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The prevalence of depression among Iranian infertile couples: an update systematic review and meta-analysis

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Abstract

Background: Depression is a common mental disorder. Infertility can lead to depression. The current systematic review and meta-analysis were conducted to estimate the pooled prevalence of depression among Iranian infertile couples. Seven electronic databases (Google Scholar, MagIran, SID, Science Direct, PubMed, Scopus, Web of Science) were searched, up to August 2019, for relevant published studies. The pooled prevalence of depression also pooled mean of depression score was determined using a random-effects model with a 95% confidence interval (95% CI). All analyses performed using Stata ver11 (Stata Corporation, College Station, TX, USA). The 0.05 was considered a significant level.

The main body: Totally, 230 studies were retrieved and 31 studies included in the meta-analysis. The pooled prevalence of depression among infertile couples was about 35.3% (95 % CI 24.1–46.5), and the prevalence of depression among females and males was 48.7% (95% CI 24.0–73.3) and 9% (95% CI 0% to 23.7%), respectively.

Conclusions: Our findings suggest a high prevalence of depression in infertile couples. The results can highlight an important and growing mental disorder among infertile couples that may be overlooked.

Keywords: Prevalence, Depression, Iranian, Infertile couples

Background

Infertility is a reproductive system deficiency defined by the "failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse" [1, 2]. The overall burden of subfertility/infertility is high globally, and it seems the trend of this deficiency does not have a decreasing trend. According to reports of the World Health Organization, over 10% of women are affected by infertility [2].. Also, according to results of Demographic and Health Surveys (DHS) data (2004), about 186 million married women at reproductive age have infertility deficiency in developing countries [3]. In Iran, the prevalence of primary infertility based on the WHO's clinical, epidemiological, and demographic definitions was 20.2, 12.8, and 9.2%, respectively. In addition, the prevalence of secondary infertility was about 4.9% [4]. Infertility affects various aspects of life including mental, social, and physical aspects [5, 6]. Also, this disorder can lead to shame, stigma, anxiety, depression, and low feelings of self-esteem and guilt [7]. One of the more prevalent disorders among infertile couples especially among females is depression [8–10]. About 86% of infertile couples experience it [11]. Depression is defined by a sense of persistent sadness and a loss of enjoyment in activities, accompanied by an inability to carry out daily activities, for at least 2 weeks [12]. This mental disorder has a negative impact on the process of infertility treatment, the follow-up stage also the hope for treatment [13]. Feeling depressed and frustrated can reduce infertile women's satisfaction with the past, present, and future lives [14]. It is estimated that about 25 to 60% of infertile

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couples suffered at least one psychological disorder [15] and globally depression affected more than 300 million people of all ages [16]. The prevalence of depression among Iranian infertile couples was estimated 0.47 in 2013 [11]. Many studies have been conducted to estimate the prevalence of depression among Iranian infertile couples, which are widely reported. Also, a systematic review conducted up to 2011 [11] the prevalence of this mental disorder among Iranian infertile couples maybe change over time. Therefore, the purpose of the current systematic review and meta-analysis was to estimate a pooled measure of the prevalence of depression among Iranian infertile couples between 2005 and 2019.

Methods

Materials and methods

The current meta-analysis was performed based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyzes (PRISMA) and Meta-analysis of Observational Studies in Epidemiology (MOOSE).

Search strategy

In this study, articles published from January 2005 to August 2019 through 7 electronic databases (Google Scholar, MagIran, SID, Science Direct, PubMed, Scopus, Web of Science) were searched. The keywords were as follows: Infertility, Sterility, Sterile, Iran, Depressions, Depressive Disorder, Bipolar Disorder, Unipolar Disorder, Emotional Depressions, Depressive Symptom Were examined. The search was conducted in Persian and English languages. The search strategy of the databases was done independently by two researchers, and the dispute was resolved by a third person.

Screening and selection criteria

We included all published cross-sectional studies between 2005 and 2019 that estimated the prevalence of depression or mean and standard deviation of depression score among Iranian infertile couples. Also, the case-control, cohort, clinical trial, case reports, and case series studies were excluded. In addition, studies that did not

