

Prevalence of Depression in adults with type 2 Diabetes Mellitus in the Middle East countries and the factors associated with it: A systematic review

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Abstract

Aims and Objectives: This study aims to assess the prevalence of depression in adults with type 2 diabetes mellitus in Middle East countries and the factors associated with it.

Method: This narrative systematic review followed the Preferred Reporting Items for Systematic Review guidelines. Studies published from January 2000 to December 2020 were retrieved through database search engines from PubMed, EMBASE, Medline Ovid, and Google Scholar. Joanna Briggs Institute checklist for prevalence studies was used to assess the quality of the studies.

Results: A total of 12 studies were retrieved from search databases from 8 different countries in the Middle East including Saudi Arabia, Egypt, UAE, Iran, Iraq, Kuwait, Israel, and Palestine, and the data are summarized in narration. The prevalence of depression in type 2 diabetes mellitus in the Middle East is found to be fairly high ranging from 17% to 74.4%. Egypt has the highest prevalence of depression whereas UAE has the lowest. Female gender, uncontrolled glycemia, and diabetic complications are the major predictors of depression in type 2 diabetics. Longer duration of diabetes, low education, low socioeconomic status, physical inactivity, and insulin users are among other associated factors.

Conclusion: The prevalence of depression in adults with type 2 diabetes mellitus in Middle East countries is high with a wide-ranging difference. The factors associated with the development of depression in type 2 diabetes need to be addressed and taken care of. Lack of meta-analysis is the major limitation of this study that could be considered for future reviews.

Keywords: depression, adults, type 2 diabetes mellitus, Middle East

Introduction

Background:

Diabetes is a rapidly emerging non-communicable disease putting a huge burden on the global health system and economy. In 2015, 1.31 trillion USD (95% CI 1.28-1.36) or 1.8% (95% CI 1.8-1.9) of global gross domestic product (GDP) was the estimated cost of diabetes (1). According to the International Diabetes Federation Diabetes Atlas, 9th edition, the estimated prevalence of global diabetes in 2019 was 9.3% (463 million people). This number is expected to rise more to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045 (2).

Depression is a common accompaniment of many chronic illnesses including diabetes. A meta-analysis conducted in 2001 showed that the odds of depression in the diabetic group were twice that of the non-diabetic comparison group (OR = 2.0, 95% CI 1.8–2.2) (3). A more recent meta-analysis conducted in 2006 included studies from the USA, Europe, and Iraq, which also showed the prevalence of depression to be 17.6% higher among those with type 2 diabetes than those without (4). Among those with diabetes, depression is associated with a 50-70% increase in health service cost (5). There is a significant increase in mortality in those who are depressed and have diabetes (6). Depression is also found to be associated with poor glycemic control and its complications including retinopathy, nephropathy, neuropathy, and other macrovascular events (7).

Self-care is one of the key elements of diabetes care to maintain the optimal wellbeing of people with type 2 diabetes (8). A healthy diet, physical activity, regular medication, and self-monitoring of blood glucose were found to be associated with significant improvement of HbA1c levels, and non-adherence of any of these factors may lead to diabetes-related complications (9). Depression imposes adverse outcomes in patients with diabetes leading to poor self-care, less physical activities, poor diet, and smoking, all of which are also the reasons for uncontrolled hyperglycemia and its sequel, ultimately affecting the quality of life. One meta-analysis has concluded that depression has a very high risk of mortality over a lifetime in people with diabetes approximating 1.5-fold (10,11).

The relation between diabetes and depression can be bidirectional (12). Diabetes is regarded as a risk factor for the development of depression and depression is also considered a major contributor to the development of diabetes. However, there is uncertainty about what causes depression in people with diabetes. A population-based study done in 2005 showed that the presence of other chronic co-morbidities was attributed to depression among people with type 2 diabetes (13). Depression is common by two folds in diabetes patients as compared to the general population (14). Diabetes and other chronic diseases can lead to high level of distress among people. However, the emotional problems of diabetic patients are not recognized by the health personnel most of the times (15).

