Review Article

J Babol Univ Med Sci
Vol 19, Issu 4; Apr 2017. P:16-27

The Prevalence of Depression in Patients with Diabetes in Iran

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J Babol Univ Med Sci; 19(4); Apr 2017; PP: 16-27
Received: Nov 13th 2016, Revised: Nov 26th 2016, Accepted: Feb 22th 2017.

ABSTRACT

BACKGROUND AND OBJECTIVE: Depression is the most common psychiatric disorders in diabetic patients. This study was performed for evaluating the prevalence of depression in Iranian diabetic patients with meta-analysis method.

METHODS: This review study was conducted according to PRISMA checklist for systematic review and meta-analysis studies. Two independent researchers with using Mesh keywords for archive literature was conducted a comprehensive search on the national and international databases including Magiran, IranMedex, SID, Medlib, IranDoc, Scopus, PubMed, Science Direct, Cochrane, Springer, Web of Science, Wiley Online Library and Google Scholar search engine without any time limit to March 2016. I^2 index and Cochran test was used to assess heterogeneity of studies. The data were combined using Random Effects Model by Stata software (ver.11.1).

RESULTS: Forty-one studies involving 9.491 diabetic patients were collected in this meta-analysis. The prevalence of depression among Iranian diabetic patients was estimated 61% (95% CI [Confidence Interval]: 55-67). This rate in males and females diabetic was 49.7% (95% CI: 33.9-65.5) and 65.6% (95% CI: 51.8-79.5), respectively. The minimum and maximum depression prevalence was obtained in West (55%) and East (66%) regions of Iran, respectively. 25.8%, 20.5%, 13.8% and 3.6% respectively indicate mild, moderate and severe and very severe depression.

CONCLUSION: The prevalence of depression in diabetic patients in Iran is high. So the routine psychology counseling is necessary to diagnose and treatment of the depression in these patients.

KEY WORDS: *Prevalence, Depression, Diabetes, Systematic review, Meta-analysis, Iran.*

Please cite this article as follows:

Azami M, Moslemirad M, Mansouri A, Khataee M, Sayehmiri K. The Prevalence of Depression in Patients with Diabetes in Iran. J Babol Univ Med Sci. 2017;19(4):16-27.

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[DOR: 20.1001.1.15614107.1396.19.4.2.9]
[DOI: 10.22088/jbums.19.4.16]

Introduction

Diabetes is the most common and most important metabolic disease (1). Diabetes type I and II are two forms of the disease that about 95-90% of people with diabetes, are with type II (2).

The prevalence of diabetes is increasing in the world which is worrying. The number of diabetics patients is estimated to be from 171 million to 366 million over the period 2000 to 2030 (3).

In the twenty-first century we can see industrialization, globalization, increased life expectancy and changes in lifestyle of people around the world. One result of these changes, changes in disease patterns and prevalence of chronic diseases such as diabetes (4).

High prevalence of diabetes in Iran and about 7.7% have been reported (5). The complications of diabetes include cardiovascular disease, retinopathy, neuropathy, nephropathy, impotency in men, infections and psychiatric disorders are noted (6,7). Depression is the most common psychiatric disorders in diabetic patients (8-10).

The prevalence of diabetes has been reported more than doubled in the general population (10,11). Most psychological issues of patients are because of problems imposed by diabetes, such as monitoring invasive blood glucose, daily injections of insulin, chronic physical effects, dietary, mobility and low activity, hospitalization and shortening the average life expectancy (12,13).

The results of two meta-analysis of longitudinal studies show that depression is associated with a 60-37% increased risk of diabetes and the relationship of these studies, after controlling for diabetes risk factors such as BMI (Body mass index), family history of diabetes, smoking, physical activity, diet and alcohol consumption remained significant(14,15).

Also in diabetic patients with depression, control of blood sugar and diabetic complications are more difficult (16).

