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Research paper

Prevalence of major depressive disorder in older adults in China: A systematic review and meta-analysis

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ABSTRACT

Background: The prevalence of major depressive disorder (MDD) in Chinese older adults in epidemiological surveys have been inconsistent. We thus conducted a systematic review and meta-analysis of the pooled prevalence of MDD in older adults in China.

Methods: Two investigators independently conducted a systematic literature search in English (PubMed, EMBASE, PsycINFO and Cochrane Library) and Chinese (CNKI, Sinomed and Wan Fang) databases. Studies reporting the prevalence of MDD in older adults in China using diagnostic instruments were identified and analyzed using the Comprehensive Meta-Analysis program.

Results: A total of 28 studies with 76,432 subjects were included. The mean age ranged from 62.1 to 74.1 years. The point prevalence of MDD in older adults was 2.7% (95% CI: 2.1%–3.4%), 12-month prevalence was 2.3% (95% CI: 0.6%–8.5%), and lifetime prevalence was 2.8% (95% CI: 1.8%–4.4%). Subgroup analyses revealed significant differences in the prevalence of MDD across regions.

Conclusion: The prevalence of MDD in older adults varied across different regions in China. Further epidemiological studies and service planning should take into account such differences.

1. Introduction

Aging population is growing fast worldwide, especially in developing countries (Petersen and Yamamoto, 2005), such as in China. The proportion of the global population aged 60 years and above was projected to increase from 10.0% in 2000 to 21.8% in 2050 and to 32.2% in 2100 (Lutz et al., 2008). Due to the increased life expectancy and the previous one-child family policy, China's large population is rapidly aging with the proportion of older adults predicted to increase to 336 million in 2030 (Flaherty et al., 2007).

Due to biological and psychosocial factors (such as physical diseases, bereavement, retirement and living alone), depression is one of the most common psychiatric disorders in older adults (Alonso et al., 2004; Yaka et al., 2014) and is significantly associated with negative health outcomes, such as impaired functioning, cognitive performance, and lowered quality of life (Holtfreter et al., 2017; Waugh, 2006; Wu et al., 2017). In order to implement effective health services and improve quality of care, it is fundamental to understand the prevalence of depression in this population (Holtfreter et al., 2017; Schoevers et al., 2000).

The prevalence of depression has been examined widely in both Western countries and China. The prevalence of major depressive disorder (MDD) in older population ranged between 3% and 16.52%, while the prevalence of depressive symptoms was between 8% and 16% (Ritchie et al., 2004; Robins et al., 1984; Volkert et al., 2013). In addition, the prevalence of depression varied greatly across different

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countries (Barua et al., 2011). For example, a review found the prevalence of MDD in older adults was up to 16% in the USA (Blazer, 2003), and a multicenter study found 8.7% of older adults were diagnosed MDD in England (McDougall et al., 2007). In Asia, a review reported that the prevalence of MDD in older adults ranged between 13% and 25% nationwide in India (Barua et al., 2011), while multicenter studies in China found that the prevalence of MDD in older adults ranged from 0.45%−6.88% (Tang et al., 2001; Wang et al., 2017). The large discrepancy in the prevalence of depression across studies could be due to several reasons. First, the definition of depression was different with some studies examining MDD, while others measuring depressive symptoms only (Ayuso-Mateos et al., 2001). Some studies used systematic diagnostic instruments, such as the Mini-International Neuropsychiatric Interview (MINI), but others used screening scales for depression symptoms, such as the Hamilton Rating Scale for Depression (HAMD) (Lyness et al., 1999), Montgomery–Åsberg Depression Rating Scale (MADRS) (Yohannes et al., 2000), the Patients' Health Questionnaire (PHQ-9) (Kocalevent et al., 2013) and the Center for Epidemiologic Studies Depression Scale (CES-D) (Lewinsohn et al., 1997). Second, variation in the study quality could result in inconsistent findings.

In China the prevalence estimates of depression in older adults ranged from 6.35% (Chen et al., 2007) to 60.3% (Jia et al., 2011) which is due to different tools used, sample sizes and sociocultural contexts. A previous meta-analysis had estimated the prevalence of depressive symptoms (23.6%) in Chinese older adult population (Li et al., 2014), but no meta-analysis on MDD has used structured instruments based on international diagnostic criteria, such as the Diagnostic and Statistical Manual of Mental Disorders (DSM) and International Statistical Classification of Diseases and Related Health Problems (ICD) systems.

Therefore, we conducted a systematic review and meta-analysis to estimate the pooled prevalence of MDD in Chinese older adults and also explored its moderating factors (e.g., gender, areas, survey year, and diagnostic tools used), based on epidemiological surveys using semi-structured or structured instruments, such as the Structured Clinical Interview for DSM (SCID), Composite International Diagnostic Interview (CIDI), and Schedule for Clinical Assessment in Neuropsychiatry (SCAN) according to the DSM and ICD systems or the Chinese Classification of Mental Disorders (CCMD).