The Middle East and North Africa (MENA) region has one of the highest prevalence of diabetes in the world estimated at around 9.2% (equivalent to 34.5 million) of the adult population in 2013 and is expected to rise to 11.6% by 2035. This increase is attributed hugely to an uprising economy and urbanization with changes in lifestyle leading to less physical activity, increased consumption of carbohydrate diets, and resulting obesity (16). Out of the 34.5 million diabetes cases, 17 million people in MENA region are undiagnosed and not aware of their condition. Several factors including access to healthcare, affordability of care, quality of healthcare service, etc. are considered to be the reasons for undiagnosed cases. As these cases remain undiagnosed, they are liable to more complications and poor outcomes thus demanding early screening. On the other hand, timely detection of depression in diabetes is essential to address the barriers to self-care which will eventually help in reducing the complications associated with it. Hence, more studies on this field in this part of the world are needed which could help raise awareness among the health professionals to be vigilant in assessing depression in such vulnerable groups and help the patients improve their quality of life.

Methodology

1 Aim:

This study aims to assess the prevalence of depression in adults with type 2 diabetes mellitus in Middle East countries.

2 Objectives:

The objective of this systematic review is to analyze the prevalence of depression in adults with type 2 diabetes in the Middle East countries and the factors associated with it. The purpose of this study is to consolidate the findings and help improve self-care and management thus reducing the adverse outcomes associated with it in these vulnerable groups.

3 Study Design:

A systematic review was conducted following the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines and the quality of findings was reported using the Joanna Briggs Institute (JBI) checklist (17,18)

4 Search Strategy:

All the studies were retrieved through databases including PubMed, EMBASE, Ovid Medline, and Google scholar. Appropriate Boolean operators ("AND" and "OR") were incorporated into the search strategy. Key search terms used with MeSH headings were "Type 2 Diabetes Mellitus" OR "T2DM" OR "Type 2 Diabetes" OR "Non-Insulin Dependent Diabetes Mellitus" OR "NIDDM" AND "Depression" OR "Depressive Symptoms" OR "Major Depression" OR "Mental Health" AND "Middle East" OR "Gulf Countries" AND "Prevalence" OR "Occurrence" OR "Frequency" OR "Incidence" OR "Demography". The reference lists of the included articles were searched for additional eligible studies by using the reference manager software program Zotero.

5 Study Selection:

All the studies were selected and reviewed based on the following criteria after screening the title and abstract and the entire article.

Inclusion criteria:

All the observational studies (cross-sectional, case-control, and cohort) on the prevalence of depression in type 2 diabetes conducted in adults above 18 years in Middle East countries with full texts published in the English language from January 2000 till December 2020 were included.

Exclusion criteria:

Type 1 diabetes, gestational diabetes, less than 18 years of age, preexisting depression or other mental health issues, review articles, and non-peer-reviewed (grey) literature were excluded.

The PRISMA flowchart is shown to demonstrate the screening process (17) and the reasons for exclusion of the studies (Figure.1).

6 Data Extraction

Different variables from the included studies, like population characteristics (age and sex), study aim and design (cross-sectional, case-control, and cohort), citation, country of studies, year of publication, population and sample size, sampling technique, and data analysis were formulated and compiled in a data extraction form (Table 1).

7 Quality assessment:

The quality of this study was assessed by the Joanna Briggs Institute (JBI) critical appraisal checklists for prevalence studies (Table 2) (19). The checklist looked into 9 criteria focusing on sampling frame, sampled population, study population, and settings, sufficient coverage of the identified population in data analysis, valid methods used for identification of the condition, measurement of statistical analysis, and response rate. A final score obtained by each study on the individual domain of the checklist was demonstrated.

8 Data Analysis:

A systematic narrative synthesis was performed summarizing the study design and the findings from all the studies and relevant tables presented to portray the prevalence of depression in type 2 diabetes. Quality of each study is assessed by JBI critical appraisal tool and summarized in a tabular form. The association of the different socio-demographic factors with depression and type 2 diabetes were discussed. The meta-analysis was not performed due to heterogeneity in study designs and study tools used to measure the outcome.

Ethical Approval:

This is a systematic review of previously published articles without human involvement and hence, will not require any ethical approval.

Results

A total of 3129 potentially relevant articles were retrieved from the search engines (Embase 83, Ovid Medline 25, PubMed Central 661, Google Scholar 2360). After excluding articles which were not relevant and done in non-Middle East countries (2936), 193 articles were selected. Fifteen articles were removed as were duplicate and so total 178 articles that were conducted in Middle east countries were included. However, out of these, 160 were removed after abstract reading, 2 removed as full articles couldn't be retrieved, 4 articles removed as they included both type 1 and type 2 diabetes and 1 removed as it contained age less than 18 years. One article was included from the reference list of one of the articles. Hence, in total, 12 articles were selected for final review. Full selection criteria are detailed in the PRISMA flow chart (Figure 1.).