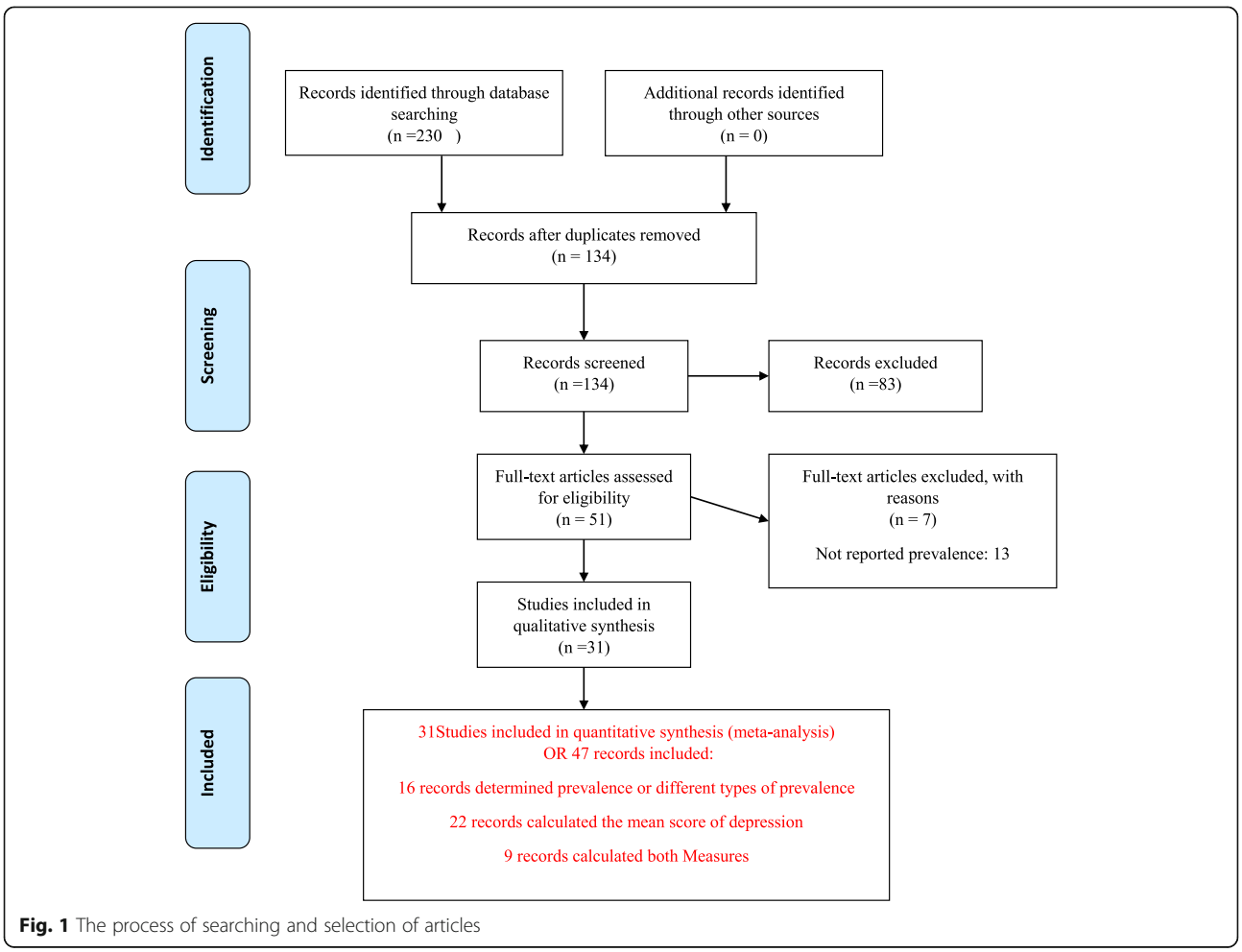

Fig. 1 The process of searching and selection of articles

Table 1 The characteristics of studies that entered into the meta-analysis

First author	Country	Publication year	Period assessment	Sex	Age	Measuring tools	Sample size	Sampling method	Duration of infertility	Outcome (prevalence of depression (%) or mean score)
Ahmadi [17]	Tehran	2011	2008–2009	Male	34.1 ± 7.1	BDI	114		7 ± 6	Sever, 42.5; mild, 57
Rahmati [18]	Ilam	2019	2017	Female	35.91 (6.01)	BDI	200	Random	10.84 ± 6.20	Sever, 42; moderate, 19.5; mild, 14.5
Shahraki [19]	Tehran	2018	2015–2017	Female	32.9 ± 7.2	BDI	115	-	-	13 ± 9.1
Shahraki [19]	Tehran	2018	2015–2017	Female	31.3 ± 6.2	BDI	78	-	-	16.3 ± 8.7
Shahraki [19]	Tehran	2018	2015–2017	Female	32.4 ± 5.4	BDI	71	-	-	16 ± 10.4
Omani-Samani [20]	Tehran	2018	2017	Male and female	32.68 ± 5.54	Patient Health Questionnaire-9 (PHQ-9).	1506	Random	5.27 ± 3.95	7.05 ± 6.03; prevalence, 30.5
Maroufizadeh [21]	Tehran	2018	2017	Male	34.31 ± 5.01	PHQ-9	180	Convenience	4.83 ± 3.61	4.82 ± 5.47
Maroufizadeh [21]	Tehran	2018	2017	Female	30.54 ± 5.39	PHQ-9	180	Convenience	4.83 ± 3.61	6.76 ± 5.78
Maroufizadeh [22]	Tehran	2018	2014–2015	Male and female	31.37 ± 5.69	Hospital Anxiety and Depression Scale (HADS)	1128 (479 male, 649 female)	-	5.62 ± 4.03	5.99 ± 3.76; prevalence, 33
Basharpoor [23]	Tabriz	2017	2015	Female	Range 25–40	Cognitive Emotion Regulation Questionnaire (CERQ)	322	Random	-	45.22 ± 11.58
Samani [24]	Tehran	2017	2013–2014	Male	32.94 ± 4.74	DASS	180	-	-	Slight, 18.3; moderate, 8.3; sever, 5; very sever, 5
Samani [24]	Tehran	2017	2013–2014	Female	29.39 ± 5.09	DASS	180	-	-	Slight, 15; moderate, 21.7; sever, 6.7; very sever, 5
Omani Samani [25]	Tehran	2017	2014–2015	Male and female	31.95 ± 5.59	HADS	312	Convenience	6.39 ± 4.55	6.06 ± 3.63
Navid [26]	Tehran	2017	2014–2015	Male	33.25 ± 5.70	HADS	248	Voluntary	4.82 ± 3.50	5.50 ± 3.63
Navid [26]	Tehran	2017	2014–2015	Female	29.15 ± 5.28	HADS	248	Voluntary	4.82 ± 3.50	6.65 ± 4.09
Karimzadeh [27]	Tehran	2017	2014–2015	Female	28.3 ± 5.96	The Symptom Checklist-90-Revised (SCL-90-R)	78	Convenience	5.9 ± 4.19	1.44 ± 0.94
Karimzadeh [27]	Tehran	2017	2014–2015	Male	31.68 ± 3.43	The Symptom Checklist-90-Revised (SCL-90-R)	50	Convenience	5.5 ± 2.76	1.18 ± 0.73
Amini [28]	Tehran	2017	2014–2015	Male and Female	31.16 ± 5.87	HADS	651	Random	5.16 ± 3.77	5.96 ± 3.82
Dadi pour [29]	Bandarabbas	2016	-	Female	-	Goldberg and hiller questioner (GHQ -28)	100	Convenience	-	16.46 ± 4.45
Shahverdi [30]	Kermanshah	2015	-	Female	-	Goldberg and hiller questioner (GHQ -28)	100	Convenience	-	12.10 ± 5.08

Table 1 The characteristics of studies that entered into the meta-analysis *(Continued)*

