

## Gender and risk of depression in Saudi Arabia, a systematic review and meta-analysis

Osama A. Alibrahim,<sup>1</sup> Nabilla Al-Sadat,<sup>2</sup>  
Nagi A. M. Elawad<sup>1</sup>

<sup>1</sup>Al-Amal Hospital, Jeddah, Saudi Arabia  
<sup>2</sup>Department of Social and Preventive  
Medicine, Faculty of Medicine, University  
of Malaya, Kuala Lumpur, Malaysia

### Abstract

Depression is one of the leading causes of mortality and morbidity worldwide. In the year 2000 depression accounted for 4.4% of the global disability adjusted life years (DALYs). The Kingdom of Saudi Arabia (KSA) has a population of 28 million people and is one of the countries experiencing demographic transition in its population structure. Improvements in socioeconomic status have been shown to be associated with increased chronic diseases including chronic mental diseases like depression, but still there is no comprehensive review summarizing the various reports currently existing in the literature. Although individual studies within Saudi Arabia have reported prevalence rates and risks, the quality of such studies need to be subjected to rigorous assessment and their findings pooled to give combined weighted evidence that will provide basis for targeted intervention. Pooled risks have the advantage of adjusting inherent variations within sampled populations and therefore providing more reliable estimates even though there are concerns about possible magnification of smaller individual risks.

### Introduction

Depression is one of the leading causes of mortality and morbidity worldwide.<sup>1</sup> In the year 2000 depression accounted for 4.4% of the global disability adjusted life years (DALYs).<sup>2</sup> The Kingdom of Saudi Arabia (KSA) has a population of 28 million people.<sup>3</sup> KSA is one of the countries experiencing demographic transition in its population structure. Recent economic and industrial advancements have resulted in higher improved living conditions and longer life expectancy among KSA Nationals.<sup>4</sup> Improvements in socioeconomic status have been shown to be associated with increased chronic diseases including chronic mental diseases like depression. Although many studies have reported prevalence and factors associated with depression in KSA,

there is no comprehensive review that will summarize the various reports currently existing in the literature. There are debates and concern to know the true prevalence rates and factors associated with depression in Saudi Arabia and most other developing countries with populations in demographic transition. Although individual studies within Saudi Arabia have reported prevalence rates and risks, the quality of such studies need to be subjected to rigorous assessment and their findings pooled to give combined weighted evidence that will provide basis for targeted intervention. Pooled risks have the advantage of adjusting inherent variations within sampled populations and therefore providing more reliable estimates even though there are concerns about possible magnification of smaller individual risks.

The objective of this paper is therefore to provide a systematic review and meta-analysis of all available studies on the risks of depression in KSA.

### Materials and Methods

We included studies that are observational assessing depression among Saudi Nationals either cross sectional, or cohort studies; as well, we included studies which participants are adults (17 years and older), or youths (13 years and older), both sexes, diagnosed with Depression or assessed to have depression during the course of the study. All ethnic groups and locations within Saudi Arabia were considered. We excluded studies done on children and those who are not Saudi national, as well Saudi Nationals who are not resident in Saudi Arabia but were on visit to the country.

Using the DSM IV criteria, we measured depression as reported in all considered studies as primary outcome reported, we also considered the followings as secondary outcomes: socioeconomic status, psychosocial factors and co-morbid medical conditions.

An exhaustive search was conducted in electronic databases for relevant studies, both published and unpublished. No language restrictions were used. Specifically, we searched the following sources:

- MEDLINE (1966-Date)
- EMBASE (1974-Date)
- Science Direct (1980-Date)
- PsycINFO/PsycLIT/ClinPSYC(1980-Date)
- Neuroscience Citation
- Proquest Psychology Journals
- ArabPsyNe
- PsiTri
- OVID

Specific search terms used were: depres

Correspondence: Osama A. Alibrahim, Al-Amal Hospital, P O Box 7822 Jeddah 21472, Kingdom of Saudi Arabia.

E-mail: doctoralibrahim@yahoo.com

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sion, anxiety, mood disorder, Saudi Arabia, prevalence, factors, epidemiology, Kingdom of Saudi Arabia, elderly, youths, adolescents, general out-patient department, primary care centres.