In Iran many studies have been conducted to determine the prevalence of depression in patients with diabetes and statistics between 91-11 per cent have been reported (17-20); therefore, systematic review of all documents and their combination can rise to a more complete picture of the scale of the problem in an Iranian population (21-24). This study aimed to investigate the prevalence of depression in diabetic patients using the method of systematic review and meta-analysis.

Methods

Search strategy: This study was based on a systematic review and meta-analysis of studies reporting system (PRISMA) (23). According to this protocol, the entire process of research include search, selection of studies, quality assessment and data extraction were done by two independent researchers and in case of discrepancies in the results obtained by researchers examined the third.

To achieve the relevant literature و a comprehensive search was performed in the national and international databases including: Magiran, Iranmedex, SID, Medlib, IranDoc, Scopus, PubMed, Science Direct, Cochrane, Springer, (ISI) Web of Science, Wiley Online Library and the search engine Google Scholar without time limitation to May 2016. References of all relevant articles were also examined.

In order to maximize the comprehensiveness search, general keywords including: "Epidemiology," "Outbreak," "depression", "diabetes", "blood sugar", "endocrine disorders" and "psychiatric disorders" were used for Persian electronic databases and Mesh terms for English databases were included: "Epidemiology", "Prevalence", "Depression", "Diabetes", "Endocrine Disorders", "Mental Disorders", "Iran" and all possible combinations for English databases were used.

Inclusion and exclusion criteria: Inclusion criteria for this study was the prevalence of depression in diabetic patients in both Persian and English languages. Exclusion criteria included: non-random sample, non-diabetic patients, no relation to the subject and insufficient data, such as failing to report the prevalence of depression was determined.

Assessment of quality: researchers evaluated selected articles from the aspects of methodology, including sampling, measurement parameters, statistical analysis and objectives of the study using a scoring system (44 points) based on list Czech STROBE (24). Scoring system is as follows: poor score was 15-1, intermediate 30-16 and 44-31 good quality were considered. The quality of articles that won a minimum score of 16 were selected for the meta-analysis.

Although each study qualitatively assessed, the quality score will not be included in the weight of the original meta-analysis.

Data Extraction: All the final articles imported to the study by a prepared check list were extracted. Check list includes name of author, year of study, place of study, study design, sample size, age, duration of diabetes, measurement tools of depression, prevalence

[DOR: 20.1001.1.15614107.1396.19.4.2.9]
[DOI: 10.22088/jbums.19.4.16]

of depression, and prevalence of depression by gender and severity of the outbreak.

Statistical analysis: variance was calculated for each study according to the binomial distribution. Given the sample size and variance studies were combined. Cochran test was used to assess heterogeneity of the studies and I2 index. The heterogeneity in the study were 97.8 that is considered at high heterogeneity among the studies (I2 index less than 25% low heterogeneity, intermediate heterogeneity between 25-75% and 75% high heterogeneity) (25).

Due to the heterogeneity of studies and meaningful index I2, the random effects model was used in the meta-analysis (26). To investigate the relationship between depression with year of study and sample size metaregresion model was used. Publication bias in the reviewed studies was drawn by Begg funnel plot. Data were analyzed using Stata Ver.11.1 software and $p<0.05$ was considered significant.

Results

In systematic review of studies, 41 studies which have been done between 1991 and 2015, were input into the meta-analysis process. 9491 diabetic patients with an average age of 33.49 (CI-95%: 45.61-53.04) were studied (table 1).Publication bias for studies in the meta-analysis was shown in funnel plot as asymmetry that was calculated p =0.751 and show the possibility of publication bias is not statistically significant (Fig2). The prevalence of depression in Iranian diabetic patients was estimated 61% (CI-95%:67-55) (p=0.001) and I2 index was 8/97%. The lowest prevalence of depression was in a study in 2006 in Arak (11%) and the highest prevalence of depression was in a study in 1998 in Kashan (91.2%) (Fig 2).

Major depressive disorder according to DSM-IV criteria four assessed studies was 42.3% (CI-95%: 10.1-74.5). Tool of Most studies is (78%) Beck and based on the prevalence of depression was estimated 65% (CI-95%: 71-59) (Fig 3).