First author	Country	Publication year	Period assessment	Sex	Age	Measuring tools	Sample size	Sampling method	Duration of infertility	Outcome (prevalence of depression (%) or mean score)
Maroufizadeh [31]	Tehran	2015	2013–2014	Male and female	33.9 ± 5.3 in male, 30.3 ± 5.4 in female	HADS	330	-	6.2 ± 4.1	5.95 ± 3.54; mild, 21.2; moderate, 8.5; sever, 1.2
Maroufizadeh [31]	Tehran	2015	2013–2014	Male	33.9 ± 5.3	HADS	122	-	6.2 ± 4.1	5.98 ± 3.58; mild, 24.6; moderate, 9.0; sever, 0.8
Maroufizadeh [31]	Tehran	2015	2013–2014	Female	30.3 ± 5.4	HADS	208	-	6.2 ± 4.1	5.93 ± 3.52; mild, 19.2; moderate, 8.2; sever, 1.4
Hasanpour [32]	Tabriz	2014	2012–2013	Female	29.64 ± 5.98	GHQ	345	Convenience	4 (2–7)	3.58 ± 4.11
Zamani [33]	Kerman	2013	2012	Female	-	BDI	30	Convenience	-	24.7 ± 6.16
Zarei [34]	Tehran	2013	2012	Female	29.8	DASS-42	137	Convenience	-	8.72 ± 7.78
Zarei [34]	Tehran	2013	2012	Female	29.8	DASS-42	137	Convenience	-	7.9 ± 7.06
Zarei [34]	Tehran	2013	2012	Female	29.8	DASS-42	137	Convenience	-	7.51 ± 6.76
Pakpour [35]	Zaheda, Ahvaz, Qazvin, Tehran, Gilan	2012	2011–2012	Female	30.22 ± 7.68	HADS	410	-	-	Prevalence, 46; 6.6 ± 2.4
Pakpour [35]	Zaheda, Ahvaz, Qazvin, Tehran, Gilan	2012	2011–2012	Female	29.75 ± 8.06	HADS	194	-	-	Prevalence, 41; 6.2 ± 2.2
Tamannai Far [36]	Kashan	2011	2008	Female	-	GHQ-28	65	Random	-	13.1 ± 3.50
Peyvandi [37]	Sari	2011	2008	Female	28	BDI	200	-	-	Total, 62; mild, 27.5; moderate, 27.5; sever, 9
Haririan [38]	Orumieh	2010	2009	Female	27.5 ± 4.4	BDI	100	-	7.01 ± 4.45	Total, 58; mild, 37; moderate, 10; sever, 11
Noorbala [39]	Tehran	2009	2005–2006	Female	27.7 ± 5.2	SCL-90-R	150	consecutive	6.1 ± 4.4	1.30 ± 0.70
Faraji [40]	Rasht	2009	2005	Female	28.19 ± 5.77	BDI	150	-	-	Mild, 49.3; moderate, 7.3; Sever, 7
Farzadi [41]	Tabriz	2008	2006	Female	27.3 ± 5.6	BDI	193	Census	4.1 ± 3.01	Total, 72.54%; mild, 30.05; moderate, 30.0; sever, 10.88
Sadeghin [42]	Hamadan	2006	2004	Male	30.56 ± 6.4	SCL90	200	Available	7–21	6.87 ± 0.62; mild, 17.58; moderate, 3.01; sever, 2.51
Sadeghin [42]	Hamadan	2006	2004	Female	30.56 ± 6.4	SCL90	200	Available	7–21	12.24 ± 0.72; mild, 27; moderate, 13.5; sever, 9
Bahdani [43]	Mashhad	2005	-	Female	27.68 ± 4.41	BDI	200	Simple	-	Total, 57.1; mild, 36.3; moderate, 9.9; sever, 11
Yassini [44]	Yazd	2005	-	Female	-	BDI	50	-	-	Mild, 48; moderate, 21.3; sever, 16

Table 1 The characteristics of studies that entered into the meta-analysis *(Continued)*

First author	Country	Publication year	Period assessment	Sex	Age	Measuring tools	Sample size	Sampling method	Duration of infertility	Outcome (prevalence of depression (%) or mean score)
Yassini [44]	Yazd	2005	-	Female	-	BDI	25	-	-	Mild, 44; moderate, 32; sever, 16
Yassini [44]	Yazd	2005	-	Female	-	BDI	25	-	-	Mild, 40; moderate, 24; sever, 28
Noruzinejad [45]	Qom	2016	2013	Male	32.5 ± 5.5	BDI	136	Available	3.6 ± 3.3	Total 16.9; mild, 52.2; moderate, 30.4; sever, 17.4
Behjati Ardakani [46]	Tehran	2011	2006–2007	Male and female	34 ± 6	GHQ-28	400	Purpose-based sampling	-	3.3
Behjati Ardakani [46]	Tehran	2011	2006–2007	Female	34 ± 6	GHQ-28	399	Purpose-based sampling	-	4.5
Behjati Ardakani [46]	Tehran	2011	2006–2007	Male	34 ± 6	GHQ-28	398	Purpose-based sampling	-	2
Sotoudeh [47]	Tehran	2008	2000–2001	Female	-	BDI	55	Simple	-	21.88 ± 6.52

Table 2 The pooled and subgroup depression prevalence among Iranian couples

Variable	Number of records	Sample size	Prevalence (95% confidence interval)	T^2	I^2 (%)
Gender					
Females	7	1696	48.7 (24.0–73.3)	0.11	99.3
Males	2	534	9 (0–23.7)	0.01	95.1
Both gender	3	3034	22 (2–42)	0.03	99.6
Type of questionnaire					
BDI	5	829	53.3 (32.8–73.8)	0.05	97.7
Patients Health Questionnaire-9 (PHQ-9)	1	1506	30.5 (28.2–32.8)	-	-
HADS	3	1732	39.8 (30.8–48.8)	0.005	91.2
Goldberg and Hiller Questioner (GHQ)	3	1197	3 (1–4.5)	0.001	52.6
Overall prevalence	12	5264	35.3 (24.1–46.5)	0.03	99.4

provide an accurate report about the prevalence of depression (or mean and standard deviation of the depression score) in the infertile population, as well as studies that did not use a standard questionnaire to measure depression, were excluded.

Quality and risk of bias assessment

An 8-item checklist was used for critical appraisal and risk of bias assessment of the studies. This checklist includes items such as Clearly define depression, clearly definite infertility, Give the eligibility, Give precision of the estimates, indicate the study's design, Explain sample size calculation, describe the locations, and describe the dates [11].

Data extraction

The data extraction form was included (1) author's name, (2) country, (3) year of performing and publication, (4) sex, (5) mean and standard deviation of age, (6) measuring tools, (7) sample size, (8) sampling method, (9) mean and standard deviation of duration infertility, (10) mean and standard deviation of duration marriage, and (11) and mean and standard deviation or prevalence of depression in infertile couples. All data were extracted independently by two authors. Also, some studies estimated different types of depression (mild, moderate, severe) among infertile couples. So the pooled prevalence of the mentioned subgroup was calculated separately.

