



A meta-analysis of studies related prevalence of depression in Iran

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Abstract

Depression is one of the most important and common mood disorders. This study aimed to present a clear picture of the prevalence of depression in studies conducted in Iran. In this systematic review study, all published relevant studies were searched in credible scientific databases using standard key words. Repeated cases and those outside the time span of this study (1996 to 2011) were excluded. Articles were examined in terms of quality, and irrelevant ones were excluded. Eventually, 145 articles were selected for this systematic review. Fifteen different tools had been used in these articles, mostly standard tools such as Beck's and general health questionnaires. Beck's inventory indicated the prevalence of depression as 52.12% in students, 37.22% in the general population, 33.45% during postmenopausal period and 27.62% during pregnancy. General health questionnaire revealed the prevalence of depression as 12.02% in students, 19.46% in general population. For the older adults, Geriatric Depression Scale (GDS) played an important role. GDS revealed the prevalence of depression in older adults living at home as 57.58%, and in those living in nursing homes 81.85%. Because of its ubiquitous features, Beck's inventory had been used, which showed overall prevalence of depression 42.59%. Considering high prevalence of depression in Iran, greater attention to depression and preventive measures are hugely important.

Keywords: Depression, Meta-Analysis, Prevalence

Introduction

Behavioral and psychological problems show an increasing trend in developing countries, so that in transition to social development and subsequent changes in climate, politics, and economics, people are more exposed to psychological pressures. Accordingly, the issue of psychological health has always been an important health concern in developing countries [1]. Among various psychological health problems created in the process of change, depression is of particular importance. Depression is one of the most important

psychiatric disorders and the most common mood disorder, and because of its high prevalence, it is referred to as psychological common cold. Depression is a state in which individuals have at least 5 known symptoms of this disorder for at least two weeks. These symptoms include depressed mood, loss of interest or enjoyment (anhedonia), weight gain or loss, increased or reduced sleep, mental and motor stimulation or retardation, lack of energy, a sense of guilt and worthlessness, and inability to think or concentrate [2]. Recent

data indicate that approximately 121 million people worldwide suffer depression. Depression is the second leading psychological disorder, and according to the world health organization, it will top the list of psychological diseases in future [3].

Review of various related literature shows that the prevalence of depression varies across different countries depending on the tools used, culture of the society, and sample size [4]. In epidemiological studies in Iran, different methods and tools have been used to assess the prevalence of depression, and different results have been reported. In 1999, Noorbala reported the prevalence of depression in 15 year-old people and older 21% [5]. Mohammadi *et al* reported the prevalence as 2.98% [6]. In a study by Montazeri *et al.*, titled "systematic review of studies on depression in Iran", a limited number of results were reviewed and only studies and prevalence of depression found in them were cited, which ranged from 5.69% to 73% [7]. In a systematic review study by Sarokhani *et al.*, overall prevalence of depression among Iranian students was reported 40% [8], but this study included only articles that had used Beck's Depression Inventory. In their systematic review study, Sadeghi *et al.* reported overall prevalence of Major Depressive Disorder (MDD) in Iran 4.1%, ranging from 0.3% to 5.59% across different provinces [9]. Given the importance of depression and studies conducted in this area reporting different prevalence rates in Iran, and the need for evidence-based policy-making and planning, makes it essential to use existing and purposive future studies. Thus, the present study aims to conduct a structured review of all documents, and summarize data and results obtained to provide a full picture of dimensions of this problem in Iran.

Method

This is a descriptive systematic review, the best known method, which is actually a secondary analysis of previous studies through structured or systematic search, based on predetermined regulations. Meta-analysis quantifies results from systematic review using statistical methods.

In this study, statistical population consisted of all articles resulting from quantitative study on the prevalence of depression in Iran published from 1996 to 2011. A search was conducted using keywords: depression, dysthymia, melancholia, and mood disorder in SID, Irandoc, Iranmedex, Iran psych, and Magiran, and English keywords; depression, mood disorder, melancholia, dysthymia, and Iran in Medline databank.

In Farsi sources, search was conducted using article title, abstract and keywords. In non-domestic sources, in Pub Med database, using keyword Iran in organizational affiliation section (affiliation) and its combination (And) with keyword depression in title/abstract section, titles and abstracts of all Iranian articles on depression (306 articles) were found. The same method was used for four English keywords, and with the exception of keyword depression, only keyword mood disorder produced results (28 articles).

Study inclusion criteria included studies conducted on the prevalence of depression in Iranian population in the recent 15 years (1996-2011). Studies conducted on non-human subjects, and those tool or methodology with problems were excluded.

Given the above criteria, ultimately 4077 articles were assessed. In the first screening stage, repeated cases and those outside the 15-year time span were excluded (it should be noted that articles extracted from a reference article were also excluded as repeats, and reference article was included only), and thus 1234 articles remained. In the second screening stage, 753 articles were excluded according to the criteria of relevance to study subject and exclusion of repeated articles in English, and the remainder (481 articles) entered qualitative assessment stage. Qualitative assessment of articles was performed by integration of qualitative assessment checklists, including one by Vameghi (combining existing guidelines with a few innovative questions) [10], and checklists of Critical Appraisal Skills Program (CASP) site. At this stage, articles obtained were assessed by two team members, and if no

consensus was reached, they were referred to a third member. Eventually, a total of 70 articles were excluded for lack of minimum acceptable quality, and of the remaining 411 articles, 145 relevant articles to "prevalence of depression" entered systematic review stage.

