Prevalence and determinants of depression in caregivers of cancer patients
A systematic review and meta-analysis

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Abstract

Background Aim of this study was to estimate the prevalence rate of depression in cancer patient caregivers and to identify factors affecting depression and quality of life of cancer caregivers.

Methods Relevant research articles were retrieved after literature search in several electronic databases. Random effects meta-analyses were performed to obtain pooled estimates of the prevalence rates of depression and anxiety; their respective scores, and quality of life scores. Significant relationships between depression and factors related to depression and quality of life reported in individual studies were identified.

Results Thirty studies were included. Overall, 21,149 caregivers were appraised in these studies (age 52.65 years [95% CI: 49.65, 55.65]; 31.14% [28.40, 33.89] men). The prevalence of depression and anxiety were 42.30% [33.31, 51.29] % and 46.55% [35.59, 57.52], respectively. Quality of life score, as measured with Caregiver Quality of Life—Cancer scale was 64.55 [47.44, 81.66]. Patient's condition, caregiving burden, duration of caregiving, spouse caregiver, caregiver being unemployed, caregiver with chronic disease, caregiver's sleep quality, caregiver's avoidance, financial problems, and female sex were positively associated with depression whereas overall quality of life of caregiver, pre-loss grief, caregiver's education level, caregiver's age, caregiver's sense of coherence, and caregiver's bondage with patient were negatively associated with depression in caregivers.

Conclusion A considerably high prevalence of depression is found in cancer patient caregivers. Several factors may affect depression and their quality of life of cancer patient caregivers.

Abbreviations: BDI = Beck Depression Inventory, CESD = Center for Epidemiological Studies Depression, CQOLC = Caregiver's Quality of Life Index—Cancer, DSM-IV = Diagnostic and Statistical Manual of Mental Disorders-IV, EORTC QLQ-C15-PAL = Core Questionnaire of the European Organization for Research and Treatment of Cancer, HADS = Hospital Anxiety and Depression Scale, POMS = Profile of Mood States, PRISMA = preferred reporting items for systematic reviews and meta-analysis, SCID = structured clinical interview, SF = Short Form, STAI = State-Trait Anxiety Inventory, WHOQOL-BREF = World Health Organization Quality of Life Best Available Techniques Reference Document.

Keywords: cancer patient caregivers, depression, meta-analysis, nursing, systematic review

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1. Introduction

Cancer patient caregivers play an important role in patient's disease management and palliation which may adversely affect their own health in the longer run.[1–3] Increasing stress due to increased duration of caregiving produces marked changes in neurohormonal and inflammatory processes which may increase the risk of morbidity and mortality among caregivers.[4] Caregiver's time and effort, use of material and emotional resources, and social life compromise deteriorates caregiver's quality of life.[5,6]

With ever-increasing population, there is a trend towards shortened hospital stay but more outpatient/home care that has put more burdens on family and close relatives involving emotional and physical sacrifices with profound economic consequences. Caregiving is burdensome; most caregivers (up to 62%) sustain high burdens. Cancer caregivers spend approximately 33 hours weekly with patients which may involve complex medical or nursing assignments for as much as 72% of caregivers.[7] Resource shortage leads to more stressful caregiving situations and higher burdens, whereas the availability of resources is found to be associated with better perceived health of caregivers.[8] It has been reported that the mental health of the caregivers is disrupted more seriously than physical health.[9]

Caregiver's health may be improved by strengthening psychological and psychosocial environment as it has been found that subjective burden and lack of positive aspects of caregiving leads to poorer health.[10–12] Healthcare policy-makers too have stressed on having interventions capable of fostering the caregivers' health.[13–15] However, a better understanding of the factors affecting caregivers' long-term health status is required before a useful interventional strategy can be devised.

Grief and distress are commonly associated with cancer patient family caregivers which in many cases take form of long-term depression. The present study undertakes a systematic review of this problem in order to synthesize up-to-date knowledge regarding the prevalence of depression in cancer patient caregivers and attempts to identify factors affecting depression-quality of life nexus in these caregivers.

2. Method

This study was performed by following the Cochrane Collaboration guidelines and is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement.