Statistical analysis

The heterogeneity between studies was assessed using I^2 and T^2 (Tau2) statistics. Due to the presence of heterogeneity between studies (I^2 more than 90% and T^2 statistic), the pooled prevalence of depression also pooled mean of depression score was determined using a random-effects model with 95% confidence interval (CI). The weight of each study was determined using the inverse variance model. The univariate meta-regression was conducted to determine the probable cause of heterogeneity between studies. Also, the pooled estimate was estimated according to different subgroups. Begg and Egger's tests were used to assess publication bias. All analyses performed using Stata ver11 (Stata Corporation, College Station, TX, USA). The 0.05 was considered a significant level.

Results

As it is shown in Fig. 1, a total of 230 articles were found in the databases. After eliminating duplicates, screening the titles and abstracts of the articles, 51 articles were selected for full-text review. Of these, 20 studies were excluded because did not report the prevalence and were not cross-sectional study. Finally, 31 articles with 47 records were included in the study (Fig. 1). The general characteristics of the articles are listed in Table 1.The overall prevalence of depression among infertile couples was about 35.3% [(95% CI 24.1–46.5), I^2 99.4, T^2 0.03 P heterogeneity < 0.001].

Table 3 The pooled prevalence of mild, moderate, and severe depression among Iranian infertile couples

Type of depression	Number of records	Sample size	Prevalence (95%confidence interval)	T^2	I^2 (%)
Mild	18	2813	31.2 (25.4–36.9)	0.01	92.0
Moderate	17	2699	15.4 (11.5–19.4)	0.005	90.7
Severe	18	2813	13.7 (9–17.6)	0.006	95.0

The prevalence of depression among females was 48.7% (95% CI 24.0–73.3) and for males was 9% (95% CI 0% to 23.7%). According to the results of articles, the prevalence of mild, moderate, and severe depression among Iranian infertile couples was 31.2% (95% CI 25.4–36.9), 15.4% (95% CI 11.5–19.4), and 13.7% (95% CI 9–17.6), respectively. More details were showed in Tables 2 and 3 and Fig. 2. Some studies calculated the mean and standard deviation of depression scores among understudy cases. The overall mean of depression score among Iranian couples was 7.74 [(95% CI 5.52–9.93), I^2 86.7, T^2 21.21, P heterogeneity < 0.001] (Fig. 3). Also, the mean of depression score according to different used tools was shown in Table 4. In terms of heterogeneity, the publication year, sex, and sample size does not have any significant effect on heterogeneity of between studies, but the depression measuring tools had a significant effect on heterogeneity between studies in the estimation of pooled prevalence. Also, in estimation pooled mean of depression score, the publication year, sex, measuring tools, and sample size had no effect on heterogeneity between studies (Table 5). According to Fig. 4, the prevalence of depression had an increasing trend with the increase in sample size and publication year. Also, the mean of depression score among infertile couples had an increasing trend with the increase in sample size, but this score had a decreasing trend with the increase in a publication year.

Publication bias

The results of Begg and Egger's tests for prevalence were statistically significant (p = 0.001 for both tests), whereas the tests for estimation mean of depression score were not statistically significant (p = 0.11 for both tests). It means for prevalence, the results of the Egger and Begg's test indicating that there is publication bias but for estimation mean of depression score there is no publication bias.

Discussion

Depression in infertile couples has been considered as one of the psychological problems in recent years. It cannot be denied that infertility is a concern for many people and should be taken into consideration. The results of this meta-analysis revealed that 35.3% of Iranian infertile couples had depression, a disorder that can affect other aspects of health. In a systematic study by Masoumi in 2013 reported the prevalence of depression in infertile couples was 0.44 [11]. The