The prevalence of depression in diabetic patients shows a breakdown of the five geographic regions, the lowest and highest incidence of depression, associated with the West (58%) and East of Iran (66%) (Fig4). The prevalence of depression in diabetic patients according to the severity of depression shows that the highest prevalence of depression in the spectrum of mild 25.8% (CI-95%: 22.1-26.6) (table 2). The prevalence of depression in diabetic patients, men and women, respectively, 65.6% (CI-95%: 51.8-79.5) 49.7% (CI-95%: 33.9-65.5) was estimated (table 3). The prevalence of depression in patients with diabetes between Iran and year of study (p=0.705) and sample size (p=0.734) found a significant relationship during the years studied the prevalence of depression was relatively stable (Fig 5).

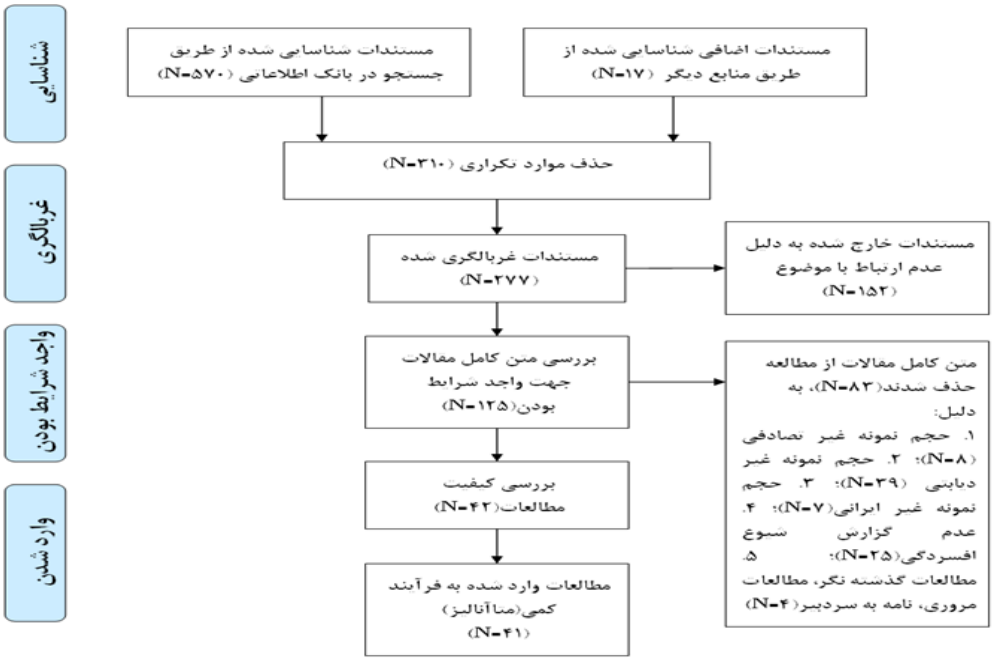


Figure 1. Flowchart of stages of the systematic review and meta-analysis

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Table 1. Profile of studies entered in meta-analysis stage

