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# Prevalence of depression among Iranian patients with rheumatoid arthritis: a systematic review and meta-analysis

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**Abstract:** Patients with rheumatoid arthritis (RA) are prone to depression due to several factors related to their RA, including chronic and persistent pain, functional disability, economic constraints, and the side effects of RA medication. Previous Iranian studies showed conflicting and inconclusive findings regarding the prevalence of depression among RA patients. Therefore, this systematic review and meta-analysis was conducted to estimate the true prevalence of depression in Iranian patients with RA. Search for eligible articles was performed using the keywords of depression, depressive disorder, dysthymic disorder, major depressive disorder, RA, and Iran, and their possible combinations in the following databases: Scientific Information Database, MagIran, Web of Science/ISI, PubMed, and Scopus. The search was restricted to articles published in Persian and English languages. The meta-analysis was performed using the random effects model, and the data were analyzed using the STATA software version 12. Overall, six articles were selected; the overall prevalence of depression among the Iranian patients with RA was 65.58% (95% CI: 56.53%–74.62%). There were no significant relationships between the prevalence of depression and articles' methodological quality and year of publication, participants' age, sample size, and duration of disease. More than half of RA patients suffer from depression. The overlap between the physical symptoms of RA and depression in this group of patients makes it difficult to correctly diagnose depression; therefore, initiative and efforts are required to improve the identification of early depression symptoms in RA patients in order to effectively manage their depression.

**Keywords:** depression, Iran, meta-analysis, prevalence, rheumatoid arthritis

## Introduction

Rheumatoid arthritis (RA) is a systemic, chronic, and inflammatory disease that affects 0.5%–1% of the world's population.<sup>1</sup> This painful and progressive disorder causes systemic disability and has no known treatment. Pharmacotherapies are only intended to reduce pain and inflammation, delay joint erosion, and maintain patient's normal functioning.<sup>2</sup> While the etiology of the disease is unclear, genetic, infectious, hormonal, and environmental factors may play a role in RA.<sup>3</sup> The unpredictable courses of the illness and pain affect all the aspects of the patient's life, such as social relationships, family life, and psychological well-being.<sup>4,5</sup> Due to the different disease periods, patients with RA can hardly manage their daily life and disease process.<sup>5,6</sup>

Cohort studies have shown that the prevalence of depression is higher in patients with RA than in healthy subjects.<sup>7,8</sup> Other cross-sectional studies have also shown that depression is more prevalent in patients with RA than in those with diabetes, cancer, or Parkinson's disease.<sup>4,6,9–11</sup>

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Several factors that are related to RA could make this group of patients vulnerable to depression, including continuous pain, functional disability, inability to work, economic constraints, and the side effects of RA medication.<sup>11</sup> Furthermore, depression in this group of patients may be caused by the interaction among clinical, biological, psychological, and demographic factors.<sup>10</sup> Depression in these patients is associated with fatigue, reduction of quality of life, increased inability and costs of treatment, and reduced compliance with the therapeutic regimen.<sup>12–15</sup> Depression not only affects the effective management of RA but also impacts the effective management of other comorbid conditions that are often associated with RA, such as cardiovascular diseases, infection, and cancer.<sup>16,17</sup> These patients are always concerned about joint deformity, impaired functioning, and inability to do daily activities, and this constant worry can increase the likelihood of several negative outcomes, such as losing one's job, early retirement, and shorter working hours, hence, leading to a higher possibility of depression.<sup>3</sup> Given the well-recognized, substantial negative impact of depression on patients' quality of life, adherence to therapeutic regimen, and its association with suicidal thoughts, early identification and effective treatment of depression in patients with RA is necessary.<sup>18</sup> This requires accurate statistical description of the prevalence of RA as it would help in planning and developing methods for better diagnosis and management of depression. Therefore, this study was designed to estimate the prevalence of depression in Iranian patients with RA.

## Methods

The screening and selection process was carried out in accordance with the PRISMA statement.<sup>19</sup>

## Search strategy

In this systematic review and meta-analytic study, published articles in Persian and English languages in domestic and international journals were searched for in various databases (Scientific Information Database, MagIran, Web of Science/ISI, PubMed [including Medline], and Scopus) from inception until February 2018. Search keywords were depression, depressive disorder, dysthymic disorder, major depressive disorder, RA, and Iran. The references of the identified articles were also accessed as the backtracking method to retrieve more articles.