1 Characteristics of the studies

Four studies are from Saudi Arabia, 2 from Egypt, and one each from UAE, Israel, Kuwait, Iran, Iraq, and Palestine. Eight studies are cross-sectional without control groups and 4 are cross-sectional including control groups. All the participants were known type 2 diabetics following up with their diabetes clinic. Different depression measurement tools were used in different studies (Table 1).

Two studies from Egypt showed the highest prevalence of depression in adults with type 2 diabetes mellitus (74.4% and 69% (20,21), whereas Saudi Arabia has a fairly high depression rate (62.5%, 49.6%, 37.9%, and 32.1%) (4,22–24). UAE has the lowest prevalence (17%) (25). Iraq (26), Palestine (27) and Iran (28) are the next with high prevalence (44.5%, 40.2%, and 37.8% respectively) whereas Israel (29) and Kuwait (30) have the similar figure (29%). Four cross-sectional studies with control showed that the prevalence of depression was almost double in the diabetic cases than their control. (24, 26, 28, 31)

Two studies from Egypt showed a statistically significant association between depression and poorly controlled diabetes, female gender, longer duration of diabetes, insulin users, and those with diabetic complications (32,33). Among 4 Saudi studies, two studies showed a significant association between depression and poorly controlled diabetes (23,34) and the other two showed higher depression rates significantly associated with diabetic complications (31,35). However, even though depression is highly prevalent in the female gender and longer duration of diabetes, there was no statistically significant association between depression and age, gender, and duration of diabetes.(23)

A study from Iran showed a significantly higher prevalence of depression in diabetic women than in non-diabetic women (39.7% vs 15%) and those with retinopathy than those with no retinopathy (55.6% vs 24%). However, the correlation between depression and diabetes duration, HbA1c level, and BMI has no statistical significance. The study concluded that diabetes was the only significant determinant of depression ($P = 0.005$, 95% CI = 0.118 – 0.667) (36),

Similarly, a study in Palestine also showed no significant association between depression and glycemic control and duration of diabetes. However, the study showed that female gender, low education level, joblessness, multiple additional illnesses, low medication adherence, and obesity are strongly associated with depression (37).

The study from Iraq showed both the diabetics and control groups scored more than 16, which is the lower threshold for diagnosis of depression in CES-D. The study postulated that almost all their population will have depression if these figures are applied in general (26).

A study conducted in people over the age of 50 years of age in Israel found that diabetic females were more likely to have depression compared to their male counterparts, and those with financial distress and limited physical activities were also more likely to be depressed (29). A study from Kuwait showed similar findings with diabetic females and physically inactive people being more likely to have depression.(30) They also showed that depression was more likely to be seen among Kuwaiti nationality, insulin users, people with high BMI, hypertensive, and those with uncontrolled HbA1c.

UAE, being one of the most developed countries in the Middle East has a sedentary lifestyle. However, it has a lower prevalence of depression in people with type 2 diabetes (17%) as compared to other studies in this review. In this study, depression was significantly associated with female gender, UAE nationality, having low education level, and unemployment (38).

2 Quality assessment of the studies

The quality of these studies was assessed based on the 9 criteria of the JBI checklists for prevalence studies (Table 2). The lowest score was observed for the question related to response rate of the participants (25%). All the studies except Alajmani et al. (2019), and Sehatah et al. (2009) did not report response rates in their studies (25,31). The highest scores (100%) were observed for the questions on sample representation of the target population, detailed description of subject and setting, measurement criteria, and reliability of the condition. Fifty percent of the studies did not clearly explain the sampling methods and 58.33% did not mention the adequacy of the sample size. The use of appropriate statistical analysis is not clearly shown in one study (29) and data analysis of the identified sample is not explained in another study (30). However, the overall score obtained by these studies for each domain of the checklist except for response rate was more than 50%. While the overall quality of the studies is acceptable, there is considerable room for improvement in the quantity and quality of research on this topic.