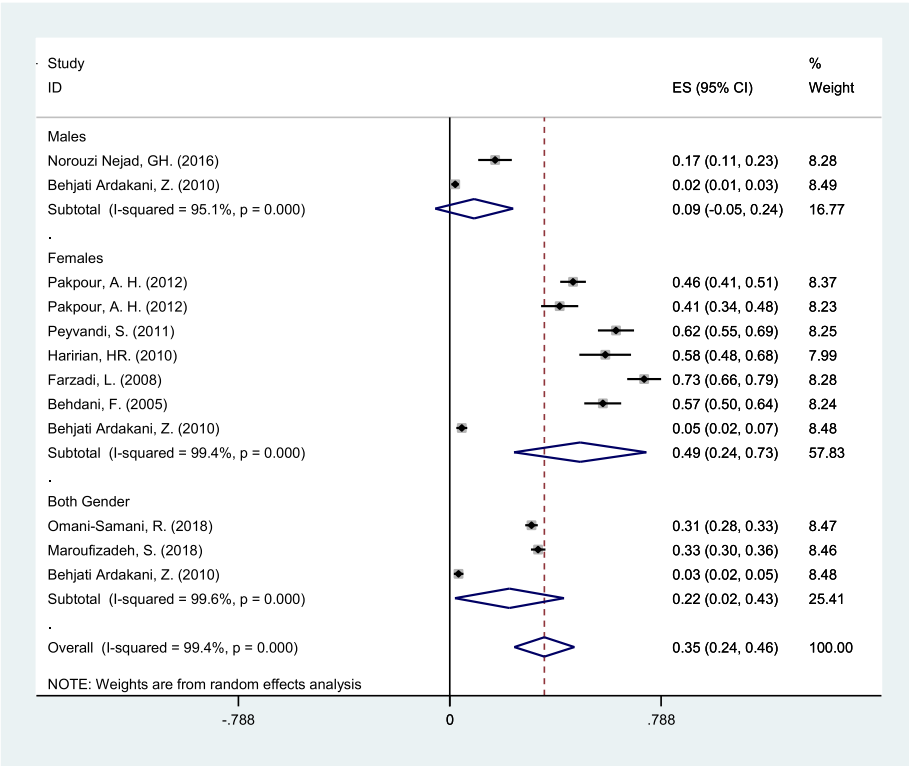

Fig. 2 Prevalence of depression among Iranian infertile couples

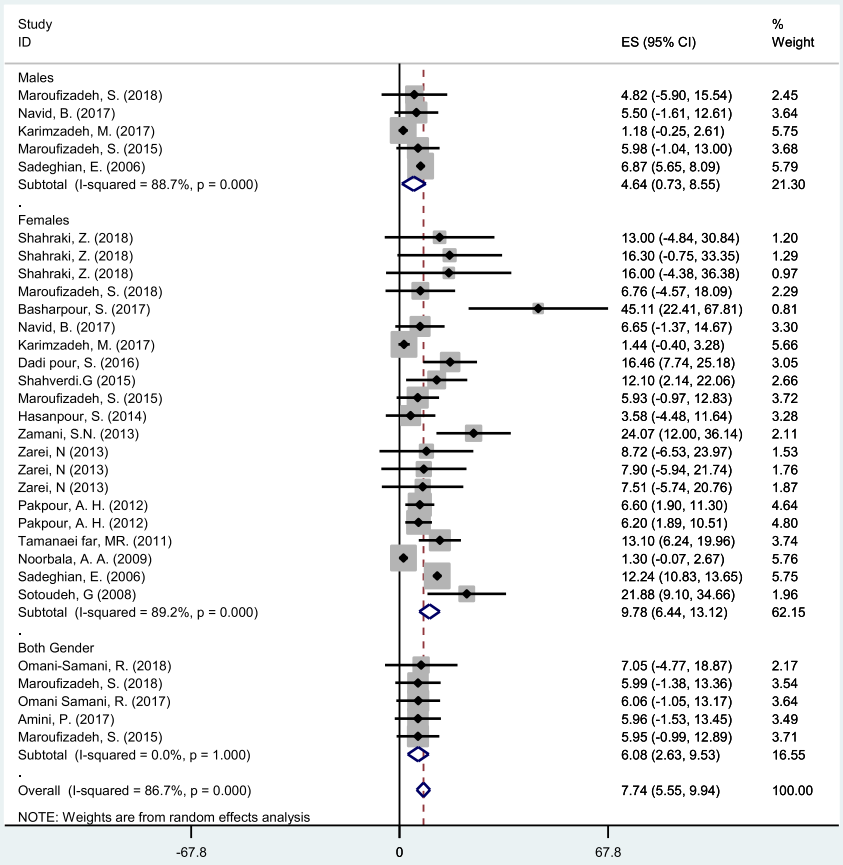

Fig. 3 The mean of depression score among Iranian infertile couples

Table 4 The pooled and subgroups of depression scores among Iranian couples

Variable	Number of records	Sample size	Mean (95% confidence interval)	T^2	I^2
Gender					
Females	21	3180	9.78 (6.44 to 13.11)	36.55	89.2
Males	5	800	4.63 (0.72 to 8.54)	12.83	88.7
Both gender	5	3927	6.08 (2.62 to 9.53)	0.00	0.00
Type of questionnaire					
BDI	5	349	19.77 (13.03–26.52)	0	0
Patients Health Questionnaire-9(PHQ-9)	3	1686	6.13 (– 0.36 to 12.63)	0	0
HADS	10	3851	6.14 (4.15 to 8.13)	0	0
Depression, Anxiety, and Stress Scale (DASS)	3	411	7.98 (0 to 16.09)	0	0
Cognitive Emotion Regulation Questionnaire (CERQ)	1	322	45.11 (22.41 to 67.80)	-	-
The Symptom Checklist-90-Revised (SCL-90-R)	5	678	4.61 (0.33 to 8.89)	23.29	97.8
Goldberg and Hiller Questioner (GHQ)	4	610	11.23 (5.97 to 16.66)	12.83	41.9
Overall score	31	7907	7.74 (5.52 to 9.93)	21.21	86.7

Table 5 The result of meta-regression on the heterogeneity of pooled estimations

Prevalence	Coefficient	Standard error	*t*	*P* > *t*	[95% CI]	
Publication year	0.00	0.02	0.06	0.95	− 0.04	0.04
Sex	− 0.01	0.02	− 0.89	0.40	− 0.05	0.02
Measuring tools	− 0.08	0.01	− 3.18	0.01	− 0.12	− 0.04
Sample size	0.001	0.001	− 0.87	0.41	− 0.005	0.002
Mean score of depression						
Publication year	− 0.24	0.27	− 0.91	0.37	− 0.80	0.30
Sex	− 1.81	1.43	− 1.27	0.21	− 4.75	1.12
Measuring tools	− 1.05	0.58	− 1.81	0.08	− 2.23	0.13
Sample size	− 0.001	0.003	− 0.45	0.53	− 0.009	0.006

reason this study differs from our study is that this study has shown the prevalence of depression in infertile women in studies between 2000 and 2005, and our study included the results of studies 2005 to 2019. Also, the addition of further studies in our study that each article reports this index differently may be the reason for the differences in the findings of this study with the present study.

Studies in other countries also show a high prevalence of depression in infertile women. Recent researches showed that prevalence can range from 11 [48] to 18 [49] and 27 [50] and 73% [41]. Dimitner et al. [51] reported that 19% of patients before the IVF cycle reported symptoms of moderate to severe depression, and 54% reported mild symptoms. Omu et al. [52] in Kuwait showed that the prevalence of depression in infertile women was 5.2% and 14.9% in men. A study in Taiwan [50] found that 40.2% of infertile women suffer from mental disorders, and 17% suffer from severe depression. Another study in Sweden [48] reported that major depression was the most common mood disorder among infertile couples with a prevalence of 10.9% in women and 5.1% in men. In a study on infertile women in Nigeria [53], Upkong and colleagues showed that the prevalence of anxiety and depression in infertile women was 37.5% and 42.9%, respectively. Similar studies have been done in different countries, and our study has been done in Iran. Consequently, the reason for the differences between the results of these studies and the present study may be due to differences in the place of study. Infertility seems to increase depression in women and men by affecting their moods, which is a serious health challenge. This should be considered a serious warning that threat the mental health of the infertile couples and should be the focus of special attention, particularly by the psychologist.