refrence	Author	Place of study	Year of study	Sample size	Mean age (year) Mean±SD	Mean duration of disease(year) Mean±SD	Depression criteria	Prevalence of depression(%)	Quality of study
17	Larijani	Gorgan	2001	375	53.6±13.6	10.1±7.5	beck	41.9	Good
18	Mahmoodi	Dehghan	2006	227			beck	77	Good
19	Sepehr manesh	kashan	2002	300			beck	53	Good
20	Ranjbar	shiraz	2002	100	39.7±13.4		beck	71.4	Good
27	Norouzi nejad	Ahvaz	2003	309	44.4±11		beck	72.2	intermediate
28	Zahir-al-din	Tehran	2002	100			beck	78	good
29	Safa nejati	Tehran	2005	100	52±10	9±6	HADS-D	66	good
30	atapour	Esfahan	2011	250	59.9±11.5		beck	85	good
31	atadokht	Ardabil	2011	120	53.9±15	7.6±6.3	scl-90R	72.5	good
32	Nikbakht	Bandar abbas	2009	100			beck	50	good
33	Tajfard	mashhad	2011	200			beck	79	good
34	momeni	tehran	1996	94			beck	50	intermediate
36	Vafadari	Yazd	2000	700			beck	68	intermediate
36	Arefian	Kerman	1996	300			beck	57	intermediate
37	Yekta	Uromieh	2006	295	55.6±12	9.2±6.8	beck	43	good
38	Paviz	golestan	2000	150			beck	61	intermediate
39	hamzehi	Kashan	1998	80			beck	91.2	intermediate
40	peyvandi	golestan	2007	150			beck	82	intermediate
41	Shah nazarpour	esfahan	1992	1200			beck	53.1	intermediate
42	salehi	arak	2006	134			hamilton	11	good
43	nourozi	ahvaz	2008	30			HOQOL-26	12	good
44	bogar	tehran	2010	254	45.5±6	6.6±6.5	PHQ-9	25	good
45	taziki	gorgan	2000	50	52.1±11	13.6±6.5	beck	34	intermediate
46	sajadi	hamedan	2007	80	52.1±11.9		GHQ-28	43.7	good
47	behrooz	kermanshah	2012	210			scl-90R	56	good
48	harouni	Farideh and chadegan	2012	403	57.6±11.7	5.3±6	beck	60	good
49	mazlomi	yazd	2008	100	55.8±9.2		beck	64	good
50	parham	qom	2012	116	15.1±11	3.5±6	beck	70.7	good
51	palezgir	tehran	2012	184			beck	71	good
52	behnam	semnan	2002	450			beck	71.6	good
53	Kasiri dolat abadi	esfahan	2007	383		8.9±6.7	beck	72	good
54	Mosavi	Shahrood	2006	100			beck	78	good
55	Abdollahian	Mashhad	1998	100			sc-90R	87	good
56	Baradarn	Tehran	2009	185	56.1±9.5	9.7±7.3	PHQ-9	74.6	good
57	Shahrakiavand	Zabol	2010	100			beck	81	good
58	Shamsaei	Hamedan	2005	384			beck	73.4	good
59	Kalantari	Rasht	2011	90	54.2±10.5	10.1±7.1	beck	37.8	good
60	Taheri	Khoramshahr	2014	102	54±14.8		beck	85.3	good
61	Kiani	Zahedan	2015	350			beck	18.8	good
62	Derakhshan	Gorgan	2012	330	50±9	5.4±7.5	beck	58.2	good
63	khamosh	tehran	2014	206			beck	71.8	good

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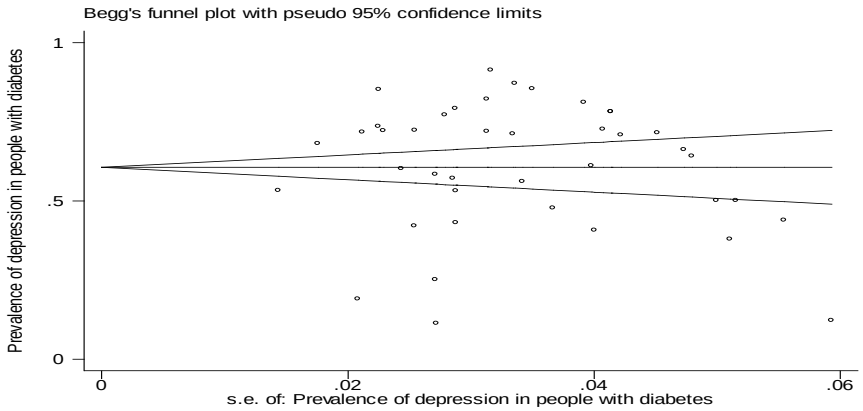