## Selection of studies and data extraction

All observational (noninterventional) articles reporting the prevalence of depression in Iranian patients with RA were

eligible. The exclusion criteria included nonrelevant articles, case reports, interventional studies, repeated studies, and lack of access to the full text of articles. To reduce bias, the search process was performed independently by two researchers, and the disagreements between them were resolved through discussions. In the next step, the articles' information including the name of the first author, year of publication, place of study, sample size, type of instrument used, mean age of participants, duration of the disease, and the prevalence of depression were extracted and recorded on a specific form.

## Quality assessment

The methodological quality of the selected articles was evaluated using a tool assessing five aspects: study plan, comparison groups, characteristics of the samples, sample size, and data collection tools. Each aspect was rated 0–3, and a higher score indicated a higher methodological quality<sup>20–22</sup> (Table S1).

## Statistical analyses

Since the prevalence rate has a binomial distribution, the variance of prevalence was calculated using the binomial distribution variance formula. Also, the weighted mean was used to combine the prevalence rates reported by different studies. To evaluate the heterogeneity between the selected studies, the Cochran's  $Q$  test and the  $I^2$  statistic were used. Heterogeneity was classified into three categories of <25% (low heterogeneity), 25%–75% (moderate heterogeneity), and over 75% (high heterogeneity). According to the level of heterogeneity between the selected studies (89.3%) and the significance of  $I^2$  statistic ( $P < 0.0001$ ), the random effects model was used to combine the prevalence rates reported by the studies and estimate the total prevalence rate. The meta-regression was used to examine the relationship between the prevalence of depression with year of study, participants' mean age, duration of disease, and sample size. The subgroup analysis was used to estimate the prevalence of depression among RA patients in different regions of Iran. Egger's test and a Funnel plot were used to test the publication bias. The sensitivity analysis was performed through removing articles step by step. The data were analyzed using the STATA software v.12.

## Registration

The study has been registered in the international prospective register of systematic review (PROSPERO) as number CRD42018100573. This study was a systematic review and meta-analysis of published studies, so it was not necessary to obtain an ethics approval or informed consent.

## Results

Of the 331 identified articles, a total of 6 articles were selected according to the inclusion criteria for the final analysis (Figure 1).

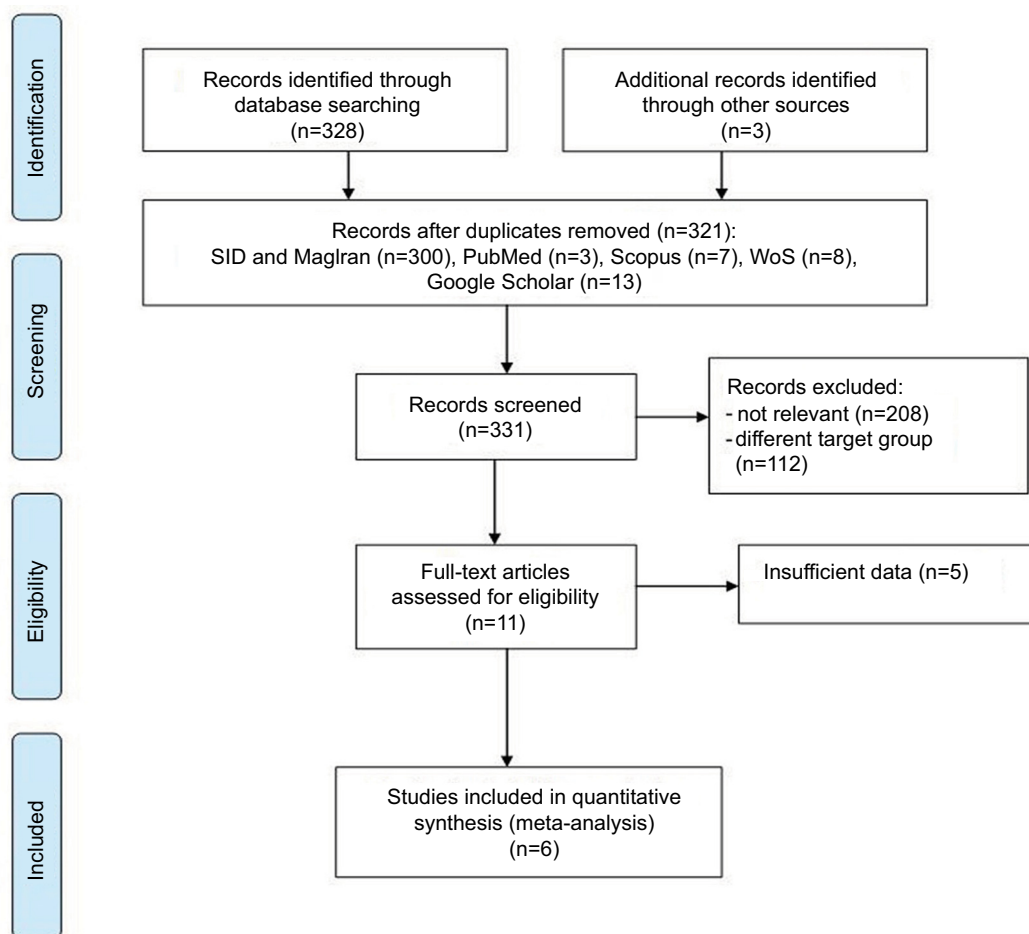
The overall sample size was 1,046 individuals within an average of 175 participants in each study. The largest and lowest sample sizes were for the studies of Jamshidi et al and Ghoreishi et al, respectively.<sup>23,24</sup> The highest and lowest prevalence rates of depression were for the studies of Atapoor et al and Arman et al, respectively.<sup>25,26</sup> In terms of methodological quality, all articles were in the moderate level. The general profile of selected studies for meta-analysis is reported in Table 1.