Some studies have reported a mean depression score based on the type of questionnaire used. In studies that used the BDI (Beck Depression Inventory) questionnaire to measure depression, the mean depression score was 20.95, based on the scoring [54]; participants had moderate depression. In studies using the PHQ (Patient Health Questionnaire), the mean depression score was 6.13, which according to the scoring [55]. Depression was moderate. Also, in studies using the HADS (Hospital Anxiety and Depression Scale) questionnaire, the mean depression score was 6.14, based on the scoring of this questionnaire [56]. In terms of depression, participants had normal status. As observed, studies have included this meta-analysis showed that depression has been mild in infertile couples, which is consistent with existing studies [57, 58]. Studies using other questionnaires to measure depression in infertile couples almost showed that depression is moderate or mild in participants.

This study showed that the prevalences of depression in infertile men and women were 9% and 48.7%, respectively. These findings are consistence with the Samani et al. [59], Maroufizadeh et al. [57], and Hariri et al. [60] studies. In a study by Ahmadi [17], the prevalence of depression in infertile men in Tehran was 42%, which is inconsistent with our study. It seems that because women are more involved with fertility and different aspects of infertility can affect women's mental health, women are more likely to be depressed than men.

There were a few limitations and potential biases in this study. Included studies may vary in the duration of the depression period of the study participants. So, the severity of depression cannot be the same across all included studies. Another limitation of this study is that studies may vary in quality and instrumentation used, making comparability difficult. Different questionnaires have also been used to measure

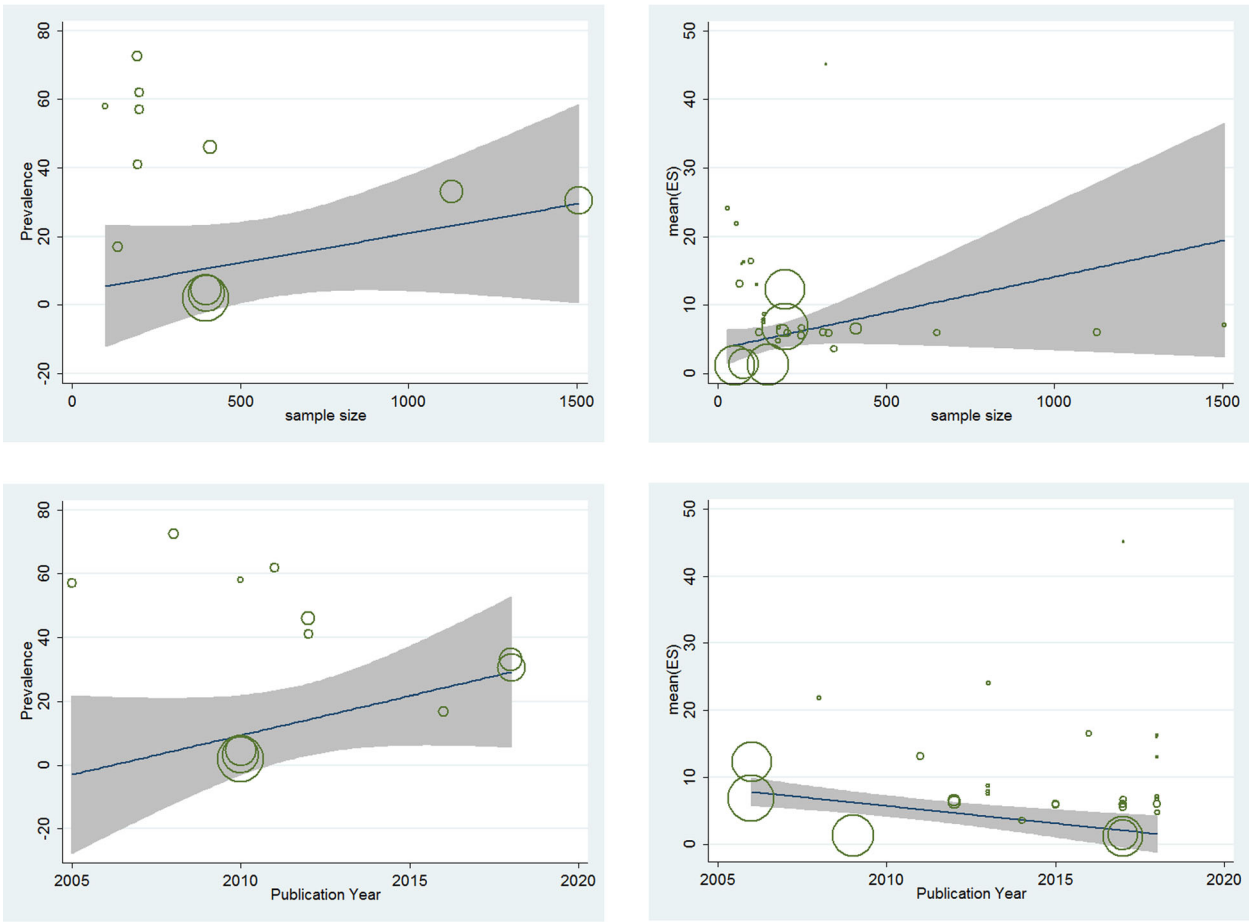

Fig. 4 The effect of different variables on heterogeneity between studies

depression, which makes it difficult to compare studies in terms of results.

Conclusion

Our study showed that 35.3% of infertile couples suffer from depression. The results can highlight an important and growing mental disorder among infertile couples that may be overlooked. Depression, as a major mental disorder, should be of particular concern to gynecologists, midwives, and physicians who manage infertile couples for fertility and related issues. However, many individuals, social, and cultural characteristics play an important role in the onset and exacerbation of depression, especially among infertile couples. Depression can occur in people of any age, gender, or background. It is predicted that in the whole world, depression alone will take second place in the disease burden until 2030. Also, according to this prediction, depression and anxiety disorders will be the main cause of the five factors that cause loss of life due to disability [61].

Abbreviations

DHS: Demographic and Health Surveys; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyzes; MOOSE: Meta-analyses Of Observational Studies in Epidemiology

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Authors' contributions

YA contributed in the data analysis, manuscript preparation, and supervision. AM, MS, and FE contributed in the manuscript searching, manuscript preparation, and data analysis. RR contributed in the search strategy, article searching, and manuscript preparation. All authors have read and approved the manuscript.

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Availability of data and materials

Data will not be shared because they are completely included in the manuscript.