In order to widen our search, we contacted primary authors of our identified relevant studies to check if they knew of other existing relevant studies. We also consulted proceedings for relevant studies and reference lists of identified studies. Free hand searching was conducted for studies in un-indexed or very recent journals and conference proceedings. Specifically, we searched the following local Saudi Arabian based medical journals: Saudi Medical Journal; Saudi Society of Family Medicine; Local Library of King Saudi University.

Two authors (OA and NE) independently assessed our potential relevant studies. Subsequently, we retrieved the full text reports of all studies considered by one or both authors as potentially relevant as well as those that were unclear. Each author used our standard eligibility form based on the inclusion and exclusion criteria to assess the studies. The characteristics of included studies are reported in Table 1; the reasons of excluding studies are noted in Table 2.

Another pair of authors (OA and YM) independently extracted data from the studies using our pre-tested data extraction forms. We extracted the inclusion and exclusion criteria for the participants, total number of participants, number of dropouts and withdrawals and numbers diagnosed with each outcome. Any disagreements about data extracted were resolved by referring to the studies report and

Table 1. Characteristics of included studies.

Lead Author	Date	Place	Age	Population	Instrument	Sample	Prevalence of depression	Journal
Al-Shammari	1994 -1995	Nationwide	65 and older	Elderly Saudi patients	Geriatric Depression Scale (GDS)	7970	39%	International Journal of Geriatric Psychiatry
Becker	2000-2002	Riyadh	17 and older	Adult patients	Patient Health Questionnaire Scale (PHQ).	431	35.7%	Social Psychiatry and Psychiatric Epidemiology
Asal	2005	Taif	16-20	Secondary school students	Beck's Depression Inventory (BDI)	490	(Male 5-55%) (Female 0-49%)	Neurosciences

Table 2. Excluded studies and reasons for exclusion.

Lead Author	Study Date	Journal	Reason for exclusion
Bassiony	2005	Depression and Anxiety	Did not report depression prevalence and risk by gender of respondents.
Abumadini	2000-2002	Journal of Family & Community Medicine	Methodology was not adequately described. Did not report depression prevalence and risk by gender of respondents.
Al-Khatami	2000	Saudi Medical Journal	Did not report depression prevalence and risk by gender of respondents.
Al-Gelban	2007	The journal of the Royal Society for the Promotion of Health	Did not report depression prevalence and risk by gender of respondents.

by discussion. Where data were insufficient or missing, we contacted the study's authors.

For continuous outcomes, we extracted the arithmetic mean values, standard deviations, and number of participants on whom the outcome was assessed.

For count data, we extracted the total number of events. If this information was not available, we extracted alternative summary statistics such as odd ratios and confidence intervals if available.

A pair of authors (OA and NE) independently assessed the presence of bias in all our included studies. We used the guidelines for the reporting of observational studies to assess the presence of bias in our included studies. The results of the risk of bias are presented in the risk of bias table.

We expressed results of dichotomous outcomes as risk ratio (RR) with 95% confidence intervals (CI). Outcomes on continuous scales of measurement are expressed using mean difference (MD) and standardised mean difference (SMD) if different scales have been used.

Where we found some data are missing, we contacted the study's authors for the missing data. If there was no response or there was response but could not provide data, we excluded such outcomes from our analysis.

Data was entered into Review Manager<sup>5</sup> by one of the authors (OA) and cross-checked by other two authors (NE and YM). We presented results with 95% confidence intervals. We also compared all odd ratios against other studies.

By using forest plot and performing the  $\chi^2$  test for heterogeneity and using a P value of 0.10 to determine statistical significance, we assessed the presence of statistical heterogeneity among studies. The  $I^2$  test was also used to assess inconsistencies within studies, a value greater than 50% was considered as substantial heterogeneity. If we found a low level - moderate heterogeneity, we used the random effect model to adjust. If there was significant statistical heterogeneity, we explored the possible sources of heterogeneity by removing studies with low quality and by using subgroup analyses for studies according to the age of the participants. Sensitivity analyses were also done to assess the robustness of the meta-analysis among the studies.

