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Prevalence of mental health disorders in knee osteoarthritis patients: a systematic review and meta-analysis

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Background: Knee osteoarthritis (OA) is a prevalent degenerative disease affecting synovial joints, predominantly the knee, leading to various complications, including mental health conditions like depression and anxiety. This systematic review aimed to determine the prevalence of depression and anxiety in knee OA patients.

Methods: A comprehensive literature search was conducted in various databases till September 15, 2023. Studies focusing on the prevalence of mental health issues in patients with knee OA were included, excluding narrative reviews, protocols, unpublished reports, editorials, case reports, abstracts, and commentaries. All statistical analyses were performed in R version 4.2.3.

Results: This review included a total of 14 studies involving middle-aged to elderly adult patients with knee OA, with ages ranging from 45 to 75 years. Among these, 13 studies involving 3390 adult patients with an average age of 59.75 years reported a pooled prevalence of depression of 30% (95% confidence interval: 18–43), demonstrating a substantial heterogeneity ($I^2 = 98\%$). Additionally, anxiety was identified with a combined prevalence of 27% (95% confidence interval: 24–30) based on three studies that included 1407 older adult patients with an average age of 62.1 years. These studies displayed minimal heterogeneity ($I^2 = 7\%$).

Conclusion: The findings show a significant prevalence of depression among adult patients with knee OA and anxiety among older adults with knee OA, emphasizing the need for integrated healthcare approaches that address both orthopedic and mental health conditions. More comprehensive research is essential to deepen our understanding of the connection between mental illnesses and knee OA and to develop effective preventive and treatment strategies.

Keywords: anxiety, depression, osteoarthritis, prevalence, systematic review

Introduction

OA is a quintessential degenerative illness predominantly affecting synovial joints[1]. It registers the highest incidence among all inflammatory joint diseases. The condition is characterized by gradual degeneration and ensuing damage to the articular cartilage, often leading to secondary harm to adjacent structures like bones and ligaments[1]. OA typically results in deformity, pain, and functional disability. Radiographically, pathological alterations such as the degeneration of articular cartilage, the formation of osteophytes, and the narrowing of joint space are discernible. Clinically, the manifestations of OA extend to stiffness, joint pain, a diminished range of motion, and crepitus and can also contribute to the development of mental disorders[2]. Knee joint OA may lead to abnormalities in gait, while hip joint OA can impact posture and, in the case of hand OA, result in the formation of osteophytes.

HIGHLIGHTS

- A significant prevalence of depression (30%) and anxiety (27%) among knee osteoarthritis (OA) patients aged 45–75 years underscores the global mental health challenge within this demographic.
- Variations in depression prevalence due to different diagnostic scales and study designs underscore the impact of diagnostic methods on outcomes, highlighting the necessity for standardized diagnosis.
- Psychological health assessments, including routine screenings for depression and anxiety, into knee OA management, emphasizing a holistic care approach that addresses both orthopedic and mental health needs.

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A majority of individuals with OA often contend with mental health challenges, including depression and anxiety, experiencing a decline in quality of life. Additionally, they face physical impediments such as challenges in performing activities of daily living and increased susceptibility to falls. Persistent pain and stiffness may also give rise to potential substance abuse issues[3,4]. The enduring pain and discomfort associated with knee OA, coupled with the consequential restrictions on physical activity, are significant contributors to the development of mental health conditions like depression and anxiety[5]. The continuous struggle with performing everyday tasks, coupled with a reduction in mobility, can induce feelings of despair, helplessness, and hopelessness, impacting individuals' psychological well-being substantially. The chronic progression of knee OA often requires enduring and multifaceted management strategies, including lifestyle modifications, medication regimes, and possibly surgical interventions[6]. The ongoing nature of these interventions can be mentally taxing and frustrating, leading to heightened stress and potential exacerbation of existing mental health conditions. The limitations imposed by the condition can also lead to social isolation, which can further intensify feelings of loneliness and depression, creating a vicious cycle of physical pain and mental anguish.

Moreover, persistent pain and the ongoing need for management can sometimes lead to sleep disturbances, further impacting mental health and overall quality of life. The struggle with disrupted sleep can lead to heightened irritability, diminished cognitive function, and exacerbated feelings of anxiety and depression[7]. Understanding the interplay between mental health conditions such as depression, stress, anxiety, and knee OA is crucial for optimizing patient care and improving the overall quality of life.