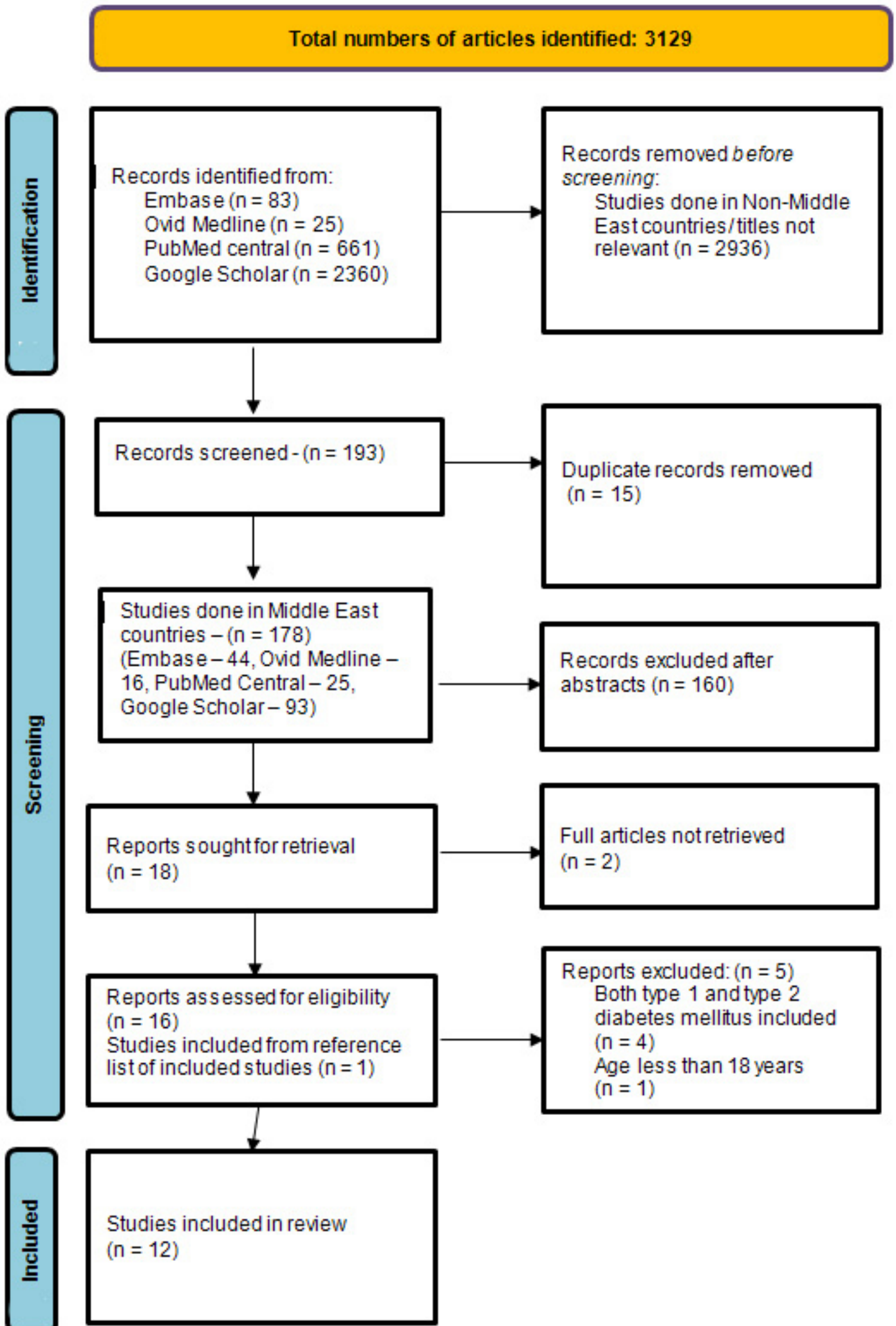
Table 1: Characteristics of the studies

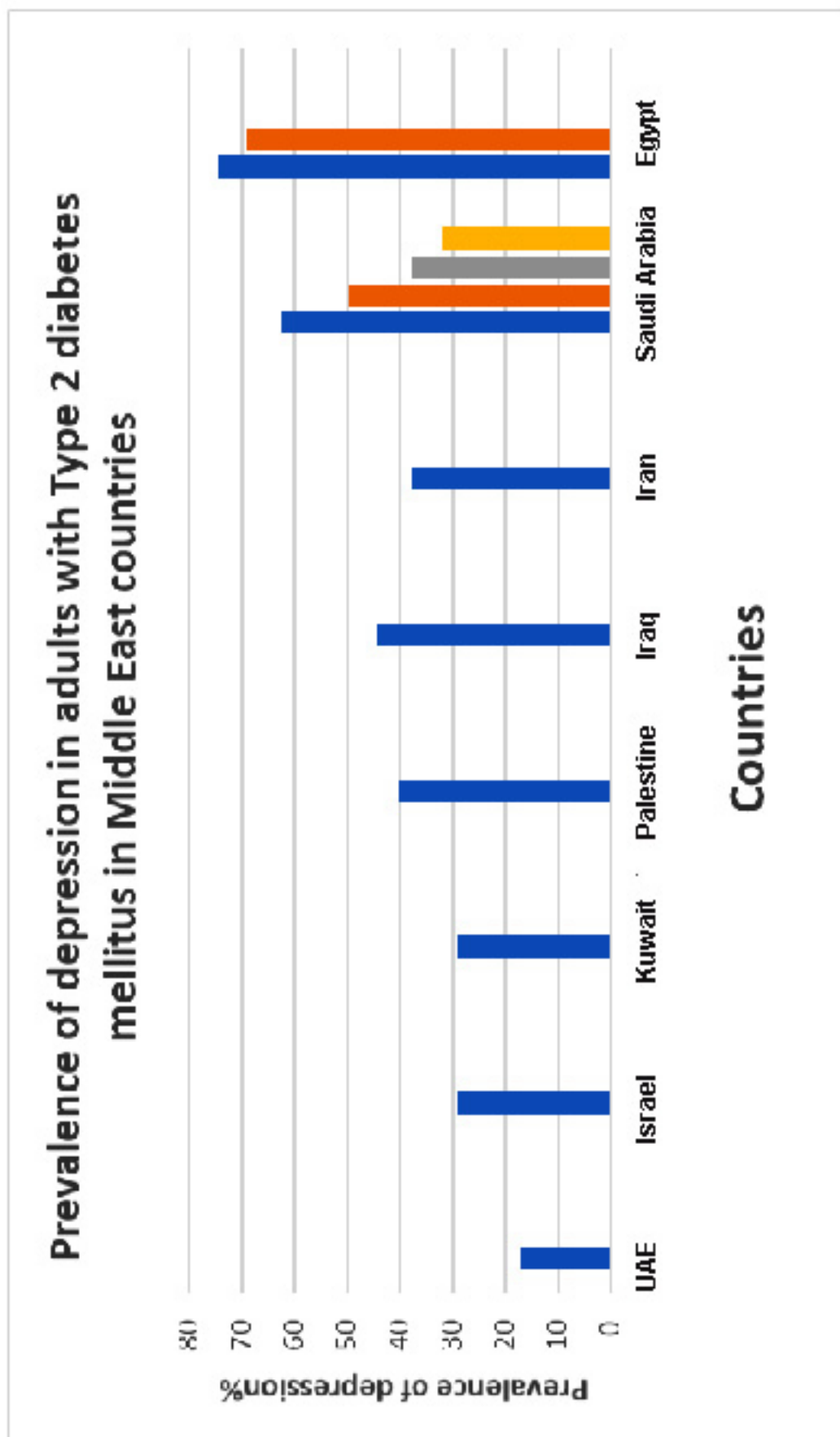
Author/year of publication	Country	Study Design	Sample size/ population with T2DM	Mean Age (years)	Sex (female %)	Assessment of Diabetes	Mean duration of diabetes	Assessment of depression	Prevalence of depression %
Alajmani et al/2019	UAE	Cross-sectional	559		57	Known T2DM		BDI (Cutoff –16)	17
Albasheer et al/2017	Saudi Arabia	Cross-sectional	385					PHQ 9 (Cutoff –10)	37.9
Osnat Baskin/2018	Israel	Cross-sectional	561	> 50		Self-reported		EURO-D (Cutoff –3)	29
Al-Ozairi et al/2020	Kuwait	Cross-sectional	260	53.3	48.2	Known T2DM	12.5	PHQ9 (Cutoff –10)	29
El Mahalli A A/2015	Saudi Arabia	Cross-sectional	260			Known T2DM		CES-5 (Arabic) (Cutoff –15)	49.6
Ismail et al/2019	Egypt	Cross-sectional	300	42 ±17.11		Known T2DM		PHQ 9 (Cutoff –5)	69.0
Kalantari et al/2014	Iran	Cross-sectional Case control	Case: 90 Control: 90			Known T2DM		BDI	37.8 Control: 16
Mansour and Jabir/2007	Iraq	Cross-sectional Case control	Case: 103 Control: 103	57.7 ±12.7		Known T2DM	At least 1 year	CES-D (Cutoff –16)	Depression Score: 44.5 ±11 Control: 34.4
Saadalla et al/2015	Saudi Arabia	Cross-sectional Case control	Case: 200 Control: 100			Known T2DM		BDI	62.5 Control: 29
Shehatah et al/2009	Saudi Arabia	Cross-sectional Case control	458 Control: 546	65±8.9		Known T2DM	19±8.7	BDI-II (Cutoff –14)	32.1 Control: 16
Sweileh et al/2014	Palestine	Cross-sectional	294	Median 60		Self-reported	Median 10	BDI-II (Cutoff –16)	40.2
El Shafie et al/2011	Egypt	Cross-sectional	125	48±5.9	58.4	Known T2DM		MADRS	74.4