## Results

A total of 730 studies were retrieved; 685 studies were excluded, among these 653 titles were not relevant to our review, 5 were drug trials, were non-relevant abstracts and 7 were duplicates. Forty-five full text were assessed and out of these 7 papers met the inclusion criteria for this review.

Five of the studies assess depression among adults in primary care setting, while 3 studies were community based surveys assessing depression among young people in Saudi Arabia (Figure 1).

Al-Shammari<sup>5</sup> reported on 7970 Elderly

Saudi patients aged 65 and above. The study was cross sectional national survey to assess prevalence of depression among Saudi elderly. The survey was conducted between January 1994 and December 1995, the geriatric depression scale (GDS) was used for the evaluation.

Becker<sup>6</sup> reported on 431 Saudi patients in Riyadh KSA. The study was cross sectional survey to assess correctly diagnosed somatisation and depression by primary care physicians among adult primary care patients. The survey was conducted between September 2000 and April 2001, the patient health questionnaire scale (PHQ) for assessment mental disorders was used for the evaluation.

Asal<sup>7</sup> reported on 490 Saudi secondary schools students in Taif KSA. The study was cross sectional survey to assess depression among young people aged 16-20 using the Arabic Beck's depression inventory (BDI). The survey was conducted between January and May 2005.

## Excluded studies

Bassiony<sup>8</sup> reported on 98 Saudi patients in Eastern province KSA. The study was cross sectional survey to assess prevalence of depression among patients with social anxiety disorder symptoms referred to out psychiatric out-patients care department.

Abumadini<sup>9</sup> reported on 632 Saudi patients in King Fahad Hospital University (KFHU) in Eastern Saudi Arabia, KSA. The study was cross sectional survey to assess prevalence of depression among patients referred to psychi-

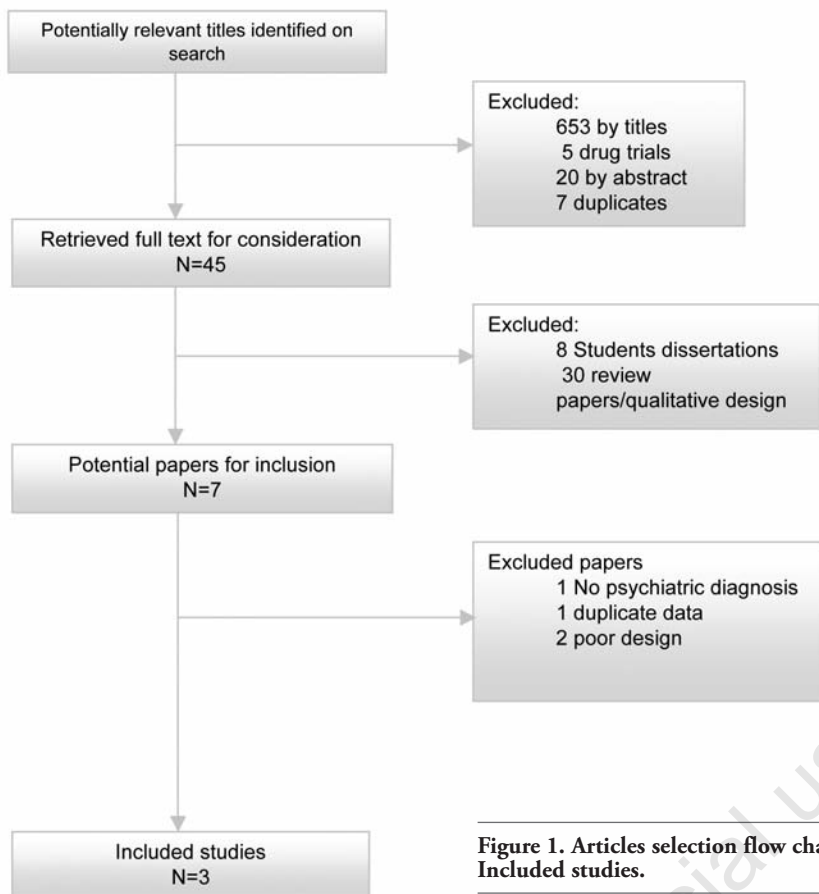


Figure 1. Articles selection flow chart. Included studies.