The overall prevalence of depression in patients with RA was 65.58 (95% CI: 56.53%–74.62%) (Figure 2).

The prevalence of depression in patients with RA was 65.51% (95% CI: 54.88%–76.14%) using the Beck Depression Inventory and 66.00% (95% CI: 56.72%–75.28%) using the Hospital Anxiety and Depression Scale. The six final

articles that had been screened and examined according to the PRISMA statement were assessed in terms of sensitivity. It was found that the overall estimate of the prevalence of depression was not changed by removing each of the studies. To investigate whether all articles on depression in Iranian patients with RA were included in the study, a bias diagram was drawn. Based on the Egger's regression test, publication bias was not significant ( $P=0.76$ ; Figure 3).

The results by the study language showed that the prevalence of depression in the Persian articles (72.28%; 95% CI: 51.31%–93.25%) was higher than those in the English articles (62.09%; 95% CI: 52.60%–71.57%). The results of single-variable meta-analysis showed that the methodological quality of the articles ( $P=0.88$ ), participants' age ( $P=0.77$ ), sample size ( $P=0.54$ ), and duration of disease ( $P=0.71$ ) had no significant relationships with the prevalence of depression. An increase in the year of publication led to a downward trend in the prevalence of depression, which was not statistically significant ( $P=0.09$ ; Figure 4).