Table 2: Critical appraisal of included studies

Study	Was the sample frame appropriate to address the target population?	Were study participants sampled in an appropriate way?	Was the sample size adequate?	Were the study subjects and the setting described in detail?	Was the data analysis conducted with sufficient coverage of the identified sample?	Were valid methods used for the identification of the condition?	Was the condition measured in a standard, reliable way for all participants?	Was there appropriate statistical analysis?	Was the response rate adequate, and if not, was the low response rate managed appropriately?
Alajmani et al	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Albasheer et al	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Osnat Baskin	Yes	Unknown	Yes	Yes	Yes	Yes	Yes	Unknown	Unknown
Al-Ozairi et al	Yes	No	Unknown	Yes	Unknown	Yes	Yes	Yes	Unknown
El Mahalli A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown
Ismail et al	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown
Kalantari et al	Yes	Unknown	Unknown	Yes	Yes	Yes	Yes	Yes	Unknown
Mansour and Jabir	Yes	Unknown	Unknown	Yes	Yes	Yes	Yes	Yes	Unknown
Sadalla et al	Yes	Unknown	Unknown	Yes	Yes	Yes	Yes	Yes	Unknown
Sehatah et al	Yes	Unknown	Unknown	Yes	Yes	Yes	Yes	Yes	Yes
Sweileh et al	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown
El Shafie et al	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown
Score %	100.0	50.0	58.33	100.0	91.66	100.0	100.0	91.66	25.0

Figure 1: PRISMA Flow chart





Discussion

Depression is a common prevailing comorbid condition in diabetes mellitus (3) and is associated with poor glycemic control leading to microvascular and macro-vascular complications (7). Overall, 12 studies were included in this systematic review from 8 different countries in the Middle East including Saudi Arabia, Egypt, UAE, Iraq, Israel, Kuwait, Iran, and Palestine.

The majority of the participants in these studies scored higher than the cut-off value in the depression assessment tool (Table 1). The prevalence of depression in people with type 2 diabetes mellitus in this review ranged from 17% to 74.4% with the highest in Egypt and lowest in UAE. Four studies, 2 each from Egypt and Saudi Arabia have more than 50% depression prevalence. The rest of the studies showed that more than a quarter of their participants (>25%) have depression except in the UAE where even though more than 50% of the participants responded, the prevalence was down to 17% only. With a wide range of depression prevalence in these studies, it is evident that most people with type 2 diabetes in Middle East countries are depressed and the findings are consistent with the findings from countries in other regions.