The results from each of the final articles were entered into data input form as data collection tool, in preparation for meta-analysis. To assess possibility of meta-analysis of data, the statistical evaluations are not enough to identify homogeneity of data [11], so the observation method was used as well as Chi-square test. Chi-square test results suggested no significant

difference between data from various studies, and thus meta-analysis could be performed on these data. Moreover, observation showed that data could be combined. Next, in each study, equivalent sample size was determined according to its weight, and mean weight of each study found. Articles that had used only one tool were combined and their mean weight was extracted.

Results

Following stages of search, screening, and qualitative assessment of studies, meta-analysis was conducted on 145 articles (Figure 1).

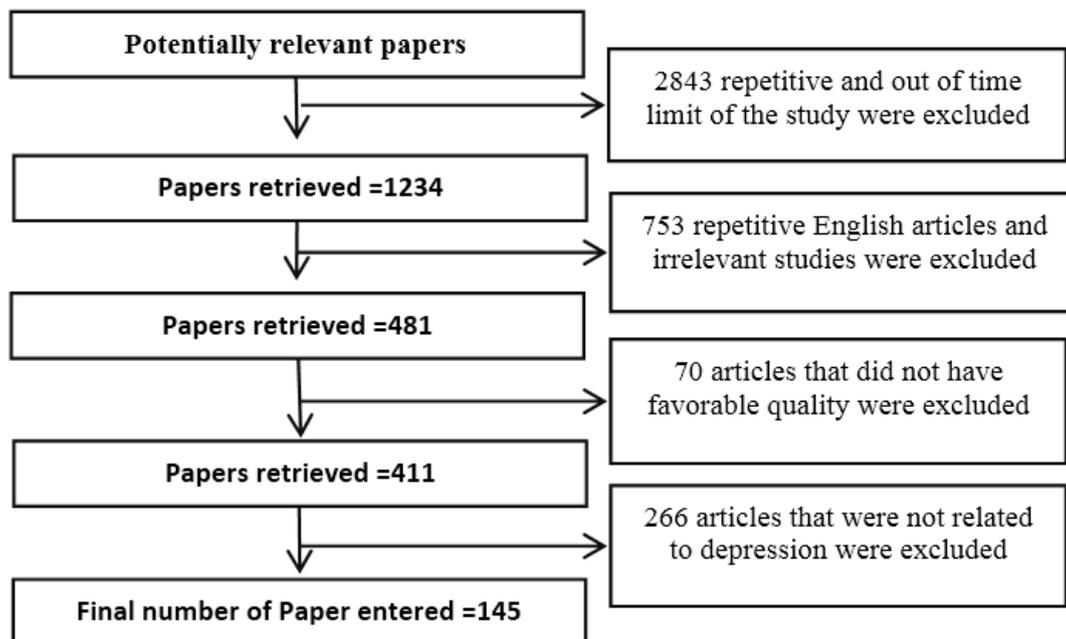


Figure 1 Stages of inclusion and exclusion of studies into final meta-analysis

These studies included a total sample size of 132001 people. Of these studies, 139 had been conducted in urban areas (or in combined urban and rural areas), 4 in rural and 2 in tribal areas. Investigation showed that 15 different tools had been used in these studies, namely Beck Depression Inventory, Edinburgh Postnatal Depression Scale, Geriatrics Depression Scale (GDS), Children Depression Inventory (CDI), Self- Rating Depression Scale of Zung, Standardized Depression Scale (DVYSS), Center for Epidemiology Studies-Depression Child (CES-DC), and Depression, Anxiety and Stress Scale (DASS21). General Health

Questionnaire (GHQ) and Duke's Health Screening questionnaire were used in assessment of general health, and Schedule for Affective Disorders and Schizophrenia (SADS), Symptoms Check List-90 (SCL-90), clinical interviews, Rutter children's behaviour questionnaire and Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS) were used to measure psychiatric disorders. Each measured the concept of depression in its own way. In the present study, only data relating to depression in these studies were used in process of analysis. Of these tools, 6 that appeared in most studies were used in

this systematic review, including BDI, GHQ, SCL-90, Edinburgh, GDS, and CDI. Articles obtained were examined in 4 general classes of school pupils (31 articles), university students (39 articles), general public (21 articles), and the older adults (15 articles), and also a secondary class called women's depression (40 articles). One of the articles concurrently addressed pupils' and women's depression [12], and was repeated in both groups, which made the total number of articles

146 instead of 145. Next, studies concerned with the prevalence of depression in different groups and types of tools used were assessed, and finally, overall prevalence of depression was investigated using more usual tools.

1- *Prevalence of depression in pupils*: A total of 31 articles were found on depression in pupils, most of which had addressed depression among high school students. Details of these studies are presented in Table 1.