Several studies have explored the relationship between mental health conditions such as depression, stress, and anxiety and their prevalence among patients with knee OA[8–11]. Studies indicate a significant relationship between mental health issues, particularly depression, and knee OA. A systematic review highlighted that depression is strongly associated with knee pain, while anxiety showed limited evidence of a relationship, and poor mental health showed minimal evidence of a connection with knee pain[12]. Studies have shown that psychological functioning plays a crucial role in knee pain, with higher pain levels correlating with an increased likelihood of anxiety and depression[12,13]. Additionally, there is evidence that depression can worsen arthritis symptoms, lower pain thresholds, and lead to more functional limitations, affecting treatment adherence and overall health outcomes[14].

The current published studies have reported the prevalence of mental illness in OA patients[15–19]. However, it varies substantially between investigations. Therefore, this systematic review is conducted to synthesize existing research to determine the prevalence of these mental health conditions in individuals suffering from knee OA.

Materials and methods

The present systematic review has been conducted following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and registered with PROSPERO under the registration number CRD42023469320 (Supplementary Table S1, Supplemental Digital Content 1, http://links.lww.com/MS9/A535).

Inclusion and exclusion criteria

We included studies that report on the prevalence of mental health issues in individuals with knee OA, encompassing both observational studies and clinical trials. Studies focusing on other forms of arthritis or OA manifesting in joints other than the knee were also excluded to maintain specificity. Inclusion was limited to preprints and articles published in English, but no restrictions were placed on geographical location or research environment, allowing for a broad range of studies. Detailed inclusion and exclusion criteria are enlisted in Supplementary Table S2 (Supplemental Digital Content 1, http://links.lww.com/MS9/A535).

Search strategy and screening

A comprehensive literature search was conducted up to September 15, 2023, utilizing several prominent databases, including PubMed, EMBASE, Scopus, and Web of Science. The search strategy implemented involved a combination of keywords and synonyms related to knee OA and mental illnesses. Additionally, manual searches were performed in Google Scholar and other preprint platforms to find additional relevant articles. No restrictions were placed on the year of publication, ensuring an inclusive collection of available literature. Detailed information about the search strategy and the specific keywords and terms used is delineated in Supplementary Table S3 (Supplemental Digital Content 1, http://links.lww.com/MS9/A535).

After acquiring search results, duplicate entries were diligently eliminated, and Mendeley was deployed as a reference management tool to organize the accumulated references systematically. The ensuing initial screening process was collaboratively undertaken by two independent researchers utilizing Rayyan software, a tool designed to facilitate the early stages of systematic review preparation[20,21]. Both researchers, working independently, scrutinized the titles and abstracts of each retrieved study to exclude those deemed irrelevant to the review's focus. Following this, an examination of the full texts of the shortlisted studies was conducted to assess their compliance with the inclusion criteria. In cases of discrepancies or differing opinions concerning a study's eligibility, the input of a third independent researcher was sought to resolve any disagreements.

Data extraction

Three reviewers meticulously extracted data from the selected studies to ensure accuracy and thoroughness. The information extracted from each study included the first author's name, the country where the study was conducted, the publication year, demographic details, total sample size, type of mental issue, criteria for diagnosing the mental issue, and the number of patients.

Quality assessment

The quality of the included studies was assessed using a modified version of the Newcastle–Ottawa Scale, ranging from 0 to 6, which was employed since the outcome of concern is prevalence[22–25]. The Cochrane RoB 2 tool was used for randomized controlled trials (RCTs)[26,27]. A study garnering a higher score was deemed to possess superior methodological quality and presented a lower risk of bias[28]. This meticulous

approach to data extraction and quality assessment ensures the reliability and robustness of the findings derived from the reviewed studies.

Statistical analysis

A random-effects model was utilized to compute the pooled prevalence of mental health conditions in knee OA patients to accommodate the potential variations between the included studies. This model is advantageous as it accounts for the anticipated heterogeneity across studies, offering a more reliable and encompassing estimation of overall prevalence. The number of patients diagnosed with mental illness (events) and total sample size were taken to determine the pooled prevalence[24,29]. The extent of heterogeneity, or variability in results across different studies, was quantified using I^2 and tau-squared statistics[30]. I^2 values of 25, 50, and 75% typically represent 'low,' 'moderate,' or 'high' heterogeneity[31]. A predefined significance level was established to assess the statistical significance of the observed heterogeneity. Conventionally, a P value of less than 0.05 indicates statistical significance. The tau-squared value was calculated employing the maximum likelihood estimator. Additionally, sensitivity analyses and influencer diagnostic analyses were conducted to scrutinize the robustness and reliability of the results. All statistical analyses were conducted using R software, version 4.2.3[32].

