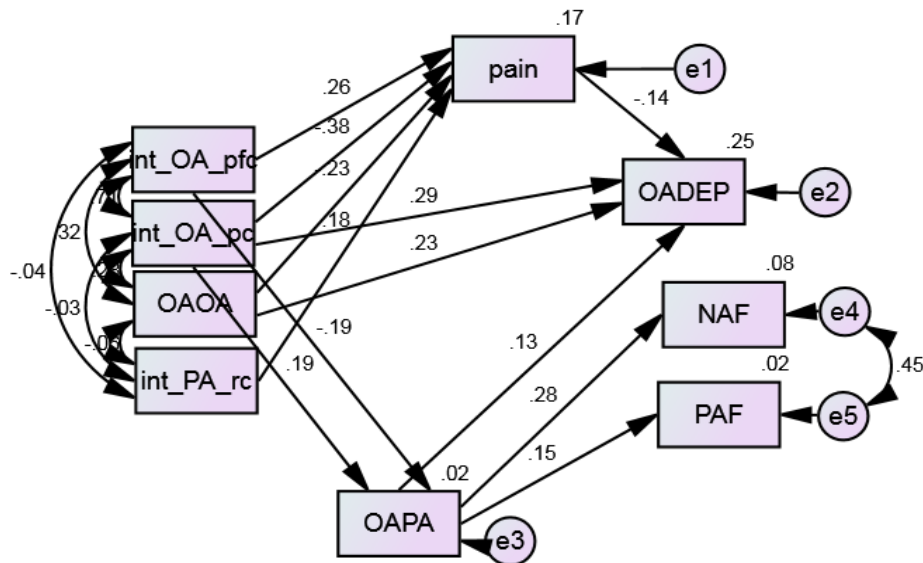
Figure 2. The moderating and mediating role of coping strategies and pain's perception among pain anxiety, osteoarthritis's perception, perception of pain, depression, positive and negative affect in osteoarthritis patients (N= 250).

Table 3
Mean difference on coping strategies, perception of pain, pain anxiety, and perception of osteoarthritis, depression, positive and negative affect in male and female osteoarthritis patients(N= 250).

	Male osteoarthritis Patient(n=145)		Female osteoarthritis Patient(n=105)				95%CI		
Variables	M	SD	M	SD	t(df)	p	LL	UL	cohen's d
OAPA	68.84	14.67	62.85	16.67	3.0(206.69)	.00	2.06	9.92	..38
OAOA	138.01	27.85	138.85	27.41	-.23(226.20)	.81	-7.85	6.17	-
Pain	3.69	1.60	4.09	1.75	-1.87(213.70)	.06	-.82	.02	-
Dep	40.34	8.13	38.37	10.82	1.63(186.76)	.10	-.39	4.32	-
PFC	17.79	3.13	17.61	3.47	.44(212.52)	.65	-.64	1.01	-
RC	10.07	2.36	10.09	2.29	-.06(229.74)	.95	-.60	.57	-
PC	18.09	3.50	18.25	3.09	-.38(239.81)	.70	-1.00	.67	-
AC	24.78	3.43	24.40	3.41	.86(227.29)	.38	-.48	1.24	-
PAF	17.83	3.40	16.98	3.44	1.94(224.66)	.05	-.01	1.71	0.24
NAF	16.54	2.70	16.16	3.33	.99(197.39)	.31	-.37	1.13	-

Note. Pain= Perception of pain anxiety; OAOA= Perception of osteoarthritis; OAPA; Perception of pain anxiety; PAF=Psychological distress; NAF= Negative affect; Dep= Depression; PFC =Problem focused coping strategy; RC = religious coping strategy; Pc = Positive coping strategy; AC = Active avoidance coping strategy.
*p < .05, p < .01, ***p<.001*