Table 1 Summary of studies associated with pupils' depression

Row	First author	Year	Population	Tool	Sample size	Prevalence (%)
1	Rostamzadeh	2007	Girls in Uromieh (HS)	Beck	3023	T= 68.1, M= 19.3, Mo= 32.5, S= 16.4
2	Zargham Borojeni	2001	Adolescents in Isfahan	Beck	323	43.4,(T) 55.5 (G), 30.8 (B)
3	Monirpour	2004	Pupils in Sari city	Beck	388	72 (T) 75.3(G) , 65.7 (B)
4	Zahiraldin	2004	Firoozkoh (HS)	Beck	604	65.35(T) 73(G), 58 (B)
5	Ghesli-Roshan	2002	Ardebil (HS)	Beck	967	Mo to high =28
6	Rahimikian	2003	Karaj (HS)	Beck	264	T= 64.8, M= 63.7, Mo= 30.5, S= 5.8
7	Sooki	2010	Girls in Kashan (HS)	Beck	762	T= 53.5, M= 36.27, Mo= 44.85, S= 18.88
8	Narimani	1997	Ardebil (HS)	Beck	127	T= 43, M= 25, Mo= 13, S= 5
9	Johari	1987	Ilam (HS)	Beck	372	29.1(T) 31(G), 27 (B)
10	Mogharab	2009	Birgand (HS)	Beck	450	T= 58.8, M= 32.2, Mo= 19.3, S= 9.3
11	Jonbozorgi	2005	Tehran (HS)	Beck	1551	14.77(T) 16.4(G), 13.4 (B)
12	Modabernia	2007	HS & pre-university in Rasht	Beck	4020	34 (T)
13	Zarabi	2001	Rasht (HS)	SCL-90	557	16.2 (T)
14	Huseini	2004	Sari (HS)	SCL-90	1536	0.88(T), 1.4 (G), 0.74 (B)
15	Janaabadi	2011	Saravan (HS)	SCL-90	125	26.5(T), 20.85(G), 14 (B)
16	Sepehrmanesh	2008	Kashan (HS)	SCL-90	400	18 (T)
17	Huseinifard	2001	Rafsenjan (HS)	SCL-90	830	2.4(T), 3.1 (G), 1.6 (B)
18	Masodzadeh	2002	Sari(HS)	SCL-90	1068	0.6(T), 0.62 (G) , 0.58 (B)
19	Huseini	2003	Sari (HS)	SCL-90	350	1.41(T), 1.41 (G) , 0.7 (B)
20	Ostewar	2006	Shiraz (HS)	CDI	403	15(T), 17.07 (G) , 11.99 (B)
21	Rajabi	2004	Junior & senior high -Ahwaz	CDI	400	25.6(T), 25.5 (G) , 25.1
22	Ghorbani	2006	8-16 year-old – Isfahan	CDI	117	8% (T)
23	Abdolahian	2001	10-12 year-old children in Mashhad	CDI	2071	10.3(T), 13.1 (G) , 7.6 (B)
24	Jonbozorgi	2005	Tehran (HS)	CDI	1551	13.36(T), 15.1 (G) , 11.9 (B)
25	Motaghipour	2005	12-19 year-old of Tehran	GHQ	346	1(T), 1.2 (G) , 0.6 (B)
26	Sadeghian	2010	Girls Hamedan(HS)	GHQ	600	T= 45.8
27	Habibpour	2009	Isfahan (HS)	Zung	400	M= 26, Mo= 3.5
28	Shojaeezadeh	2001	Pre-university in Kazeroon	Zung	240	T= 42.9, M= 28.8, Mo= 9.6, S= 3.3, profound 1.3
29	Shahnazi	2008	12-18 year-old girls in Tabriz	CES-DC	364	72.82 (T)
30	Rangbar-kocheksaraee	2003	15-16 year-old in Tabriz	Rutter	252	55.5 (G), 44.5 (B)
31	Ahmadkhaniha	2002	Street children in Tehran	K-SADS	87	61.4(T), 86.7 (G) , 48.2 (B)
32	Sayari	2001	Junior high students	Clinical interview	500000	1.73 (T)

Note. HS= high schools, T = total prevalence, G = prevalence among girls, B = prevalence among boys, M= mild, Mo=moderate, S=severe

One of the articles in this category had concurrently used both BDI and CDI tools, which explains the 32 rows instead of 31 in Table 1.

According to details presented in Table 1 relating to depression in school pupils, meta-analysis of articles resulted in three questionnaires of BDI, SCL-90, and CDI, which appeared in sufficient number of articles. Twelve articles used BDI to assess depression among school pupils with overall sample size 12851 pupils. Using mean weight of studies, prevalence of depression in school pupils using BDI was found 43.55%. Among these articles, 8 had assessed prevalence of depression in different sexes, and following calculation of mean weight, prevalence of depression was found 57.69% in girls and 30.09% in boys.

Furthermore, in depression scales only in boys measures severity of depression, and in these 12 articles, only 6 reported severity of depression in pupils as follows: 25.95% had mild depression, 31.58% moderate depression, and 14.92% had severe depression.