Results

Literature search outcomes

A total of 12 846 records were screened from various databases, and an additional four records were found through a citation search. After primary screening, 815 articles were assessed for eligibility through full-text screening, during which 802 were excluded for various reasons. Ultimately, 14 articles met our criteria for inclusion, with 13 of these included in the meta-analyses. The screening and selection of articles are presented in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram (Fig. 1).

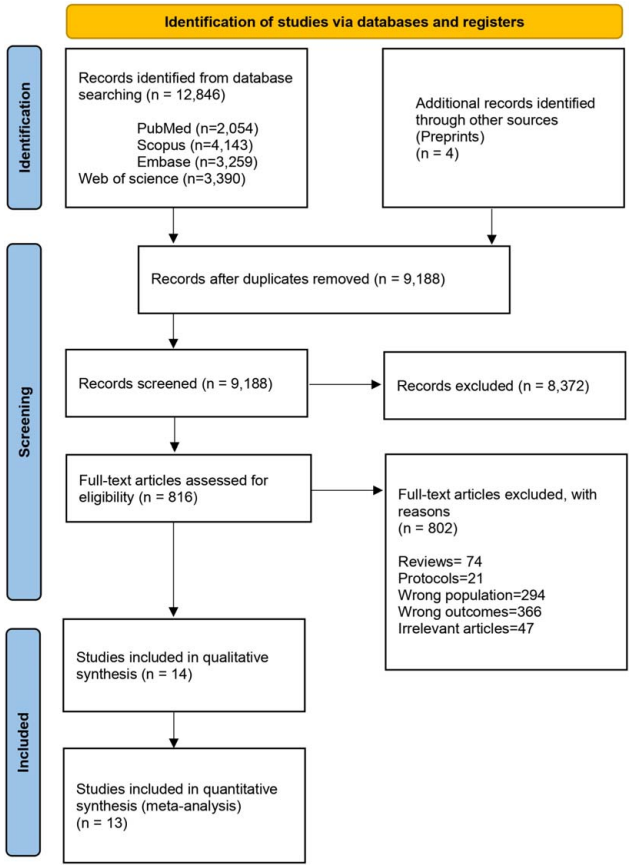

Figure 1. PRISMA flow diagram depicting the screening and selection process. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

Characteristics of included studies

The characteristics of the included studies are given in Table 1. The included studies span a variety of countries and regions, including Pakistan[15], Taiwan[33], India[16], the Netherlands[34], Canada[19,35], Korea[18,36], the USA[37], China[9,38,39], Japan[17], and Turkey[40], reflecting a diverse and comprehensive range of demographics and cultural contexts. The mean age of participants across the studies varied, ranging from 45 to 70.91 years, primarily focusing on middle-aged to elderly populations, which is pertinent given the increased prevalence of knee OA in these age groups. The study designs were diverse, incorporating cross-sectional studies, prospective observational studies, retrospective studies, a population-based cohort, and results from a RCT, enabling the synthesis of findings from varied methodological approaches. The proportion of male participants in the studies varied significantly, with some studies not reporting sex-specific data. Regarding the clinical outcomes, the total number of patients with knee OA and the number of participants developing mental illnesses like depression, anxiety, and stress were reported, with varying prevalence rates observed across different studies. Several different scales were employed to measure mental illness across the studies, including the Beck Depression Inventory (BDI), the Geriatric Depression Scale (GDS), the Hospital Anxiety and Depression Scale (HADS), patient self-reported depression, the Center for Epidemiologic Studies Depression Scale (CES-D), and the Patient Health Questionnaire-9 (PHQ-9).

Quality assessment

The quality assessment of the included studies revealed a variation in scores. Four studies received a score of 3, five studies scored 4, two scored 5, and two achieved a score of 6. The RCT also showed a low risk of bias. The overall quality of the included studies can be characterized as moderate to high (Supplementary Table S4, Supplemental Digital Content 1, http://links.lww.com/MS9/A535).

Data synthesis

Depression

A total of 13 studies reported on the prevalence of depression among patients with knee OA[15,16,18,19,33–40]. These studies encompassed 3390 patients, from which a pooled prevalence of 30% [95% confidence interval (CI): 18–43] for depression was observed. The heterogeneity was significant, $I^2 = 98\%$. Figure 2 presents the forest plot illustrating the pooled prevalence of depression.