2.1. Inclusion and exclusion criteria

The inclusion criteria were: the study—investigated the psychsomatic effects on caregivers of caregiving to cancer patients; used a relevant validated instrument capable of adequate data collection; reported the prevalence of depression and/or its instrumental scores in numeric form; and reported life factors affecting depression as determinants of quality of life impairment. Studies were excluded if involved qualitative appraisals only; or reported post-death quality of life measures or depression states of cancer caregivers.

2.2. Literature search

Relevant research articles were searched in electronic databases (Embase, Google Scholar, Ovid SP, and PubMed). Literature search was based on important keywords which were used in logical combinations. Prime combination (cancer-caregiver-depression) was used for primary searches and then for secondary searches, this combination was used along with other keywords including depression inventory, depression scale, questionnaire, inventory, scale, anxiety, mood states, attachment, coherence, avoidance, financial, stress, burden, sleep, patients, healthcare providers, emotional trauma, psychological stress, correlation, and association. Software suggested articles and cross references of important research papers were also included in screening. Literatures search encompassed peer-reviewed research articles published before March 2018.

2.3. Data extraction, synthesis and statistical analysis

Data classified as the demographic, professional and health characteristics of the participants, outcome measures, and outcomes were acquired from the respective published research articles and organized in datasheets. For the identification of factors affecting depression of cancer caregivers, the relationships between depression and life attributes of cancer patient caregivers were identified as regression coefficients, correlation coefficients, or odds ratios as reported by the individual studies which were then extracted and synthesized.

Meta-analyses were performed under random effects model with Stata software (version 12; Stata Corporation, College Station, TX). Prevalence estimates reported by the individual studies were extracted or converted into percent prevalence and their respective standard errors were calculated which were then used in the meta-analysis. For pooling depression scores reported by the individual studies, mean scores were used in the meta-analysis along with their respective standard errors. For each of the pooled analysis, the overall effect size was a weighted average of the inverse variance adjusted individual effect sizes. Between-study inconsistency was tested by I^2 index. All data are presented as weighted effect sizes with 95% confidence interval.

3. Result

Thirty studies[16–45] were selected by following the eligibility criteria (Fig. 1). Important characteristics of the included studies are presented in Table S1, http://links.lww.com/MD/C506. Overall, 21,149 caregivers were appraised in these studies. Age of the caregivers was 52.65 years [49.65, 55.65] and 31.14% [28.40, 33.89] were men.

Psychometric tools used to measure depressive and anxiety levels were: Beck Depression Inventory (BDI; 4 studies); Center for Epidemiological Studies Depression scale (CESD; 13 studies); Depression Anxiety Stress Scales (DASS-21; 2 studies); Hospital Anxiety and Depression Scale (HADS; 10 studies); Profile of Mood States (POMS; 1 study); State-Trait Anxiety Inventory (STAI; 2 studies), and Structured Clinical Interview (SCID) for Diagnostic and Statistical Manual of Mental Disorders–IV (DSM-IV; 1 study). Quality of caregiver's life was measured with several tools including 15-item Core Questionnaire of the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C15-PAL; 1 study); Short Form (SF-8; 1 study; SF-36; 1 study); Caregiver's Quality of Life Index—Cancer (CQOLC; 4 studies); and World Health Organization Quality of Life Best Available Techniques Reference Document (WHOQOL-BREF; 1 study).

The prevalence of depression in the cancer caregivers was 42.30% [33.31, 51.29] (Fig. 2A). The weighted average depression scores measured with any psychometric tool were also above depression threshold for each of the tools used (Fig. 2B). The prevalence of anxiety in this population was 46.56% [35.59, 57.52] (Figure S1, http://links.lww.com/MD/C506). Anxiety scores reported in individual studies and overall effect sizes are presented in Figure S2, http://links.lww.com/MD/C506. Quality of life score (total) measured with Caregiver Quality of Life—Cancer scale was 64.55 [47.44, 81.66] whereas the maximum score with this tool can be 160 (Fig. 3). Quality of life score assessed with other tools were also lower in cancer caregivers (Table S2, http://links.lww.com/MD/C506).