Of the 7 articles that used SCL-90 to assess pupils' depression, 5 were processed in this study [13-17], and the other two were excluded, since they did not provide an estimate of prevalence of depression. The overall sample size in these 5 articles was 2262 pupils, and prevalence of depression in pupils using this tool was found 15.87%.

Overall sample size of 5 articles that used CDI to assess pupils' depression was 4542 pupils, and mean weight of these articles showed a 13.05% prevalence of depression in pupils. Four articles reported prevalence of depression according to gender, with prevalence of 15.32% in girls and 11.05% in boys.

2- Prevalence of depression in university students: A total of 39 articles were found to have addressed prevalence of depression among university students. Details of these articles are presented in Table 2.

According to Table 2, two questionnaires

of BDI and GHQ (which had been used in sufficient number of articles) were used in calculation of mean weight. Of the 25 articles that used BDI to assess students' depression, 24 were used in synthesis and mean weight calculation. Overall sample size of these articles was 7258 students, and mean weight of prevalence of depression in students using BDI was found 52.12. Of these studies, 11 reported prevalence of depression in female students (48.35%) and 10 in male students (50.48%). Using this tool, 19 articles reported severity of depression mild to moderate, and 20 reported severe depression in students. Accordingly, in the present study, 32.71% were found with mild depression, 15.03% with moderate, and 8.14% with severe depression.

According to the search conducted, 10 articles used GHQ to assess prevalence of depression in students, of which 7 were used in this study in calculation of mean weight and overall prevalence. Overall sample size of these studies was 1380 students. Thus, prevalence of depression in students, using this tool, was found 12.02%.

3- Prevalence of depression in general population: In assessment of prevalence of depression in general public, studies that completed questionnaire by interviewing people at home were used. Accordingly, after a critical review, 21 articles entered final synthesis. Details of these studies are presented in Table 3.

Among studies on prevalence of depression among general population, one article with sample size of 25180 people had used SADS, and found prevalence of depression 2.98% across Iran. In relation to prevalence of depression in different sexes, prevalence was reported 4.38% in women and 1.59% in men. It should be noted that 18 other articles (including data on prevalence of depression in provinces) that had been extracted from this article were excluded from this study to prevent repeat of data analysis in systematic review.

Table 2 Summary of articles relating to depression in students

Row	First author	Year	Population (University)	Tool	Sample size	Prevalence (%)
1	Tavakolizadeh	2001	Gonabad (UMS)	Beck	291	62.5 (T), 43.8 (G), 57.6 (B)
2	Dadkhah	2009	Ardebil (UMS)	Beck	409	50.8 (T)
3	Abdollahian	1999	Ferdowsi-Mashhad	Beck	420	T=66.7, M= 44.3, Mo=16.4, S= 6
4	Hashemi-Mahmoodabad	2001	Yasuj	Beck	464	T= 63.8, M= 28.2, Mo= 11.6, S=20.7, P= 3.2
5	Mansoor Ghanaee	2007	Lahijan and Langrood	Beck	110	T= 61.8, M= 37.3, Mo= 14.5, S= 10
6	Sharifi	2000	Kashan(UMS)	Beck	307	35.8 (T), 34.4(G), 38.8 (B)
7	Salehi	2000	Arak (UMS)	Beck	153	22.1 (T)
8	Eslami	2002	Gorgan (UMS)	Beck	238	10.56 (T)
9	Rashidi-zavieh	2000	Zanjan (UMS)	Beck	148	48.6 (T)
10	Ghaneie-Motlaq	2003	Mashhad (UMS)	Beck	254	37 (T), 36.6(G), 35.5 (B)
11	Karimi-zarachi	2003	Medicine	Beck	197	28.9 (T)
12	Amani	2004	Ardebil (UMS)	Beck	324	T= 57.4, M= 18.5, counseling required 10.2,relatively 16.4, S= 8.2, profound 4
13	Forotani	2005	Institute of higher education in Larr	Beck	134	42.5 (T), 41.2 (G), 45.9 (B)
14	Ghasemi	2008	Mashahd- Azad (UMS)	Beck	780	28.6 (T), 31.3 (G), 18.7 (B)
15	Baghiani-Moghadam	2006	Yazd (UMS)	Beck	185	T= 52.8, M= 24.4, Mo= 22.4, S= 6.2
16	Hashemi	2001	Yasuj (UMS)	Beck	421	69.7 (T), 65(G), 73 (B)
17	Abedini	2007	Hormozgan (UMS)	Beck	190	54.75 (T)
18	Ilderabadi	2004	Zabol (UMS)	Beck	175	64.3 (T), 64.4 (G), 60.9 (B)
19	Zohor	2001	Kerman (UMS)	Beck	346	61 (T)
20	Hashemi	2004	Yasuj- Azad	Beck	452	62 (T), 71.8 (G), 75 (B)
21	Fakhari	2001	Tabriz	Beck	600	50 (T), 41.5 (G), 38.14 (B)
22	Najafipour	2008	Jahroom (UMS)	Beck	137	45.4 (T), 48.5 (G), 45.9 (B)
23	Mohammadzadeh	2011	Ilam	Beck	381	76.1 (T)
24	Jalilian	2011	Hamedan (UMS)	Beck	235	T= 37, M= 18.7, Mo= 16.2, S= 2.1
25	Ahmari	2009	Qum (UMS)	Beck	250	T= 55.2, M= 37.2, Mo= 14.83, S= 3.2
26	Karami	2001	Zanjan (UMS)	GHQ	395	T= 26.4, Mo= 21.8, S= 4.6
27	Rezaee	2006	Nursing Amol	GHQ	85	4.13 (T)
28	Ansari	2007	Zahedan (UMS)	GHQ	240	17.1 (T)
29	Ahmadi	2007	Shahrood- Azad	GHQ	360	Nursing =17.8, non,nursing =28.8 (Mo & S)
30	Saki	2002	Ilam (UMS)	GHQ	175	3.7 (T), 3.3 (G), 4.9 (B)
31	Tavakolizadeh	2002	Gonabad (UMS)	GHQ	140	2.5 (T)
32	Adham	2008	Ardebil (UMS)	GHQ	352	S= 2
33	Dalir	2003	Mashhad (UMS)	GHQ	209	2.77 (T)
34	Akashah	2000	Kashan (UMS)	GHQ	253	Major 8.7, double 3.4
35	Tavakolizadeh	2010	Gonabad (UMS)	GHQ	136	2.07 (T)
36	Farhadi	2008	Lorestan (UMS)	SCL-90	174	9.7 (G), 11.8 (B)
37	Huseini	2000	Mazandaran (UMS)	SCL-90	279	1.03 (T), 1.16 (G), 0.82 (B)
38	Parvizifard	2006	Kermanshah (UMS)	Clinical interview	423	5.67 (T), 6.37 (G), 3.67 (B)
39	Rezaee	2007	Tarbiat Modaress	DASS21	223	T= 51.6, Mo= 41.3, S= 10.3