Table 1

Characteristics of included studies

Study	Country	Study design	Mean age	Male %	Total no of patients with knee OA	No. of individuals with mental illness	Scale used to measure mental illness
Aqeel *et al.* 2021[15]	Pakistan	Cross-sectional study	55	57.6	250	Depression = 232	BDI
Chen *et al.* 2019[33]	Taiwan	Prospective cohort study	70.91	27.5	102	Depression = 4	GDS
Dhaon *et al.* 2019[16]	India	Cross-sectional study	NA	67	100	Depression = 19	HADS
Duivenvoorden *et al.* 2013[34]	Netherlands	Prospective cohort study	66.2	43.7	128	Anxiety = 29, depression = 26	HADS
Gandhi *et al.* 2015[35]	Canada	Prospective cohort study	64.7	43	475	Depression = 58	Patient self-reported depression
Iijima *et al.* 2018[17]	Japan	Cross-sectional study	74.8	32.6	95	Depression = 43	GDS
Lee *et al.* 2020[36]	Korea	Retrospective cross-sectional study	65.1	27.7	1157	Anxiety = 331 Depression = 283 Stress = 370	CES-D
Lee *et al.* 2022[18]	Korea	Prospective cohort study	70.7	10.8	106	Depression = 18	PHQ-9
Possley *et al.* 2009[37]	USA	Prospective cohort study	65.9	NA	105	Depression = 44	CES-D
Sayre *et al.* 2020[19]	Canada	Population-based cohort study	55	NA	122	Anxiety = 32, Depression = 25	HADS
Wong *et al.* 2015[9]	China	Cross-sectional study	65	NA	115	Psychiatric morbidity = 45	HADS
Yilmaz *et al.* 2015[40]	Turkey	Prospective cohort study	45	NA	139	Depression = 44	BDI
Zheng *et al.* 2021[38]	China	Results from RCT	63.3	NA	397	Depression = 101	PHQ-9
Zheng *et al.* 2022[39]	China	Cross-sectional study	69.2	NA	214	Depression = 94	GDS

BDI, Beck Depression Inventory; CES-D, Center for Epidemiologic Studies Depression Scale; GDS, Geriatric Depression Scale; HADS, Hospital Anxiety and Depression Scale; PHQ-9, Patient Health Questionnaire; RCT, randomized controlled trial.

Anxiety

Three studies reported anxiety in knee OA patients[19,34,36]. A pooled prevalence of 27% (95% CI: 24–30) was found for anxiety from a total of 1407 patients. Heterogeneity was found to be low, with $I^2 = 7\%$. Figure 3 shows the pooled prevalence of anxiety among knee OA patients.

Subgroup analysis

Given the marked heterogeneity among the studies, we conducted a subgroup analysis based on the study design and the various scales used to assess depression.

Based on assessment scales

Two studies involving a total of 381 patients utilized the BDI, unveiling a pooled prevalence of 66% (95% CI: 0.66–1.00) for depression, with a high I^2 of 99%, indicating significant heterogeneity. The GDS was employed in three other studies with 411 patients, yielding a pooled prevalence of 28% (95% CI: 5–60) and a similarly high heterogeneity (I^2 of 99%). Three studies that involved 350 participants used the HADS, demonstrating a pooled prevalence of 20% (95% CI: 0.15–0.24) for depression, with no observed heterogeneity ($I^2 = 0\%$). The CES-D was applied in two studies, comprising 1262 patients, and revealed a pooled prevalence of 32% (95% CI: 0.16–0.50) with substantial