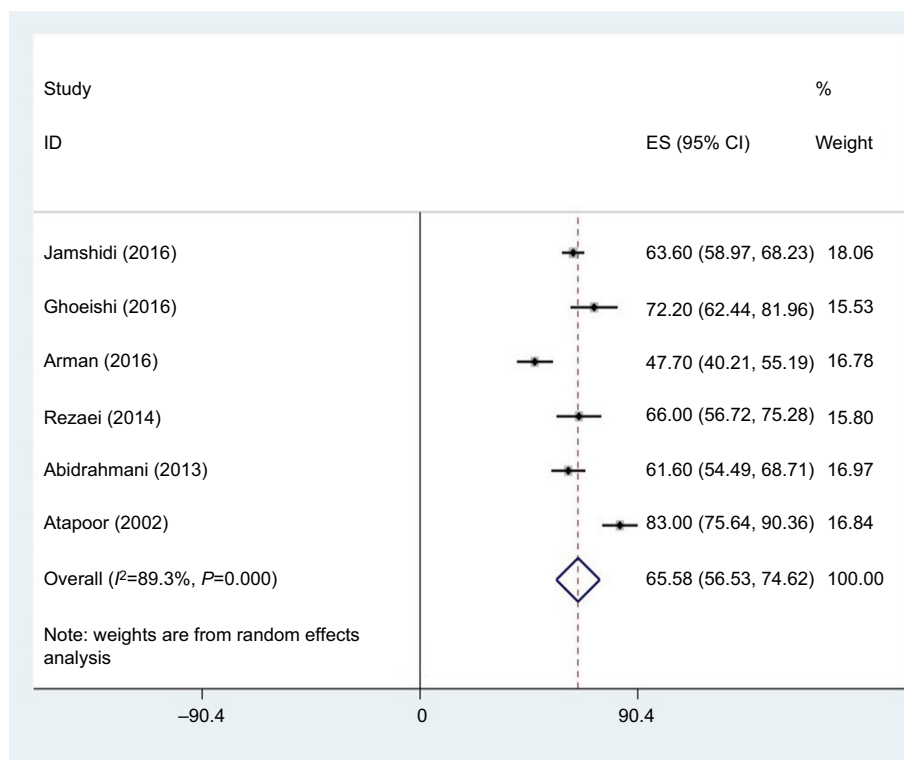


**Figure 1** Screening process and selection of articles for meta-analysis according to the PRISMA statement.

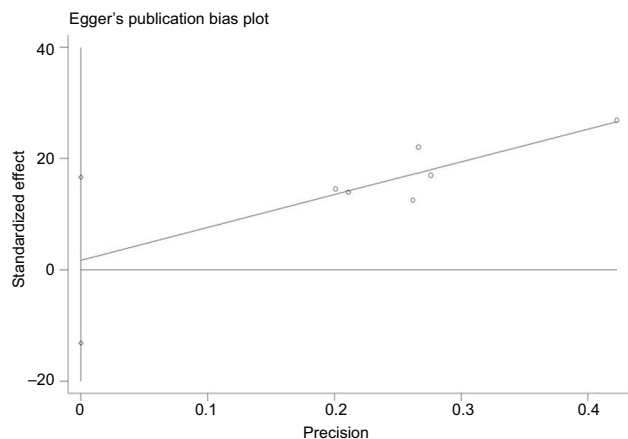
**Table 1** Characteristics of the selected articles for meta-analysis

First author	Year	Sample size	City	Tool	Mean age, years	Length of disease	Quality score	Prevalence (%)
Jamshidi et al <sup>23</sup>	2016	414	Tehran	BDI	45±11.6	5.5±5	5	63.6
Ghoreishi et al <sup>24</sup>	2016	81	Kashan	BDI	–	–	5	72.2
Arman et al <sup>26</sup>	2016	171	Kermanshah	BDI	45±11.2	–	6	47.7
Rezaei et al <sup>1</sup>	2014	100	Isfahan	HADS	–	–	7	66
Ghorbanshiroudi et al <sup>27</sup>	2013	180	Rasht	BDI	50.6±12.4	8.6±6.4	8	61.6
Atapoor et al <sup>25</sup>	2002	100	Kerman	BDI	–	6±6.5	7	83

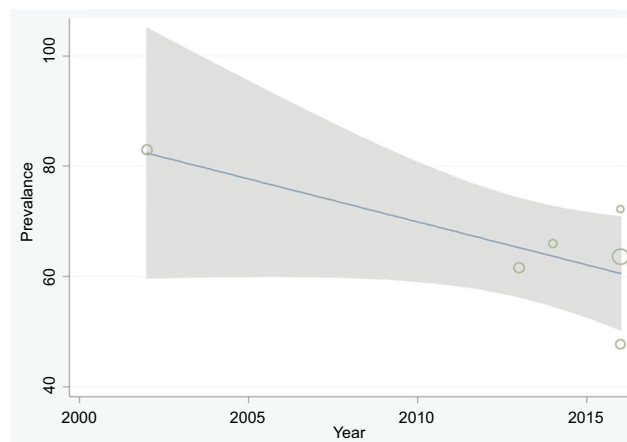
**Abbreviations:** BDI, Beck Depression Inventory; HADS, Hospital Anxiety and Depression Scale.



**Figure 2** Overall prevalence of depressive symptoms among patients with rheumatoid arthritis.



**Figure 3** Publication bias in the selected studies. Note: The circles show the weight of each study.



**Figure 4** Prevalence of depression in patients with rheumatoid arthritis in terms of publication year. Note: Circles show the weight of each study.