Note. UMS= University of medical science T = total prevalence, G = prevalence among girls, B = prevalence among boys, M= mild, Mo=moderate, S=severe

Table 3 Summary of articles relating to prevalence of depression in general public

Row	First author	Year	Population	Tool	Sample size	Prevalence (%)
1	Mohammadi	2003	Iran (U, R)	SADS	25180	7.98 (T)- 4.38 (W)- 1.59 (M)
2	Kheirabadi	2000	Kamyaran (U)	Beck	1401	69.5 (T)- 71.9 (W)- 67 (M)
3	Khoshhal	2004	Isfahan	Beck	800	50 (T)
4	Nazari	2007	Khoramabad	Beck	2740	33.4 (T)- 34.3 (W)- 32.4 (M)
5	Kaviani	2000	Tehran	Beck	1052	11.2 (T)- 13.8 (W)- 8.8 (M)
6	Bakhshi	2007	Rafsenjan	Beck	600	26.7 (T)- 27.7 (W)- 25.7 (M)
7	Ragabizadeh	2004	Mahan-Kerman	Beck	737	59.17 (T)
8	Ahmadi	2009	Isfahan (U, R)	Beck	403	23.1 (T)
9	Nazari	2001	Tehran	Beck	1191	22.5 (T)- 29.2 (W)- 16 (M)
10	Mohammadi	2007	Qashqai nomads	Beck	181	35.89 (T)
11	Ahmadi	2008	Bakhtiari nomads	Beck	400	29.6 (T)
12	Motaqipour	2005	District 13-Tehran	GHQ	927	0.75 (T)- 0.9 (W)- 0.6 (M)
13	Parvaresh	2011	Kerman	GHQ	1527	6.81 (T)
14	Noorbala	1999	Iran	GHQ	35014	21 (T)- 25.9 (W)- 14.9 (M)
15	Omidi	2008	Natanz (U)	GHQ	650	3.4 (T)- 5.5 (W)- 1.2 (M)
16	Shams-alizadeh	2001	Savugbelaq (R)	GHQ	640	11.3 (T)- 15.7 (W)- 5.4 (M)
17	Ahmadvand	2010	Kashan	GHQ	1800	9 (T)
18	Khosravi	2002	Borogen (U)	SCL-90	450	11.76(T)-15.76(W)- 6.3 (M)
19	Hassanshahi	2003	Arsenjan (U)	SCL-90	650	7.73 (T)-5.58 (W)-10.52 (M)
20	Fakhari	2003	Tabriz- North-East	Duke	2076	18.95 (W)- 6.84 (M)
21	Sadeghi	2000	Kermanshah (U)	Clinical interview	501	1.6 (T)- 1.85 (W)- 1.3 (M)

Note. U= Urban, R= Rural, T = total prevalence, W = prevalence among women, M = prevalence among Men

Ten studies had used BDI, and their overall sample size was 9504 people. Using mean weight of these studies, prevalence of depression in general population of Iran using BDI was 37.32%. Of these 10 studies, 6 reported prevalence of depression in different sexes, so that prevalence of depression in women was found 37.71% and in men 31.86%.