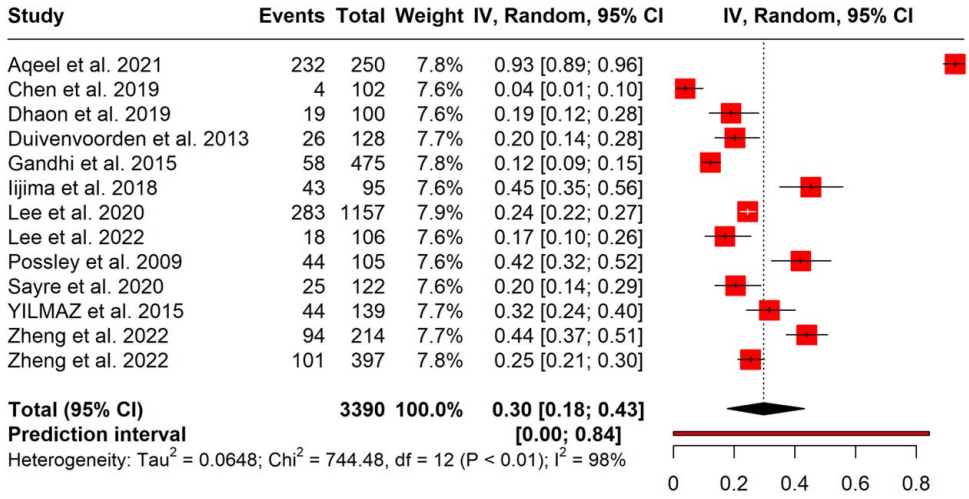

Figure 2. Forest plot illustrating the pooled prevalence of depression.

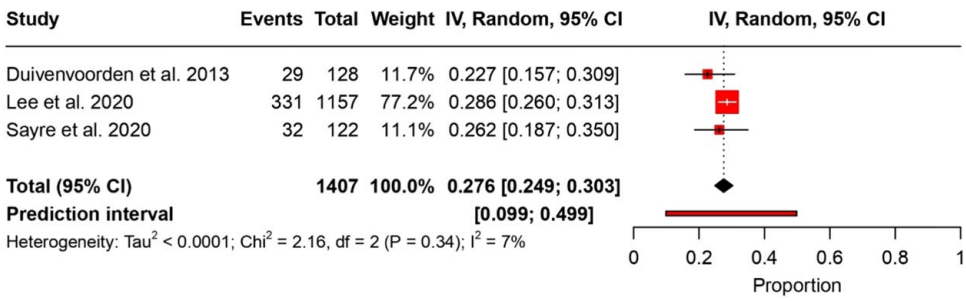

Figure 3. Forest plot illustrating the prevalence results of anxiety.

heterogeneity I^2 of 93%. The PHQ-9 scale was used in two studies with 503 patients and showed a pooled prevalence of 22% (95% CI: 0.14–0.30) for depression, with a moderate heterogeneity I^2 of 71%. A single study, which relied on patient-reported criteria and included 475 patients, indicated a 12% (95% CI: 0.14–0.30) prevalence of depression among patients with knee OA. The outcomes of these subgroup analyses, delineated by the varying diagnostic scales for depression, are illustrated in Figure 4.

Based on the study design

Five cross-sectional studies involving 1816 patients found the prevalence of depression to be 46% (95% CI: 0.17–0.76). These