Figure 2. Publication bias for depression in patients with diabetes in Iran

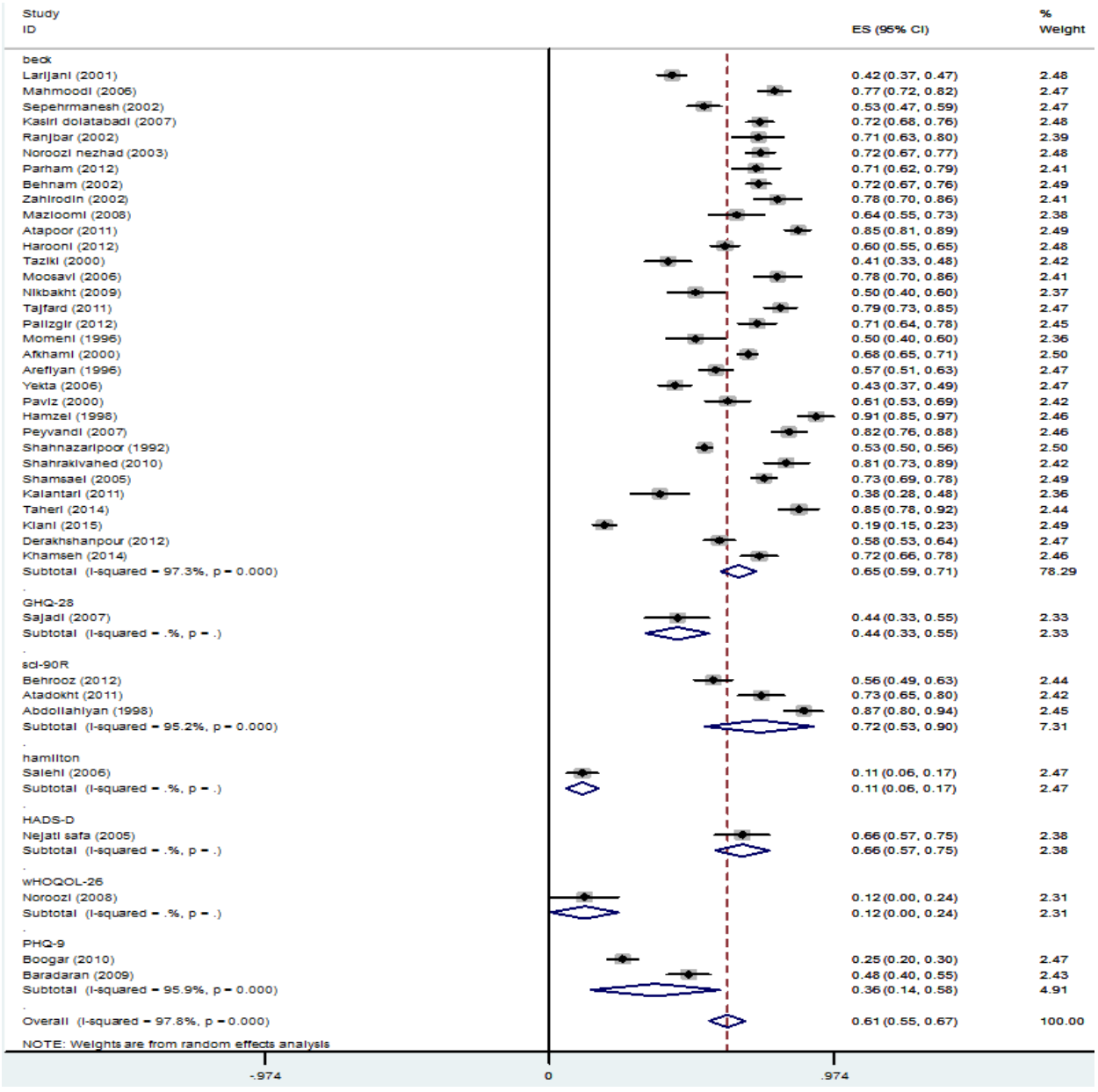


Figure 3. The prevalence of depression in diabetic patients by assessment tool based on a random effects model, midpoint of each segment indicates the percentage and length of segments indicates 95 percent confidence interval in every study. Diamond mark indicates the prevalence of depression for all studies.