2. Methods

2.1. Search strategy and selection criteria

This meta-analysis was conducted according to the MOOSE recommendation (Stroup et al., 2000). The literature search process is shown in Fig. 1 (i.e., PRISMA flow chart of the study). Two investigators (FW and QEZ) independently conducted a literature search in English (PubMed, EMBASE, PsycINFO and Cochrane Library) and Chinese [China National Knowledge Infrastructure (CNKI), Chinese biomedical literature service system (Sinomed) and Wan Fang (a Chinese biomedical database)] databases, from the commencement date of the databases to Oct 1st, 2017 (i.e., PubMed: 1966–2017; EMBASE: 1947–2017; PsycINFO: 1966–2017; Cochrane: 1967–2017; CNKI1999-2017; Sinomed: 1978–2017; Wan Fang: 1998–2017). Search terms are as follows: (``depressi*" ) AND (``epidemiology" OR ``prevalence" OR ``rate" OR ``percentage") AND (``old*" OR ``elderly" OR ``aged" OR ``aging") AND (``China" OR ``Chinese"). The systematic search also included potential publications identified through Google Scholar. An additional search was conducted for dissertations and conference posters that are usually not accessible in electronic databases, as well as the reference lists of relevant reviews or meta-analyses in order to avoid missing any studies. If more than one publication was published using the same dataset, only the one with the largest sample size was included.

Various guidelines for conducting systematic review and meta-analysis of epidemiology exist, such as the guideline by the Joanna Briggs Institute Reviewer's Manual (Munn et al., 2017). According to Joanna Briggs Institute Reviewer's Manual, the inclusion criteria using the PDC acronym were as follows: Population (P): participants aged ≥ 55 years (older adults thereafter) (Nogueira et al., 2016; WHO, 2001; Xiang et al., 2014); Disorder (D): diagnosis of MDD as established according to international or local diagnostic criteria [such as the DSM, CCMD or ICD systems] using standardized diagnostic instruments including the MINI, SCID, SCAN and CIDI; Country (C): epidemiological cross-sectional surveys or cohort studies conducted in China (only baseline data were extracted in the latter). Studies that only reported prevalence of depressive symptoms using screening depressive symptom scale, reviews and case reports were excluded.

2.2. Studies selection and data extraction

Two reviewers (FW and QEZ) independently screened titles and abstracts of the initial search results and selected the articles that fulfilled the inclusion criteria after removing the duplicates. Any uncertainties were resolved by consensus or a discussion with a third reviewer. The same two reviewers independently performed the data extraction using a standard data extraction form. Extracted information included study characteristics, such as title, the first author, publication year, study site, survey year, sampling method and sample size.

2.3. Quality assessment

To date, no gold-standard quality assessment tool in meta-analysis of epidemiology is available. Hence, following other studies (Boyle, 1998; Yang et al., 2016), a quality assessment tool with 8 items was used in this review (Loney et al., 1998). A point was given when an included study satisfied each item and the total score was obtained by adding all items. The total score ranged from 0 to 8, with 7–8 defined as `high quality', 4–6 as `moderate quality' and 0–3 as `low quality'. Two investigators (FW and QEZ) assessed the quality of included studies independently. Any disagreement in the assessment process was discussed and resolved with a third investigator.

2.4. Statistical analysis

The Comprehensive Meta-Analysis software version 2 (Egger et al., 1997) was used to analyze the data. I^2 statistic was used to assess the degree of heterogeneity across studies. Following other studies (Jansen et al., 2015; Zhang et al., 2017), I^2 greater than 50% would indicate high heterogeneity and the pooled prevalence was estimated using the random-effects model (Higgins et al., 2003). The heterogeneity could be due to different sampling methods, assessment instruments and sample size across studies. Subgroup analyses were used to examine sources of high heterogeneity if present. Continuous variables, such as year of publication and age, were dichotomized using median splitting method. Subgroup analyses were conducted based on the following variables: age (60–69 vs. 70–79 vs. ≥ 80 years), gender (male vs. female), living area (urban vs. rural), education level (primary and below vs. junior and senior secondary school vs. university and above), married status (married vs. other marital status), diagnosis tools (DSM vs. ICD vs. CCMD), study region (east region vs. west region vs. middle region as per the Chinese economic zone division) and year of publication (< 2007 vs. ≥ 2007). Publication bias was evaluated with the funnel plots and the Egger's test. The significance level was set at 0.05 (two-sided).

3. Result

3.1. Search results and characteristics of studies

Of the 6559 hits identified in literature search, 28 studies with