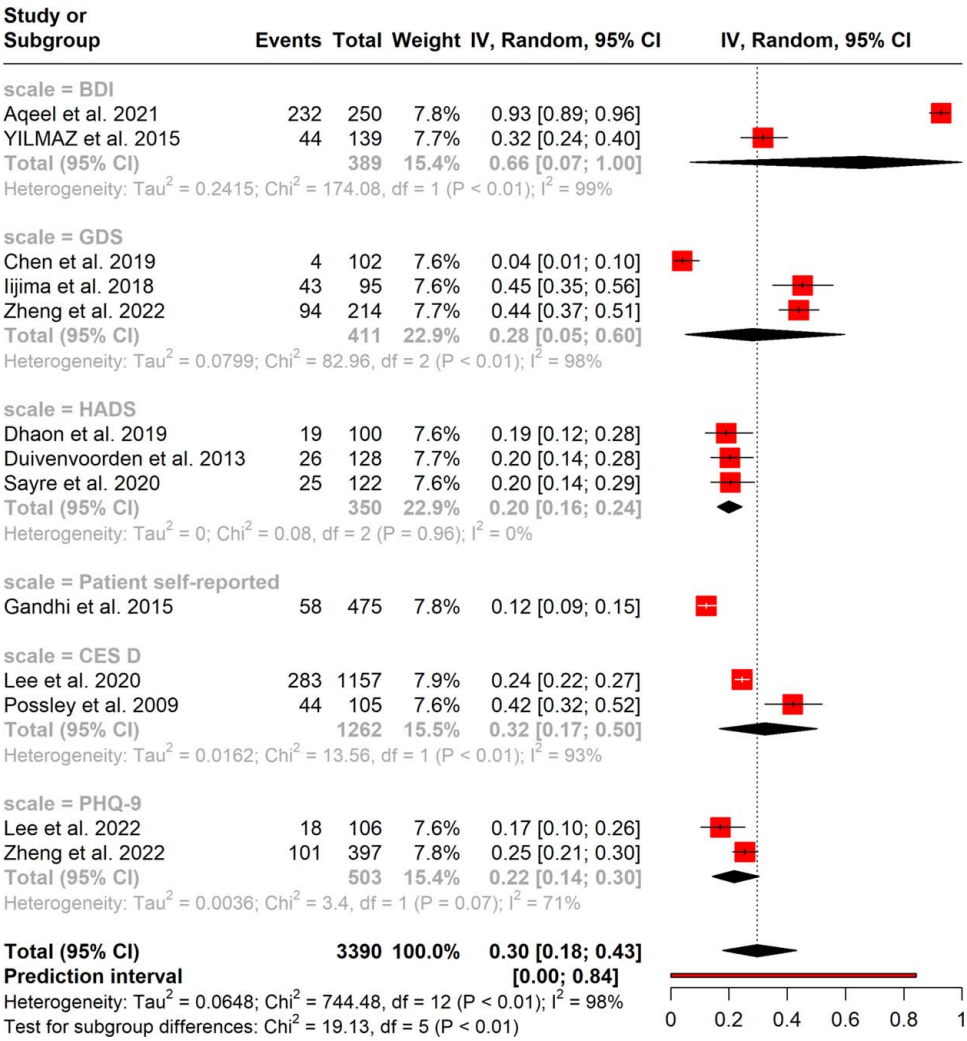

Figure 4. Forest plot depicting the results of subgroup analysis for the scale used to measure depression.

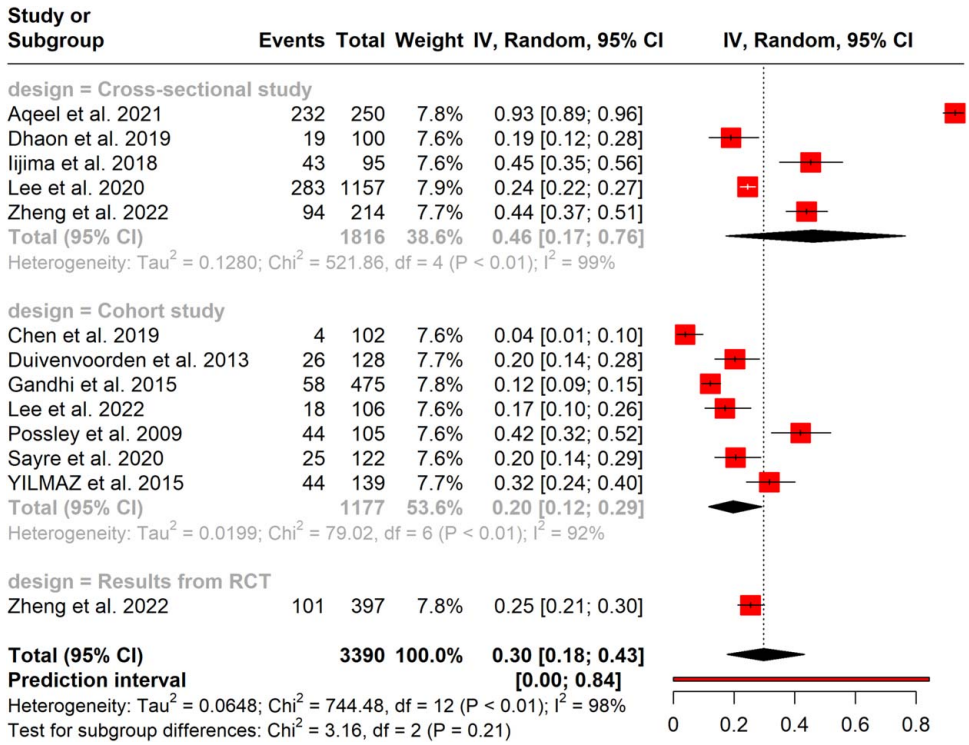

Figure 5. Results of depression subgroup analysis based on study design.

studies had significant heterogeneity, with an I^2 of 99%. Conversely, seven cohort studies with 1177 participants reported a pooled prevalence of depression at 20% (95% CI: 0.12–0.29), and these studies also exhibited significant heterogeneity with an I^2 of 92% (Fig. 5).

Psychiatric morbidity

Wong *et al*.[9] reported psychiatric morbidity among OA patients. Of the 115 OA patients studied, 65 exhibited psychiatric morbidity.