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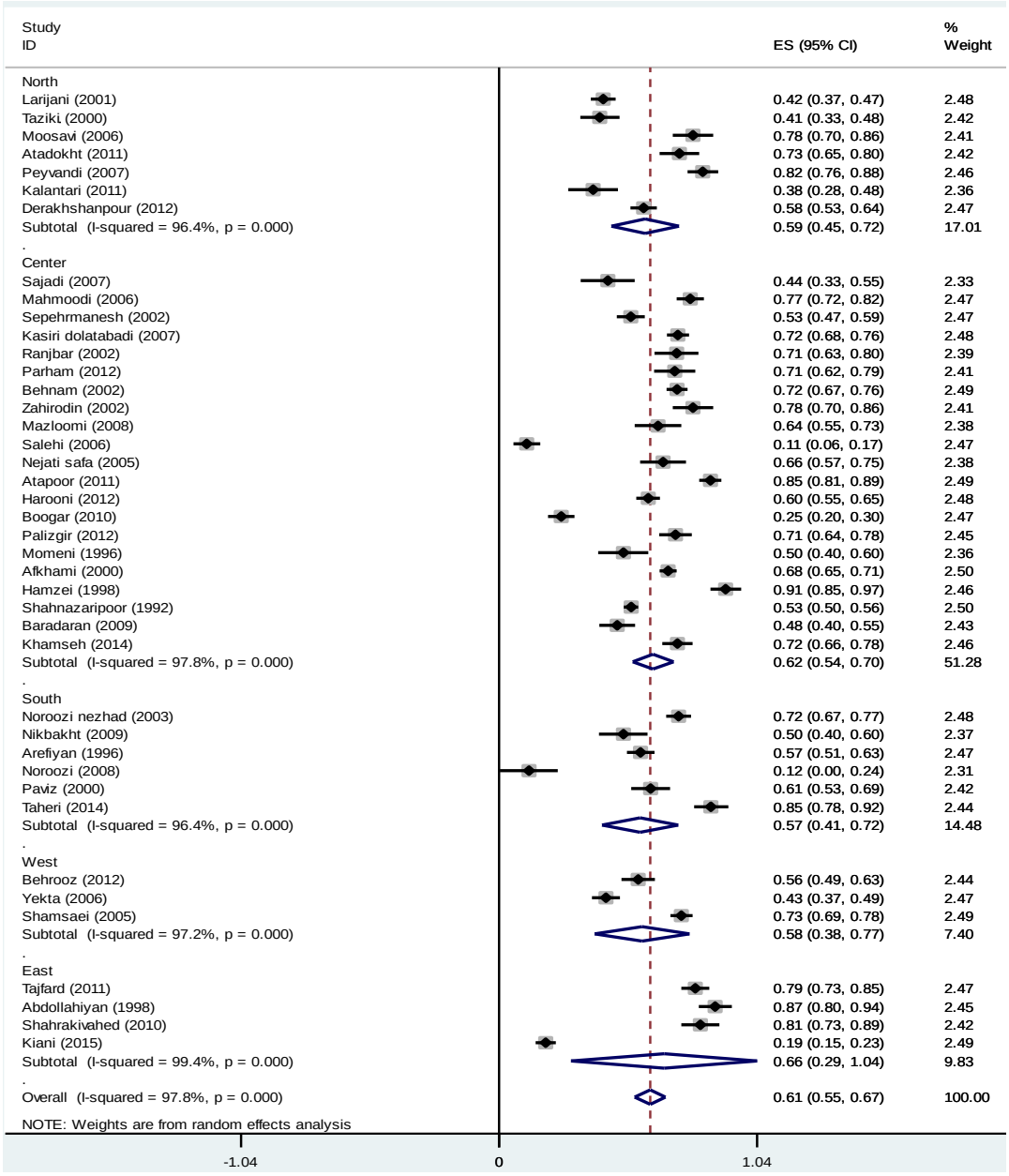