the first time a review and meta-analysis is done to assess pooled risk of depression in Saudi Arabia (Figure 2). Reviews conducted in other Middle East countries to assess pooled risk of depression are scarce as well. In Iran a review reported a combined prevalence of major depressive disorder to be 4.1% and women were as well more likely to be depressed RR: 1.95 (CI: 1.55-2.45) compared with males.<sup>12</sup> It was not possible in this review to compare prevalence of depression by spatial geographical distribution as all but one study were conducted in urban areas. Apart from gender, biological, psychological and social variables are known to affect prevalence of depression.

### Limitations

Although all efforts were made to search and retrieve all potential papers for inclusion in this review, we cannot absolutely claim to have unearthed all potentially relevant papers for inclusion in this review. We also noted the existence of substantial heterogeneity among our included studies, but we viewed this from the fact that studies with large and small sample sizes were included. We should further state that use of meta-analysis of observational studies is still a subject of intense debate and caution must be exercised when application of such findings into practice.

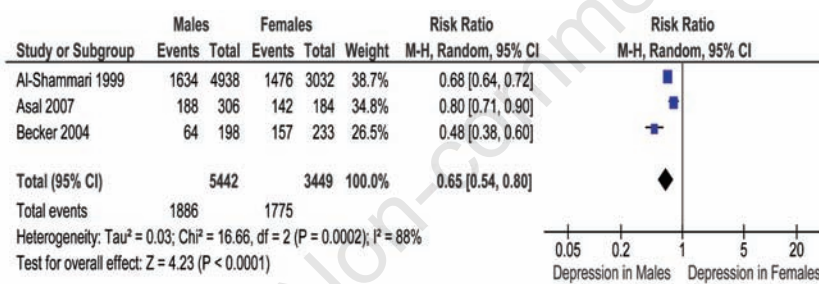


Figure 2. Prevalence of depression by gender in Saudi Arabia.

### Conclusions

Unlike it is previously thought, risk of developing depression in among Saudi nationals regardless of age did not appear to be high. Males are less likely to be depressed compared to women. It is imperative to note that this is the first meta-analysis reporting low risk of depression in Saudi Arabia. More reviews will be needed to validate our findings. Efforts must be sustained to maintain targeted intervention to sustain low risks of depression in Saudi Arabia.

### Implications for practice

Even though depression risk appears to be low, nonetheless it remains a challenge to overcome in both clinical and community settings. The findings of this study should be kept in mind by physicians, as low risk does not mean no risk. Depression should be considered among top differentials among at risk groups. Public health policy makers should use the findings of this review to sustain targeted intervention with the view to further reduce risks and impact of depression in the society.

### Implications for research

This review provides valid point estimates

atric outpatient department in KFHU. The survey was conducted between April 2000 and March 2002. The ICD-10 classification of mental and behavioural disorders was the diagnostic tool used to assess clinical depression among study participants.

Al-Gelban<sup>10</sup> reported on 545 female Saudi Secondary school Students in Abha Asser region Saudi Arabia. The study was cross sectional survey to assess depression using the Arabic version of the depression anxiety and stress scale (DASS-42). The survey was conducted in October 2007.

Al-Khatami<sup>11</sup> reported on 609 Saudi patients aged 15-65 in Al-Kharj KSA. The study was cross

sectional survey to assess prevalence of mental illnesses among adult primary care patients. The survey was conducted between July 2000 and November 2000; the Rahim anxiety-depression scale (RADS) was used for the evaluation.

### Discussion

The pooled relative risk shows males are less likely to be depressed than females, RR 0.65. The result is statistically significant with confidence interval of 0.54-0.80, even though there appears to be substantial heterogeneity among included studies with I<sup>2</sup> =88%. This is

from studies assessed to be of sound quality. However quantitative estimates do not always answer the questions “why” or “how”. There is a need for qualitative exploration of elements leading to depression among strata of demographic variables in Saudi Arabia.

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