Of the 6 studies that used GHQ in assessment of depression in general public, one did not provide an estimate of prevalence and was excluded

[18], and mean weight was calculated for the remaining 5 studies, and thus prevalence of depression in general population was found 19.46%. Overall sample size of these studies was 39631 people.

4- Prevalence of depression in the older adults and women: Following a critical review, 15 studies on prevalence of depression in the older adults and 40 studies on prevalence of depression in the women entered final analysis of the present study (Table 4).

Table 4 Summary of studies on prevalence of depression in the older adults and women

Row	First author	Year	Population	Tool	Sample size	Prevalence (%)	Case	
1	Taban	2005	Isfahan (U)	GDS	523	86.4 (N)- 46.6 (O)	Older adults	
2	Yazdkhasti	2009	Isfahan (U)	GDS	120	11.28 (N)- 9.91 (O)		
3	Sohrabi	2008	Shahrood (U)	GDS	136	69.6 (N)- 24		
4	Sadeq-Moghadam	2000	Kahrizak-Tehran	GDS	33	9.27 (T)- 9.61 (W)- 8.46 (M)		
5	Nemati-Dehkordi	2008	Shahrkord older adults	GDS	64	mild 65.42- moderate 34.37		
6	Manzori	2009	Isfahan older adults	GDS	248	63.7 (T)- 62.4 (W)- 65 (M)		
7	Sayadi-Anari	2002	Toos center-Mashhad	Beck	30	Total 100%		
8	Mobasheri	2008	Shahrkord	Beck	57	84.7 (T)		
9	Ragabizadeh	2003	Kerman (U)	Beck	121	78.6 (T)		
10	Kashfi	2008	Shiraz	Beck	120	100 (N)		
11	Nejati	2009	Qum (U,R)	GHQ	151	48.3 (T)		
12	Momeni	2010	Kermanshah (U)	GHQ	254	9.74 (N)- 6 (O)		
13	Khodadadi	2007	Gilan older adults	DVYSS	100	45.3 (T)		
14	Etemadi	2009	Tehran (U)	SCL-90	120	32.5 (T)		
15	Sadeqi	2004	Tehran older adults	Clinical interview	279	41.9 (T)		
16	Laloe	2007	Tehran (U)	Beck	400	21.3%	Women - Pregnancy	
17	Modabernia	2009	Rasht (U)	Beck	415	25%		
18	Huseinisazi	2005	Tehran (U)	Beck	180	23.3%		
19	Karbakhsh	2002	Tehran (U)	Beck	200	30.6%		
20	Bandad	2005	Mashhad (U)	Beck	320	57.8%		
21	Pazendeh	2002	Tehran (U)	Beck	580	45.7%		
22	Ahmadzadeh	2006	Isfahan (U)	Beck	600	25.7%		
23	Omidvar	2007	Babol (U)	Beck	191	78.8%		
24	Mostafanejad	2007	Jahroome (U)	SCL-90	214	47%		
25	Ghasemi	2008	Tehran (U)	SCL-90	1451	10.05%		
26	Mardani-Hamoleh	2010	Shahinshahr (U)	GHQ	315	16%		
27	Shahmiri	2006	Zanjan (U)	Zung	300	32%		
28	Jafarpour	2006	Kermanshah (U)	Edinburgh	975	17.5%		
29	Khoramirad	2010	Qum (U)	Edinburgh	300	23.7%		
30	Barkatin	2009	Isfahan (R)	Edinburgh	1898	46.6%		
31	Khodadadi	2008	Rasht (U)	Edinburgh	350	16%		
32	Azimi	2005	Sari (U)	Edinburgh	422	30%		
33	Zangeneh	2009	Kermanshah (U)	Edinburgh	531	40.7%		
34	Salehi	2001	Unknown	Edinburgh	164	14.5%		
35	Sadr	2004	Tehran (U)	Edinburgh	300	23.7%		
36	Dowlatian	2008	Marivan (U)	Edinburgh	240	34.2%		
37	Kiani	2010	Astara (U)	Edinburgh	105	25%		
38	Bagherzadeh	2009	Busher (U)	Edinburgh	400	15.5%		
39	Hassan-zahraee	1997	Isfahan (U)	Edinburgh	527	35%	Women - Postpartum	
40	Nemazi	1999	Shiraz (U)	Edinburgh	175	35%		
41	Sehati-Shafae	2009	Tabriz (U)	Edinburgh	600	34.7%		
42	Mosavi	2011	Kashan (U)	Beck	204	37.7%		
43	Frozandeh	1997	Shahrkord (U)	Beck	300	21.3%		
44	Shobeiri	2006	Hamedan (U)	Beck	400	32%		
45	Narimani	2004	Tehran (U)	Beck	100	30%		
46	Najafi	2006	Rasht (U)	Beck	335	20%		
47	Huseini	2008	Kermanshah (U)	Beck	330	24.8%		
48	Mardani-Hamoleh	2010	Najafabad (U)	Beck	60	32.7%		
49	Khosheh-Mehri	2010	Tehran (U)	Beck	250	30%		
50	Lashkaripour	2008	Zahedan (U)	Beck	33.7%	33.7%		
51	Ghafarinejad	1999	Kerman (U)	Beck	400	31.7%		
52	Shaeri	2008	Tehran (U)	SCL-90	150	Pupils 17.6% Students 14.64%		Women - Menstruation
53	Rahimi-Kian	2003	High schools- Karaj	Beck	264	64.8%		
54	Dowlatian	2006	Kermanshah (U)	Beck	460	32.2%	Women - Menopausal	
55	Rasooli	2004	Ilam (U)	Beck	150	37.7%		