Figure 4. The prevalence of depression in diabetic patients in terms of geographical areas

Table 2. Prevalence of depression in diabetic patients in Iran based on severity of depression

Severity of depression	Number of studies	Sample size	I^2	Confidence interval	Overall estimate
Mild	19	4361	87.8	22.1-26.6	25.8
Moderate	18	4261	97.8	14.3-26.8	20.5
Severe	16	3961	93.8	10.2-17.3	13.8
Very Severe	3	559	44.8	1.5-5.8	3.6

Table 3. Prevalence of depression in Iranian diabetic patients of both sexes

depression	Number of studies	Sample size	I^2	Confidence interval	Overall estimate
Man	16	1817	97.6	33.9-65.5	49.7
Women	16	3304	98.8	51.8-79.5	65.6

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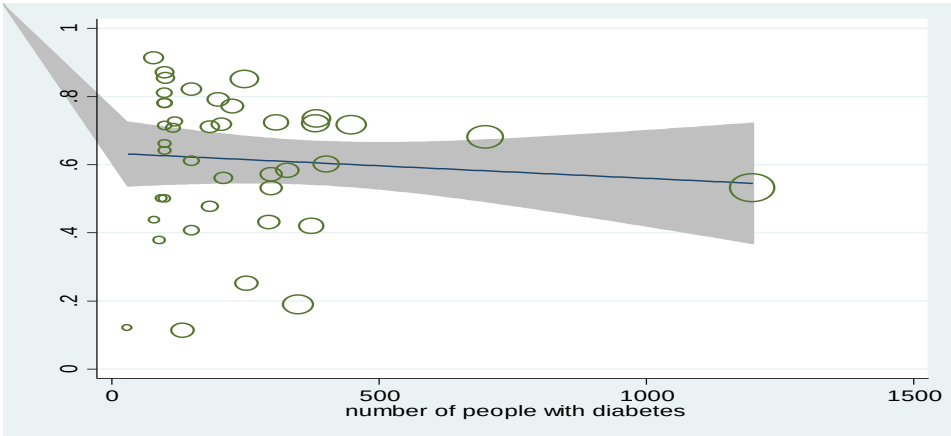


Figure 5a-.meta-regression of prevalence of depression in diabetic patients by year of study, circles indicates the weight of studies (p =0.705)

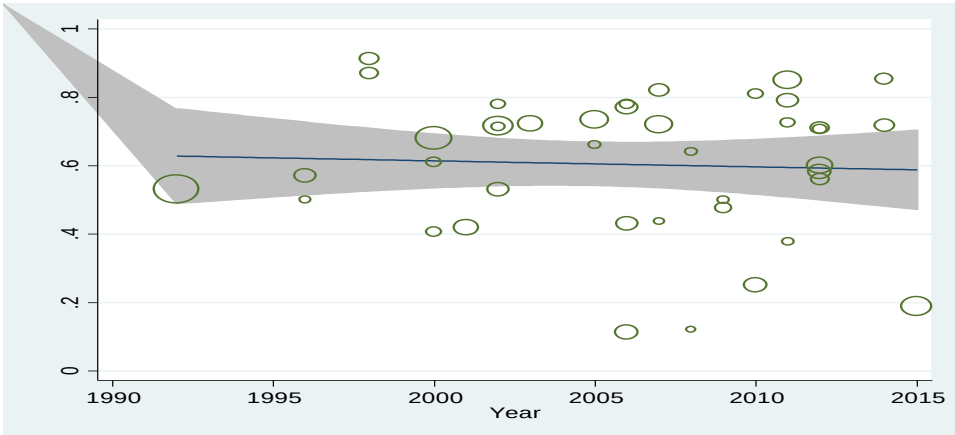


Figure 5 (b) .meat-regression of prevalence of depression in diabetic patients in terms of sample size, circles indicates the weight of studies (p=0.734)