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## Discussion

A review of the literature showed that 47%–83% of the Iranian patients with RA suffer from depression. These were different from the prevalence rates reported in other countries, such as 41.5% in Turkey and 71.5% in Pakistan.<sup>4,28</sup> The study results also indicated that depression was more prevalent in patients with RA (65.5%) than the other chronic diseases, such as hemodialysis (62%), type II diabetes (54.8%), and cardiovascular diseases (47%).<sup>3,29–31</sup>

In this regard, it is important to note that in the Asian culture, depression is considered a kind of stigma, which is rarely expressed by patients explicitly; therefore, most cases are not diagnosed and treated. But in the Western culture, it is easy to describe this condition.<sup>7,32</sup> Given the overlap between RA symptoms and depression, it may be difficult to diagnose depression in RA patients.<sup>33</sup> Various studies suggested a high prevalence of depression in patients with RA.<sup>28–34</sup> A meta-analysis of 12 studies showed the higher prevalence of depression in patients with RA than healthy subjects.<sup>35</sup> Exposure to chronic mood disorders disrupts the hypothalamus–pituitary–adrenal axis, therefore, increasing the glucocorticoid release and the activity of the sympathetic system and decreasing the activity of the parasympathetic branches of the autonomic nervous system. Therefore, it ultimately causes changes in inflammatory parameters and the progression of autoimmune diseases. The results of a 14-year cohort study showed that the risk of depression in patients with RA was 70% higher than in healthy individuals.<sup>36</sup> About one-third of patients with RA lose their ability to work within 3 years of diagnosis and are incapable of doing their daily routine, which imposes a large financial burden on patients, families, and health care systems.<sup>7</sup> Due to the inability to perform daily life activities and experiencing chronic pain, they may live in poor economic conditions that increases the possibility of experiencing depression. Another important factor for patients with RA is perceived social support. Patients with high levels of social support are less likely to have depression.<sup>37</sup> According to the studies conducted in Iran, due to changes in cultural and social conditions, patients with chronic diseases may not have much social support, which can be associated with depression.<sup>38</sup> Moreover, it has been reported that perceived social support was the most important predictor of depression and anxiety among patients with RA after controlling demographic variables.<sup>34</sup>

The results of the current study showed that there was no relationship between methodological quality, mean age of the participants, sample size, duration of the disease, and the prevalence of depression. With the increase of publication

years, the prevalence of depression showed a downward trend, which was not significant. This can be attributed to medical advances in identifying and controlling the disease. Another finding was that there was an inverse association between the age of participants and the prevalence of depression in patients with RA.<sup>39</sup> The prevalence of depression in the studies published in English was lower than that in the Persian articles; this may be attributed to the higher quality of English journals and the fact that the articles published in these journals undergo more in-depth evaluations.

Some of the articles had not reported their full results; therefore, the lack of accurate and comprehensive reports in some of the analyzed studies constituted one of the limitations of our meta-analysis. A comprehensive and up-to-date presentation of the prevalence of depression in patients with RA is one of the strengths of our meta-analysis. Overall, the findings of this study showed that more than half of patients with RA had depression symptoms. One of the most important limitations of this study was that some selected articles had not provided all the required information.

Given the overlap between the depression and RA symptoms, it is more difficult to diagnose depression in RA patients. Depression as an underlying illness, along with persistent pain, disability, and economic constraints, leads to a decrease in the patients' quality of life and reduces the patient's adherence to the therapeutic regimen. Informing health care providers and policy makers about the prevalence of depression in patients with RA can help design programs and initiate interventions useful in better diagnosis and effective management of depression in this group of patients. Future studies are suggested to use validated screening tools to diagnose those patients with RA who are at risk of developing depression, so that their condition can be controlled, and effective and holistic interventions can be provided for them.

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## Disclosure

The authors report no conflicts of interest in this work.

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## Supplementary material

**Table S1** Criteria for rating the methodological quality of included articles

Study parameters	Rating	Criteria
Study design	3	Longitudinal prospective design
	2	Retrospective or mixed design
	1	Cross-sectional design
	0	Survey or was not reported
Participants and recruitment	3	1) Description of the population, 2) eligibility criteria for participants, 3) precise details of the recruitment process, 4) accounted for the numbers recruited, and 5) lost to follow-up
	2	Minimal description of at least four criteria
	1	Two criteria missing
	0	More than two criteria missing
Comparison group	3	Healthy, age-appropriate comparison
	2	Reference sample
	1	Other comparison group
	0	No comparison group
Number of participants	3	N >100
	2	N=50–100
	1	N<50
	0	Did not report
Instruments	3	Psychometrically sound report of generic or specific resilience measures
	2	Psychometrically sound report of generic and specific resilience measures
	1	Self-report generic or specific resilience measures with some psychometric data
	0	Investigator constructed clinical rating of resilience or resilience domains with no psychometric properties

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