Sensitivity analysis

We conducted several sensitivity analyses. The Baujat plots indicated that the study by Aqeel *et al*.[15] contributed to heterogeneity and impacted the overall result for the prevalence of depression (Supplementary Fig. S1, Supplemental Digital Content 1, http://links.lww.com/MS9/A535). Similarly, influence analysis of pooled depression results[15] affected the overall result (Supplementary Fig. S2, Supplemental Digital Content 1, http://links.lww.com/MS9/A535).

We performed a leave-one-out analysis, omitting one study at a time. Excluding the study by Aqeel *et al*.[15] reduced the prevalence of depression among knee OA patients to 24% (95% CI: 18–31); $I^2 = 93\%$ (Supplementary Fig. S3, Supplemental Digital Content 1, http://links.lww.com/MS9/A535).

Publication bias

Funnel plots were utilized to detect any presence of publication bias. Visual inspection of the funnel plot suggested some asymmetry. However, the Egger test indicated no publication bias ($P = 0.706$) Supplementary Figure S4, Supplemental Digital Content 1, http://links.lww.com/MS9/A535 depicts the funnel plot.

Discussion

Our study was undertaken to evaluate the aggregated prevalence of mental illnesses, mainly focusing on patients with knee OA. We discovered a substantial prevalence of depression within this demographic, with 30% of the population being affected. However, a notable element in our findings was the presence of significant heterogeneity across the included studies. This heterogeneity may stem from the varied criteria employed by different studies to measure depression. Each study may have used distinct scales, methodologies, or thresholds to assess depressive symptoms, contributing to the variability in reported prevalence rates. It suggests that the observed prevalence of depression among knee OA patients may not be universally applicable due to differences in measurement approaches, and it underscores the need for standardized measurement techniques in future research to ensure comparability and reliability of findings. A previous systematic review also found similar results among general OA[7]. Their findings indicate that approximately 20% of individuals with OA exhibit significant levels of depressive symptoms, a pattern that aligns with observations within the rheumatoid arthritis demographic, where depression is reportedly prevalent.

Nonetheless, due to the scarcity of comparative studies, it remains undetermined whether individuals with OA have a heightened susceptibility to depressive symptoms compared to the broader population. Moreover, anxiety is present in nearly one-fifth of individuals with OA. However, the lack of

comparative data makes it challenging to ascertain whether this proportion is higher than those without OA. The result of our subgroup analysis showed a varied prevalence of depression based on the study design. Cohort studies have shown a relatively lower incidence. One possible reason is differences in how depression is measured over time (longitudinal and cross-sectional) and potential errors introduced by the selection of study participants in cohort studies.

A prior study highlighted the relationship between deteriorated indicators of mental well-being and the incidence and risk of pain flare-ups related to OA. The overall state of mental health, being an adjustable aspect of health, could potentially introduce a novel pathway for averting episodes of pain associated with OA[8]. Aqeel *et al.*[15] indicate that there is a positive correlation between the perception of knee OA and depression. However, no significant correlation was found between the perception of knee OA and pain, anxiety, and positive and negative effects. Additionally, relationships were identified among pain, anxiety, depression, and affected knee OA patients. Existing literature consistently suggests an interplay between depressive symptoms and the development of musculoskeletal pain. Patients with OA who experience symptoms of depression often experience increased functional limitations and increased pain, which can lead to other psychological problems such as mood swings and reduced physical function that is already limited due to OA. The study underscores that the severity of OA pain intensifies with the manifestation of depression symptoms, possibly resulting in increased functional impairments. Another study by Chen *et al.*[33] illustrates that in elderly patients with knee OA who underwent intraarticular hyaluronic acid (IAHA), knee pain, and depression were the predominant factors adversely impacting patient-reported knee functional outcomes.

Furthermore, it was established that age correlates with suboptimal patient-reported functional outcomes post-IAHA. Additionally, patients with a higher radiographic Kellgren and Lawrence grade (grade 3) exhibited significantly more depression and poorer knee functional outcomes compared to those with a lower radiographic OA grade (grade 2), both initially and across a 6-month longitudinal follow-up post-IAHA. Duivenvoorden *et al.*[34] unveiled a high prevalence of anxiety and depressive symptoms among individuals with end-stage hip and knee OA. Both groups observed a notable decline in the prevalence of these psychological symptoms postsurgery. The existence of preoperative depressive symptoms forecasted a diminished patient-reported outcome postsurgery for both hip and knee patients. Those who experienced preoperative anxiety or depressive symptoms reported lower satisfaction levels after the surgery. The hypothesis stemmed from the intricate link between psychological symptoms and pain and disability, leading us to anticipate a high prevalence of psychological symptoms in patients with end-stage hip and knee OA. Preoperatively, depressive symptoms were more prevalent among hip OA patients compared to knee OA patients, potentially due to differences in their ability to carry out activities of daily living before the surgery. However, to substantiate this hypothesis, further research is essential.