Note. U= Urban, R= Rural, N= Nursing home, O= own home, T = total prevalence, W = prevalence among women, M=prevalence among Men

BDI and GDS tools had sufficient appearance in articles for obtaining mean weight of prevalence of depression in older adults. Based on these studies, prevalence of depression in older adults living at home and older adults living in nursing homes can be separately calculated. Among studies that used GDS tool, only two addressed depression in older adults living in nursing homes. Total sample size of these studies amounted to 170 people. Thus, mean weight of prevalence of depression in older adults living in nursing homes was found 81.85%. Three studies investigated prevalence of depression in older adults living at home. Total sample size of these studies was 761 people. Thus, mean weight and prevalence of depression in older adults living at home was found 57.58%.

Four articles used BDI to find prevalence of depression in older adults, of these three focused on older adults in nursing homes, and one on those living at home. Thus, prevalence of depression in older adults in nursing homes is reported here only. Total sample size of these three articles was 207 people. Therefore, mean weight of prevalence of depression in older adults in nursing homes was found 95.64%. It should be added that overall sample size of studies on prevalence of depression in older adults was 1138 people, but due to absence of sufficient data, no estimate could be found for prevalence of depression in older adults in different sexes.

Depression in women categorized in five case includes depression during pregnancy, postpartum, menstruation or premenstrual syndrome, and menopausal. Of the 12 articles on prevalence of depression during pregnancy, 8 had used BDI, and were used in final synthesis here. Overall sample size of these studies was 2886 women, and mean weight was found 27.62%.

Of the 24 articles used in finding mean weight of studies on postpartum depression, 14 had used Edinburgh scale and 10 had used BDI. Mean weight of the first 14 with overall sample size of 6987 women, was found 32.52%, and mean weight of the next 10 with overall sample

size of 2679 women was found 28.66%. Total sample size of studies on postpartum depression was 9666 women.

Since the two studies on menstruation depression had used different tools, meta-analysis could not be performed on their results. However, two studies on menopausal depression had both used BDI. Total sample size in these studies was 610 women. Thus, mean weight was found 33.45%. Overall sample size of studies on women's depression used in final synthesis was 13172 women.

5- Overall prevalence of depression: of the 15 different tools used in studies to find prevalence of different dimensions of depression, 7 appeared in large number of studies, thus meta-analysis could be performed on them. Out of these tools, SADS had only been used to find depression in general public, and CDI, GDS and Edinburgh were used specifically in adolescents, older adults and postpartum depression respectively and prevalence in each group was discussed above. Hence, only three tools of BDI, GHQ, and SCL-90 had been used in different groups and were able to undergo meta-analysis. Summary of studies that used these tools is shown in Table 5 (studies that did not provide estimates of prevalence were not reported).

Table 5 shows that the majority of studies had used BDI, which was the only common tool in all groups. Hence, BDI can be considered the basis in calculation of overall prevalence of depression. Other than the two studies that did not provide an estimate of prevalence, 70 studies entered systematic review, and overall prevalence of depression with this tool was found 42.59% (it should be noted that one article had used BDI in concurrent assessment of depression in students and women, and was repeated in both groups, making total number of articles 71. Moreover, one article had used GHQ in concurrent assessment of older adults' depression at home and in nursing homes, making the total number of articles using GHQ scale 18 instead of 17).

Table 5 Summary of studies on overall prevalence of depression according to different tools used

Tool	Indicators	Groups									Total
		Pupils	Students	General population	Older adults		Women				
					Home	Nursing home	A	B	C	D	
BDI	Number of studies	12	24	10	1	3	8	10	2	1	70
	Sample size	12851	7258	9504	1212	207	2886	2679	610	264	37207
	Prevalence %	43.55	52.12	37.32	78.60	95.64	27.62	28.66	33.45	64.8	42.59
GHQ	Number of studies	2	7	5	1	2	1	-	-	-	17
	Sample size	946	1380	39631	127	278	315	-	-	-	42677
	Prevalence %	29.41	12.02	19.46	6	30.68	16	-	-	-	19.45
SCL-90	Number of studies	5	1	2	1	-	2	-	1	-	12
	Sample size	2262	279	1100	120	-	1665	-	150	-	5576
	Prevalence %	15.87	10.03	9.08	32.5	-	14.16	-	15.62	-	13.63

Note. A= Pregnancy, B= Postpartum, C= Postmenstrual, D= Menstrual

Discussion

In this study, prevalence of depression was investigated using method of systematic review. A total of 145 studies analyzed had used 15 different tools. The majority of studies had used BDI, which was therefore used as the basis of calculation in this study. Accordingly, overall prevalence of depression was found 42.59%, which is higher than prevalence of depression in general public reported in reference books (15% to 25%).