Several life factors were identified by the authors of included studies. A detailed account of these factors is given in Tables S3 (a–c), http://links.lww.com/MD/C506. Factors associated positively with depressive symptoms included patient's condition; caregiver's sleep quality; caregiver's avoidance; caregiving burden; duration of caregiving; spouse caregiver; caregiver being unemployed; caregiver with chronic disease; caregiver's financial problems, and caregiver's female sex, whereas the factors associated negatively with depressive symptoms included overall quality of life of caregiver; pre-loss grief; caregiver's education level; caregiver's age; caregiver's sense of coherence; caregiver's bondage with patient; and caregiver's social support.
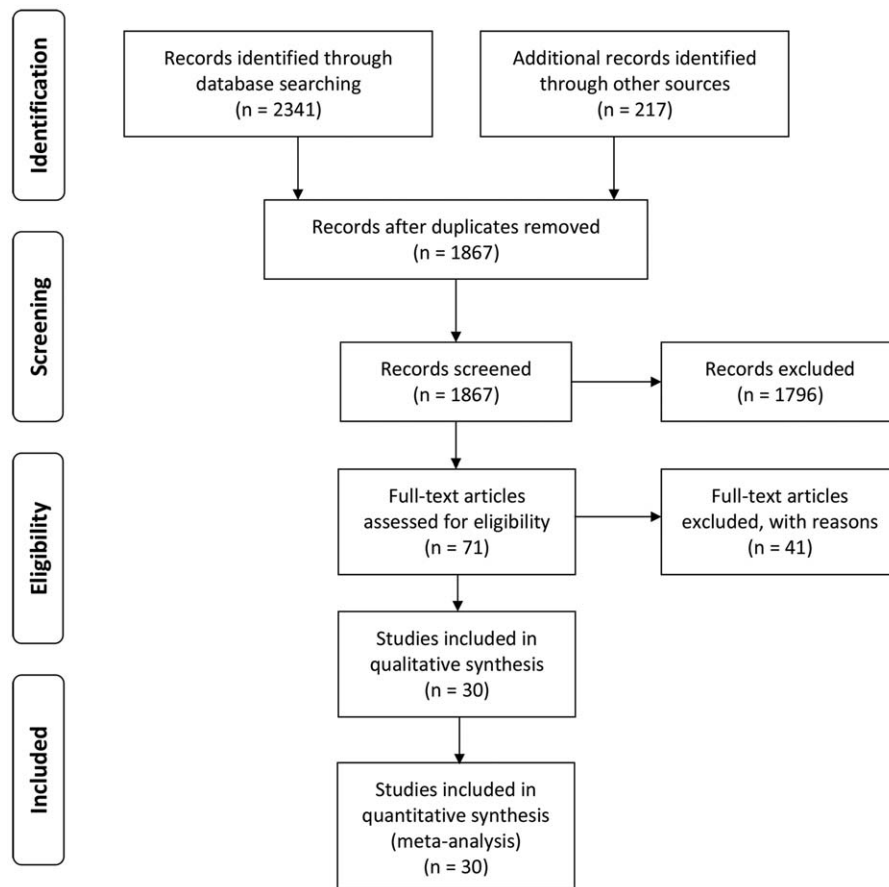
Figure 1. A flowchart of study screening and selection process.

4. Discussion

The present study finds that the prevalence of anxiety and depression in cancer patient caregivers is much high and quality of life of caregivers is low. Whereas the presence of cancer itself has been found to be a dominant source of depression and anxiety in caregivers, several other factors may exaggerate the symptoms. These include relationship and communication between caregiver and patient, caregivers social, economic, and psychological attributes, caregiver's health, and caregiving duration.

Loss or its anticipation causes grief, whereas depression is a condition irrespective of the circumstances. Pre-death grief has been found to be associated with depressive symptoms with many symptoms of grief overlap with those of depression.[33,31,46] This association has significant impact on caregivers facing an end-of-life trajectory for a close relative.[30,31] Bereaved families endure long-term grief and familial caregivers' severe depressive symptoms gradually decrease over a couple of year after the death of the cancer patient. However, prolonged grief in bereavement is predictable by modifiable factors before, during, and after bereavement which indicates that bereavement risk assessment and facilitation and preparedness for the patient's death can help in improving depression symptoms in caregivers.[47,48]

High prevalence of anxiety and depression in cancer patient caregivers warrant provision of mental health care to caregivers.