The pronounced prevalence of depression and anxiety among patients with knee OA, as illuminated by our study and various others, underscores the imperative need for integrated healthcare approaches that amalgamate orthopedic and mental health interventions. Clinically, healthcare providers should be vigilant to the psychosocial dimensions of OA, incorporating routine screenings for depressive and anxiety symptoms, especially in those with advanced and end-stage OA. Early identification and management of these psychological morbidities can be pivotal in enhancing the overall quality of life and functional outcomes postintervention, such as surgery[41,42]. There is a manifest need to consider psychological well-being as an integral component of preoperative and postoperative care, addressing mental health concerns concurrently with physiological ones. For patients undergoing IAHA, particular attention to depressive symptoms and pain management can be decisive in optimizing patient-reported outcomes and postoperative satisfaction levels. Various types of interventions designed to mitigate the perception of pain are effective in patients with chronic pain[43,44]. The observed correlations between depression, pain severity, and functional restrictions accentuate the need for multidisciplinary approaches, enveloping psychological counseling, pharmacological interventions, and physical therapy, to address the multifaceted challenges faced by OA patients holistically. On a public health front, the insights gained from these studies spotlight the necessity for awareness campaigns to educate patients, caregivers, and healthcare providers about the intertwined nature of physical and mental health in chronic musculoskeletal conditions[45]. Developing robust, evidence-based guidelines and fostering research on standardized measurement techniques for mental health symptoms in OA patients are crucial steps in advancing understanding and care. These comprehensive strategies can facilitate the creation of a health ecosystem where the psychological ramifications of OA are recognized, addressed, and mitigated, fostering improved health outcomes and quality of life for the affected individuals.

Our study does present several limitations that warrant consideration. First, including only articles published in English potentially omits valuable insights from studies conducted in other languages, biasing our findings. Second, we could only find studies predominantly on depression and anxiety, thereby limiting the scope to understand the prevalence and impact of other forms of mental illnesses among individuals with knee OA. Additionally, the substantial heterogeneity and the variability in the criteria used to assess mental illness across different studies constrain the generalizability of our results. These variations might have influenced the aggregated prevalence rates and the overall conclusions drawn from our study. Therefore, our findings should be interpreted with caution, and it is imperative to conduct more inclusive and diversified research in this domain to substantiate and expand the understanding of the relationship between mental illnesses and knee OA. We could not perform subgroup analysis based on sex due to a lack of sufficient data. Future studies should focus on the effect of demographics (sex, age) on mental illness in this population. The development of standardized measurement techniques and criteria for assessing mental illness in this population would significantly enhance the reliability and comparability of future studies, paving the way for more comprehensive and nuanced insights.

Conclusions

The findings of this study indicate a significant prevalence of depression and anxiety among patients with knee OA. This highlights a compelling need for further research aimed at exploring the spectrum of mental health conditions prevalent

within this population and identifying the contributory factors. It is critical to develop and implement comprehensive strategies that significantly enhance the mental well-being of individuals with knee OA. These interventions should prioritize both the prevention and active management of mental health conditions, integrating these efforts into the overall therapeutic plans for patients with knee OA. This integrated approach promises to improve holistic health outcomes and elevate the quality of life for this affected demographic.

Ethical approval

Ethics approval was not required for this systematic review.

Consent

Informed consent was not required for this systematic review.

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Author contribution

M.O.O.: funding acquisition, resources, and supervision. All authors were involved in conceptualization, investigation and project administration, validation, visualization, writing-original draft, and writing-review and editing.

Conflicts of interest disclosure

The authors declare no conflicts of interest.

Research registration unique identifying number (UIN)

1. Name of the registry: PROSPERO – for systematic review.
2. Unique identification number or registration number: CRD42023469320.
3. Hyperlink to your specific registration (must be publicly accessible and will be checked): https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42023469320.

Guarantor

Malik O. Oduoye.

Data availability statement

Not applicable.

Provenance and peer review

Not commissioned, externally peer-reviewed.

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