Ethics approval and consent to participate

Not applicable

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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References

1. WHO. Available: https://www.who.int/reproductivehealth/topics/infertility/multiple-definitions/en/. 2019.
2. WHO. Available: https://www.who.int/reproductivehealth/topics/infertility/perspective/en/. 2019.
3. WHO. Available: https://www.who.int/reproductivehealth/topics/infertility/burden/en/. 2019.
4. Akhondi MM, Ranjbar F, Shirzad M, Behjati Ardakani Z, Kamali K, Mohammad K (2019) Practical difficulties in estimating the prevalence of primary infertility in Iran. Int J Fertil Steril. 13(2):113–117
5. Sargolzaee MR, Moharreri F, Arshadi HR, Javadi K, Karimi S, Fayyazi-bordbar MR. Psychosexual and depression disorders in infertile female referring to mashhad infertility treatment center. Journal of Reproduction & Infertility. 2001;2(4).
6. Tanha FD, Mohseni M, Ghajarzadeh M (2014) Sexual function in women with primary and secondary infertility in comparison with controls. Int J Impotence Res 26(4):132
7. who. Available: https://www.who.int/reproductivehealth/topics/infertility/en/. 2019.
8. Montazeri A, Mousavi S, Omidvari S, Tavousi M, Hashemi A, Rostami T (2013) Depression in Iran: a systematic review of the literature (2000-2010)
9. El Kissi Y, Romdhane AB, Hidar S, Bannour S, Idrissi KA, Khairi H et al (2013) General psychopathology, anxiety, depression and self-esteem in couples undergoing infertility treatment: a comparative study between men and women. Eur J Obstetr Gynecol Reprod Biol 167(2):185–189
10. Drosdzol A, Skrzypulec V (2009) Depression and anxiety among Polish infertile couples–an evaluative prevalence study. J Psychosom Obstetric Gynecol 30(1):11–20
11. Masoumi SZ, Poorolajal J, Keramat A, Moosavi SA (2013) Prevalence of depression among infertile couples in Iran: a meta-analysis study. Iran J Public Health 42(5):458
12. WHO. Available: https://www.who.int/mental_health/management/depression/en/. 2019.
13. Garnefski N, Kraaij V, Schroevers MJ, Somsen GA (2008) Post-traumatic growth after a myocardial infarction: a matter of personality, psychological health, or cognitive coping? J Clin Psychol Med Settings. 15(4):270
14. Seif D, Alborzi S, Alborzi S. Effect of some affective and demographic variables on life satisfaction of infertile women. Journal of Reproduction & Infertility. 2001;2(4).
15. Ramezanzadeh F, Aghssa MM, Abedinia N, Zayeri F, Khanafshar N, Shariat M et al (2004) A survey of relationship between anxiety, depression and duration of infertility. BMC Womens Health 4(1):9
16. WHO. Available: https://www.who.int/en/news-room/fact-sheets/detail/depression. 2019.
17. Ahmadi H, Montaser-Kouhsari L, Nowroozi MR, Bazargan-Hejazi S (2011) Male infertility and depression: a neglected problem in the middle east. J Sex Med 8(3):824–830
18. Rahmati S, Delpisheh A, Moghadam AD, Sayehmiri K, Mohamadian F (2019) Survey frequency of the depression and anxiety levels of infertile women in western Iran. Med J Indonesia 28(1):35–39
19. Shahraki Z, Tanha FD, Ghajarzadeh M. Depression, sexual dysfunction and sexual quality of life in women with infertility. BMC women's health. 2018;18(1).
20. Omani-Samani R, Maroufizadeh S, Almasi-Hashiani A, Amini P (2018) Prevalence of depression and its determinant factors among infertile patients in Iran based on the PHQ-9. Middle East Fertil Soci J 23(4):460–463
21. Maroufizadeh S, Hosseini M, Rahimi Foroushani A, Omani-Samani R, Amini P. The effect of depression on quality of life in infertile couples: an actor-partner interdependence model approach. Health and quality of life outcomes. 2018;16(1).
22. Maroufizadeh S, Ghaheri A, Almasi-Hashiani A, Mohammadi M, Navid B, Ezabadi Z et al (2018) The prevalence of anxiety and depression among people with infertility referring to Royan Institute in Tehran, Iran: a cross-sectional questionnaire study. Middle East Fertil Soc J 23(2):103–106
23. Basharpoor S, Atadokht A, Ghaffari M, Mowlaie M (2017) Prediction of depression through cognitive emotion regulation and resilience among infertile females. J Nurs Educ 4(4):34–42
24. Samani RO, Vesali S, Navid B, Vakiliniya B, Mohammadi M (2017) Evaluation on hope and psychological symptoms in infertile couples undergoing assisted reproduction treatment. Int J Fertility Sterility 11(2):123–129
25. Omani Samani R, Maroufizadeh S, Navid B, Amini P (2017) Locus of control, anxiety, and depression in infertile patients. Psychol Health Medicine 22(1):44–50
26. Navid B, Mohammadi M, Vesali S, Mohajeri M, Samani R (2017) Correlation of the etiology of infertility with life satisfaction and mood disorders in couples who undergo assisted reproductive technologies. Int J Fertility Sterility 11(3):205–210
27. Karimzadeh M, Salsabili N, Akbari Asbagh F, Teymouri R, Pourmand G, Soleimanieh NT (2017) Psychological disorders among Iranian infertile couples undergoing assisted reproductive technology (ART). Iran J Public Health 46(3):333–341
28. Amini P, Maroufizadeh S, Samani RO (2017) Evaluating the factor structure, item analyses, and internal consistency of hospital anxiety and depression scale in Iranian infertile patients. Int J Reprod BioMed 15(5):287–296
29. Dadipoor S, Alavi A, Zarei F, Safari-Moradabadi A (2016) Mental health of infertile women in Bandar Abbas. J Prev Med 3(2):20–28
30. Shahverdi J, Ahmadi S, Sadeghi K, Bakhtiari M, Rezaei M, Wissie F, et al. Comparison of mental health, happiness, inferiority, marital satisfaction and marital conflict in infertile and fertile women in Kermanshah. Clin Res Paramed Sci. 2016;4(3):-.
31. Maroufizadeh S, Karimi E, Vesali S, Omani SR (2015) Anxiety and depression after failure of assisted reproductive treatment among patients experiencing infertility. International J Gynecol Obstetrics 130(3):253–256
32. Hasanpour S, Bani S, Mirghafourvand M, Yahyavi KF (2014) Mental health and its personal and social predictors in infertile women. J Caring Sci 3(1):37–45
33. Zamani N, Ghasemi M, Jokar E, Khazri Moghadam N (2013) Comparison of depression and life quality of fertile and infertile women and those with frequent abortions. J Babol Univ Medi Sci 15(6):78–83
34. Zarei N, Rasoolzadeh Tabatabai K, Azin SA. Comparison of depression, anxiety and stress in first, second and third trimesters of pregnancy in normal pregnant women and women undergoing infertility treatment health psychology. 2013;4.
35. Pakpour AH, Yekaninejad MS, Zeidi IM, Burri A (2012) Prevalence and risk factors of the female sexual dysfunction in a sample of infertile Iranian women. Arch Gynecol Obstetrics 286(6):1589–1596
36. Tamannai Far MR (2011) A Comprative Study of mental health, marital adjustment and coping responses among fertile-infertile women. Clin Psychol Personality 2(4):51–60
37. Peyvandi S, Hosseini SH, Daneshpoor SMM, Mohammadpour RA, Qolami N (2011) The prevalence of depression, anxiety and marital satisfaction and related factors in infertile women referred to infertility clinics of Sari city in 2008. J Mazandaran Univ Med Sci 20(80):25–32
38. Haririan H, Mohammadpour Y, Aghajanloo A (2010) Prevalence of depression and contributing factors of depression in the infertile women referred to Kosar Infertility Center, 2009. Irain J Obestetric Gynecol Infertility 2(13):45–49
39. Noorbala AA, Ramezanzadeh F, Abedinia N, Naghizadeh MM (2009) Psychiatric disorders among infertile and fertile women. Soc Psychiatr Psychiatr Epidemiol 44(7):587–591
40. Faraji R, Milani F, Danesh M (2009) O287 Realative frequeny of depression in infertile women, Rasht, Iran. Int J Gynecol Obstetrics 107:S174–S1S5