Perceived stress of cancer patient's condition affects physical health outcomes more strongly than caregiving burden itself.[49,50] Identification of factors affecting the physical and psychosocial health of cancer caregivers may not only reduce caregiver distress but may also help in reducing patient's distress by improving caregivers' motivational and psychomotor abilities to care for patient. As the cancer caregivers are at high risk of disease, appropriate interventions targeting their psychosocial, physical, and mental health needs are required to reduce this risk. Some studies have suggested that psychosocial interventions for caregivers may help in improving the overall quality of life.[10,11]

Studying this area more deeply may help in further refining the interventions. Previously, it has been reported that in comparison with non-caregivers, caregiving burden and strain is associated with 63% higher risk of mortality than non-caregivers[51] but a later study with larger sample size found that caregiving was associated with rather reduced mortality among caregivers[52] which shows that caregiving experience may be associated with positive affect and precaution to adapt for more careful life. With the increasing incidence of cancer, the number of informal caregivers is also increasing proportionally and there is increasing recognition that cancer caregivers need information and support from the health care system.[24]

The Quality of Life Index—Cancer (CQOLC) is a multi-dimensional instrument to appraise several dimensions of caregiver quality of life. The reliability and validity of this tool

Prevalence (%) of Depression in Cancer Caregivers

Study	ES (95% CI)	% Weight
CESD		
Heckel 2015	30.00 (29.12, 30.88)	6.25
Kim 2007	29.60 (28.52, 30.68)	6.25
Tang 2007	76.00 (74.69, 77.31)	6.25
Tang 2013	55.00 (53.94, 56.06)	6.25
Yang 2012	63.50 (62.62, 64.38)	6.25
Subtotal (I-squared = 99.9%, p = 0.000)	50.82 (33.41, 68.22)	31.25
DASS-21		
Nik Jaafar 2014	49.20 (47.99, 50.41)	6.25
Subtotal (I-squared = .%, p = .)	49.20 (47.99, 50.41)	6.25
HADS		
Gotze 2014	52.80 (51.42, 54.18)	6.25
Grove 2005	24.00 (22.63, 25.37)	6.25
Leroy 2016	45.00 (43.30, 46.70)	6.24
Park 2013	82.20 (81.61, 82.79)	6.25
Price 2010	5.90 (5.65, 6.15)	6.25
Yu 2017	64.00 (63.11, 64.89)	6.25
Subtotal (I-squared = 100.0%, p = 0.000)	45.65 (10.71, 80.59)	37.49
BDI		
Nielsen 2017b	26.00 (25.78, 26.22)	6.25
Rhee 2008	67.00 (66.09, 67.91)	6.25
Subtotal (I-squared = 100.0%, p = 0.000)	46.50 (6.32, 86.68)	12.51
DSM-IV		
Trevino 2018CwC	4.10 (3.93, 4.27)	6.25
Trevino 2018NCS-R	2.60 (2.57, 2.63)	6.25
Subtotal (I-squared = 99.7%, p = 0.000)	3.35 (1.88, 4.82)	12.51
Overall (I-squared = 100.0%, p = 0.000)	42.30 (33.31, 51.29)	100.00