A systematic review and meta-analysis in Ethiopia showed nearly 40% pooled estimated prevalence of depression in adults with diabetes mellitus regardless of the diabetes type (39). Similarly, one meta-analysis from India showed a 38% pooled prevalence of depression in type 2 diabetics (40) and another case-control study showed 35.8% (41). There are many factors associated with the development of depression in type 2 diabetes mellitus. Depression was more likely to be seen in female gender as compared to their male counterparts in most studies in this review. Similarly, the uncontrolled glycemia and diabetic complications also showed significant association in this review. A cross-sectional study in Trinidad and Tobago showed similar results of 17.9% as the one in UAE with higher prevalence among females and those with complications (42). Similarly, a meta-analysis by S. Ali et al. (2006) also showed a depression prevalence of 17.6% in type 2 diabetics as compared to non-diabetic control where females had a higher prevalence than males. One study conducted in Germany showed 30.3% of depression prevalence in type 2 diabetics where females were more affected and those with higher HbA1c levels and diabetic complications had more depression prevalence (43). A similar study conducted in Nepal (44) showed 40.3% of depression prevalence in T2DM with higher prevalence in females (48.2%). A study by Anderson et al. (2001) also showed higher depression prevalence in females (3). A study also found that depression is 2 times higher in type 2 diabetes mellitus than in non-diabetic people (19.1% vs 10.7%) with female predominance (45). One study investigated the prevalence of depression in Arab women only with type 2 diabetes which showed significantly high depression prevalence at 34.1% (46).

The reason for the higher prevalence of depression in type 2 diabetes in the Middle East may be because type 2 diabetes itself is very prevalent in this region owing to urbanization and a sedentary lifestyle (47). The relation between depression and diabetes is not clear and is regarded to be bidirectional (48). Depression is regarded as a consequence of diabetes possibly due to its chronicity. Also, it is postulated that biochemical changes in depression may play a role in the development of diabetes as well as negative self-care behavior (49).

Physical inactivity, low socioeconomic condition, longer duration of diabetes, and Insulin users are among other associated factors. Improving the modifiable factors in type 2 diabetes, for instance, glucose level control, encouraging physical activity, diabetic education, and timely diagnosis of diabetes, etc. can have a positive impact on glycemia, eventually leading to fewer complications related to it and better mental health. Likewise, identification of depression in diabetic patients through screening programs in diabetic clinics, hospitals, or primary care centers can result in early detection of depression and its treatment triggering self-care and overall improvement of diabetes.

There are several limitations in this review. Firstly, out of 17 countries in the Middle East, studies from only 8 countries are included here. Many studies could not be retrieved in full texts, and some included both type 1 and 2 diabetes cases. So, studies from the rest of the countries were not included which could have yielded more results. Secondly, only those studies published in the English language are included. There must be many similar studies published in their local language which were excluded. Thirdly, only one independent reviewer is included in this review, and the decision to include or exclude the studies was taken by him which may be considered as a source of bias. Fourthly, this review included only cross-sectional and case control studies and so the causal nature and direct relationship between depression and type 2 diabetes mellitus cannot be interpreted. Finally, this is a narrative summary without meta-analysis and the pooled prevalence of depression was not done.

Despite the limitations, this review provides an overview of the varying ranges of prevalence for depression in type 2 diabetes. It also highlights that though most studies conducted in the region have acceptable quality, better-designed studies are necessary to provide stronger evidence related to prevalence in the study. The findings of this study also highlight the need for more countries in this part of the region to conduct not only the prevalence studies for depression in type 2 diabetes but also how to address and manage depression and other mental health issues in primary care and improve the quality of their life. It also paves way for designing intervention studies to increase awareness among health professionals to timely diagnose depression in type 2 diabetes and identify ways to improve mental health among type 2 diabetic patients.

Conclusion

There is no doubt that depression is a very prevalent comorbid condition in adults with type 2 diabetes mellitus in Middle East countries. Overall, epidemiological studies have shown that depression is 13% to 18% common in the general population in the Middle East and North Africa region (50) with the rate double in females than males. It has an intense effect on one's quality of life leading to many deaths including suicide. However, there may have been many undiagnosed and undetected people with depression. Timely detection and treatment for both diabetes and depression warrant priority. This can be carried out by setting protocols of routine screening of depression in those with type 2 diabetes mellitus in all chronic disease clinics, diabetic and endocrine clinics, and primary health centers. Appropriate depression tools and treatment protocols should be incorporated as a routine practice. Health care providers in all health care centers and hospitals must provide education that includes mental health issues to diabetic patients. More research is warranted in the Middle East region in this sector to investigate the causal factor of depression in diabetes and vice versa so that it can be implemented into practice to identify the condition in time and improve quality of life.

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