41. Farzadi L, Ghasemzadeh A (2008) Two main independent predictors of depression among infertile women: an Asian experience. Taiwan J Obstetrics Gynecol 47(2):163–167
42. Sadeghin E, Heidarian-poor A, Abed F (2006) Comparison of psychiatric problems in infertile men and women referring to infertility clinic of Hamadan Fatemyeh Hospital. J Arak Univ Med Sci 9(2):31–39
43. Bahdani F, Erfanian M, Habrani P, Hojjat SK (2005) Prevalence of depression and its related factors in infertile women referred to Montaserieh Infertility Clinic in Mashhad. Prin Mental Health 23-24:141–147
44. Yassini M, Khalili MA, Hashemian Z (2005) The level of anxiety and depression among Iranian infertile couples undergoing in vitro fertilization or intra cytoplasmic sperm injection cycles. J Res Med Sci 10(6):358–362
45. Noruzinejad GH, Mohammadi SD, Seyedtabaee R, Sharifi AH (2016) An investigation of the prevalence rate and severity of symptoms of depression and its relationship with duration of infertility among infertile men referred to Infertility Center Jahad Daneshgahi Qom in 2013, Iran. Qom Univ Med Sci J 10(2):81–87
46. Behjati Ardakani Z, Akhondi MM, Kamali C, Fazli Khalaf Z, Eskandari S, Ghorbani B (2011) Evaluation of mental health of infertile people referred to Ibn Sina Infertility Center. J Reprod Infertility 4(11):319–324
47. Sotoudeh G, Siasi F, Lesan S, Mirdamadi SR, Chameri M (2008) Frequency of anxiety and depression and its related factors in women with elevated blood androgen levels. Iran J Med Sci Organ 4(25):482–489
48. Volgsten H, Skoog Svanberg A, Ekselius L, Lundkvist Ö, Sundström Poromaa I Prevalence of psychiatric disorders in infertile women and men undergoing in vitro fertilization treatment. 2008;23(9):2056-63.
49. Chiaffarino F, Baldini MP, Scarduelli C, Bommarito F, Ambrosio S, Dorsi C, et al. Prevalence and incidence of depressive and anxious symptoms in couples undergoing assisted reproductive treatment in an Italian infertility department. 2011;158(2):235-41.
50. Chen T-H, Chang S-P, Tsai C-F, Juang K-D. Prevalence of depressive and anxiety disorders in an assisted reproductive technique clinic. 2004;19(10):2313-8.
51. Demyttenaere K, Bonte L, Gheldof M, Vervaeke M, Meuleman C, Vanderschuerem D, et al. Coping style and depression level influence outcome in in vitro fertilization. 1998;69(6):1026-33.
52. Omu FE, Omu AE. Emotional reaction to diagnosis of infertility in Kuwait and successful clients' perception of nurses' role during treatment. 2010;9(1):5.
53. Upkong D, Orgi E (2006) Mental health of infertile women in Nigeria
54. García-Batista ZE, Guerra-Peña K, Cano-Vindel A, Herrera-Martínez SX, Medrano LA (2018) Validity and reliability of the Beck Depression Inventory (BDI-II) in general and hospital population of Dominican Republic. PLoS One 13(6):e0199750–e019975e
55. Löwe B, Kroenke K, Herzog W, Gräfe KJJoad. Measuring depression outcome with a brief self-report instrument: sensitivity to change of the Patient Health Questionnaire (PHQ-9). 2004;81(1):61-6.
56. Snaith RP (2003) The Hospital Anxiety And Depression Scale. Health Qual Life Outcomes 1:29
57. Maroufizadeh S, Karimi E, Vesali S, Omani Samani R. Anxiety and depression after failure of assisted reproductive treatment among patients experiencing infertility. 2015;130(3):253-6.
58. Pakpour AH, Yekaninejad MS, Zeidi IM, Burri A. Prevalence and risk factors of the female sexual dysfunction in a sample of infertile Iranian women. 2012; 286(6):1589-96.
59. Samani RO, Vesali S, Navid B, Vakiliniya B, Mohammadi M. Evaluation on hope and psychological symptoms in infertile couples undergoing assisted reproduction treatment. 2017;11(2):123.
60. Haririan HR, Mohammadpour Y, Aghajanloo A, Gynecology, Infertility. Prevalence of depression and contributing factors of depression in the infertile women referred to Kosar infertility center, 2009. 2010;13(2):45-9.
61. Mathers CD, Loncar DJ (2006) Projections of global mortality and burden of disease from 2002 to 2030. Plus Med 3(11):e442

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