In addition, prevalence of depression in different groups (children, adolescents, students, general public, and the older adults, pregnant and postpartum women) was investigated in detail. Prevalence of depression in school pupils was found 43.55% with BDI, 15.87% with SCL-90, and 13.5% with CDI. Odds of being depressed always exists from childhood to old age, but in most cases onset of symptoms occurs in adolescence or early young age [19]. In a study conducted by Polly *et al.* in Italy titled "self-reported symptoms of depression in 8-17 year-old adolescents" in 2003, 10% of participants scored higher than 20 (threshold of clinical symptoms) [20]. In Nigeria, the symptom of depression in school pupils was reported 9% [21], and in Ireland, O'Farrell *et al.* found severe depression in 20.8% of school pupils [22]. In a study by Biros, prevalence of moderate to severe depression was reported 20% [23]. Moreover, prevalence of depression in different sexes of pupils was

reported differently using CDI and BDI, but both showed higher prevalence among girls, which agrees with results found by Polly *et al.* in Italy [20]. Biological, psychological and social differences appear to affect prevalence of depression in two sexes, such that in adolescence, girls are more predisposed to mood disorders and depression [24].

In Iranian studies on prevalence of depression among university students, BDI and GHQ scale have been used, and prevalence of depression is 52.12% if BDI is taken as the basis. Various studies have reported different prevalence of depression among students in different countries. For instance, prevalence of depression was reported 39% among university students in Pakistan [25], 23.3% in undergraduate medical students in Nigeria [26], and 30.6% in medical students in Estonia [27]. However, despite different statistics, prevalence of depression in these studies is generally lower compared to depression among Iranian students. Of course, the difference may be due to type of tool used, culture, and timing of assessment. Prevalence of depression was found 50.48% in boys and 48.35% in girls. Greater future employment and social stresses in boys in Iran can probably be blamed for higher depression in them; whereas, prevalence of depression in girls in nearly all countries and cultures is about twice that in boys.

Meta-analysis of studies on prevalence of depression in general population showed prevalence of 37.32% with BDI and 19.46% with GHQ. If BDI is assumed the basis (with prevalence of 37.32%), then prevalence found with BDI is higher than that presented in reference books (15% to 25%). With BDI, prevalence of depression is found higher in the female section of the general population, which may be attributed to various factors such as hormonal changes associated with reproductive cycle and mental pressures caused by pregnancy and labor [28].

Review of studies on prevalence of depression in the older adults using GDS scale showed prevalence of 57.58% in older adults living at home and 81.85% in older adults living in nursing homes. Clearly, depression is higher in old age compared to that in general population. The present study results are in line with those in a systematic review study by Sajadi et al [29]. Review of prevalence of depression in the older adults in other countries shows different values, for instance, overall prevalence of depression in older adults of 30.3% in Greece [30], 16.8% in Netherlands [31], and 4.5% in Japan [32].

Review of studies on prevalence of depression in pregnant women with BDI showed prevalence of approximately 27.62%. In their systematic review study, Sajadi et al. also found similar prevalence of depression in pregnant women [33]. Pregnancy is a major stress, which can expose or exacerbate dysphoric tendencies. In a study conducted in Malta, prevalence of depression in pregnant women, using Edinburgh scale, was reported 15.5% [34]. In another study in Paris, using BDI, prevalence of depression in pregnant women was reported 13.9% [35]. Chan et al, reported prevalence of depression in pregnant women in Singapore 20% [36].

Synthesis of studies on postpartum depression showed prevalence of 32.52% with Edinburgh and 28.66% with BDI. Prevalence of postpartum depression was reported 5.5% in Denmark [37], 40.4% in Turkey [38], 17% in China [39], and 23% in Nigeria [40]. According to these statistics, postpartum

depression is more common in developing compared to developed countries. Perhaps, other factors such as culture and customs are also important along with the issue of socio-economic development. Generally, huge prevalence of postpartum depression and its serious consequences for mother, infant, and the family beget special attention to this problem.

Study limitations included limited number of English databases. Generally, articles in more well-known databases are more likely to be used in systematic reviews. But this does not necessarily mean higher quality of articles. It is recommended that future studies systematically investigate prevalence of depression in specific periods of time and identify factors affecting different population groups separately, so that appropriate preventive measures can be taken.

Conclusion

According to the present study results, although differences in methodology, tools, and culture explain differences in prevalence of depression in different cultures, based on statistics provided, prevalence of depression in Iran appears relatively higher than that in other countries. Thus, such a high prevalence of depression in domestic studies, especially in old-age, pregnancy and postpartum periods suggests the profound need for preventive measures and greater attention to this issue.

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Contribution

Study design: VF, SH MK, HS

Data collection and analysis: MV, HR, ASF, MM, SHMK

Manuscript preparation: MM

Conflict of Interest

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

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