Discussion

The prevalence of depression in diabetic patients in the present meta-analysis is 61 percent. In several studies conducted systematic review and meta-analysis of diabetic patients in developed countries, the prevalence of depression between have been reported 33-24% (64-66) which showed that the prevalence of depression in diabetic patients in Iran is more than other countries that this could be due to differences in investigation and follow-up of these patients, or could be due to the development of these countries in the field of health services and medical equipment to developing countries. In a systematic review conducted to determine the prevalence of depression among dialysis patients, the prevalence of this disorder was reported 63 percent (67) that is near to present estimation for diabetic patients.

The difference in reporting the prevalence of depression in diabetic patients is 91-11 percent, perhaps the most obvious reason is due to different diagnostic tools in the studies. In the study of Rahimi Boogar (44) that used the diagnostic tool PHQ-9 to measure depression had a higher prevalence of depression and 25% reported that while Nikbakht and colleagues (32) with the Beck questionnaire, have estimated the prevalence of depression about 50%. Therefore, we analyzed subgroups based diagnostic tool that most of the studies (78%) had used a Beck questionnaire and the prevalence of depression in diabetic patients were estimated 65% on the basis of a Beck questionnaire that did not differ much from the overall estimate.

In a systematic review study, the depression in dialysis patients was reported between 93-28 percent. This study is also knows due the large difference in the prevalence of depression in diagnostic tools (67). In considering the severity of depression in diabetic patients in Iran, the highest prevalence of depression was in the spectrum of mild and moderate (46.3%), which suggests that by planning and appropriate therapeutic interventions can prevent from the development of depression and thus prevent from

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disabling complications of diabetes (13, 14). In this study, the prevalence of depression in diabetic women (65.6%) was obtained more than men (49.7%) which was similar to the results of other systematic review studies in developed countries in this regard that was reported 28.2 and 18% respectively (64,65). Although the prevalence of depression in women was more than men, but this difference was not statistically significant, however, in some studies, women are considered a risk factor for depression (68,69).

To investigate the relationship between the prevalence of depression in diabetic patients with a year of study meta-regression model was used which was not statistically significant relationship and during the years studied (2015-1991), the prevalence of depression in these patients was stable. Fixed prevalence of depression in the past 25 years and also the high prevalence of depression (61%) of these patients can indicate a lack of attention and track issues and mental health problems in diabetic patients. Therefore, screening of these patients for early detection of mental disorders, especially depression seems necessary(70).

Blood sugar control in patients with depression is more difficult than healthy people and preventive and maintenance treatment with antidepressants can prevent recurrence of the disease and are effective in prevention of debilitating complications of diabetes (71,72). In a systematic review on diabetic patients, the depression significantly increased the risk of death in these patients (73). Due to the increasing number of diabetic patients in Iran and the importance of depression in these patients, more attention of authorities is recommended to solve the problems of psychology in these patients.

Study limitations: inability of some information sources to search for keyword combinations that can be used to combine keywords. In general, given that a high percentage of diabetic patients are depressed, prevention, recognition and treatment of depression, especially in the early years of disease onset, has an important role in diabetes control.

Depression not only affects Anti-insulin hormones to directly affect the blood glucose, but can be mitigated by disorder in eating habits, physical activity and daily living tasks also affect the treatment of diabetes and glycemic condition. On the other hand, depression can increase self-destructive behaviors such as eating or drinking in diabetic patients, increasing the vicious cycle, diabetes and therefore intensify depression. The prevalence of depression in diabetic patients is higher than in developed countries, therefore the routine psychiatric consultation to diagnosis and treatment of depression in these patients is necessary. As well as the need to implement a screening program for early detection of depression in this group of patients is recommended.

Acknowledgments

Hereby, we would like to thank Ilam University of Medical Sciences for supporting this research.

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