NOTE: Weights are from random effects analysis
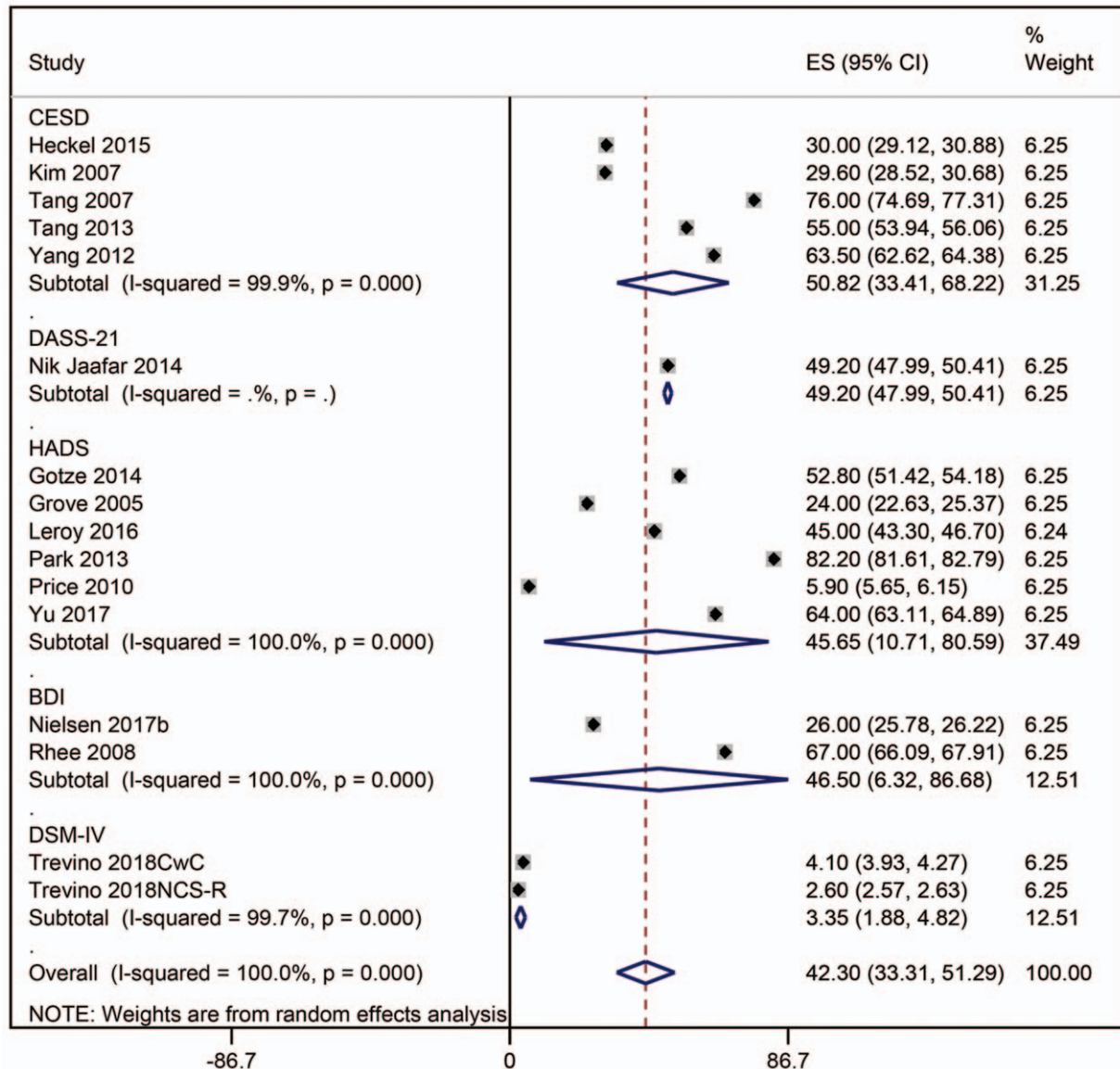
-86.7   0   86.7

Figure 2. Forest graphs showing the pooled estimates of (A) the prevalence rates of depression with regards to psychometric tools used in the included studies; and (B) the depression scores.

is reported in several countries including the United States, Korea, Turkey, France, and China.[53] With the use of this instrument, better quality of life is found to be associated with good overall mental health, whereas more emotional distress and poor patient performance status are associated with lower quality of life.[54] Although, in the present review, less studies reported both depression and CQOLC scores due to which it was not possible to assess the relationship between depression and/or anxiety and quality of life quantitatively but pooling of 4 studies revealed much less CQOLC scores depicting significantly lower quality of life in cancer caregivers. Choi et al,[18] who used CQOLC, found significantly inverse associations between mild, moderate, and severe depression and the quality of life (regression coefficients: −7.35, −13.74, and −19.51, respectively). Shin et al[38] also found an inverse relationship between depression scores and the

CQOLC scores. By using SF-36 physical/mental composite scores (PCS/MCS) also, significant differences have been noted between caregivers and non-caregiver controls.[22]

Cancer palliation is a troublesome period for patients as well as for caregivers which adversely affects caregiver's quality of life. Less is understood and intervened for improving the quality of life of the caregivers. The present study is first to achieve a reliable estimate of the prevalence of depression in cancer caregivers and synthesize knowledge about factors affecting quality of life of caregivers during caregiving period. Depression and anxiety affect quality of work as well as quality of life. Whereas patient's condition; caregiver's female sex, heath and socioeconomics pose risk of depression, better quality caregiver's life and education level; caregiver's sense of coherence and bondage reduces risk of depression. Thus, caregiver's training, socioeconomic support
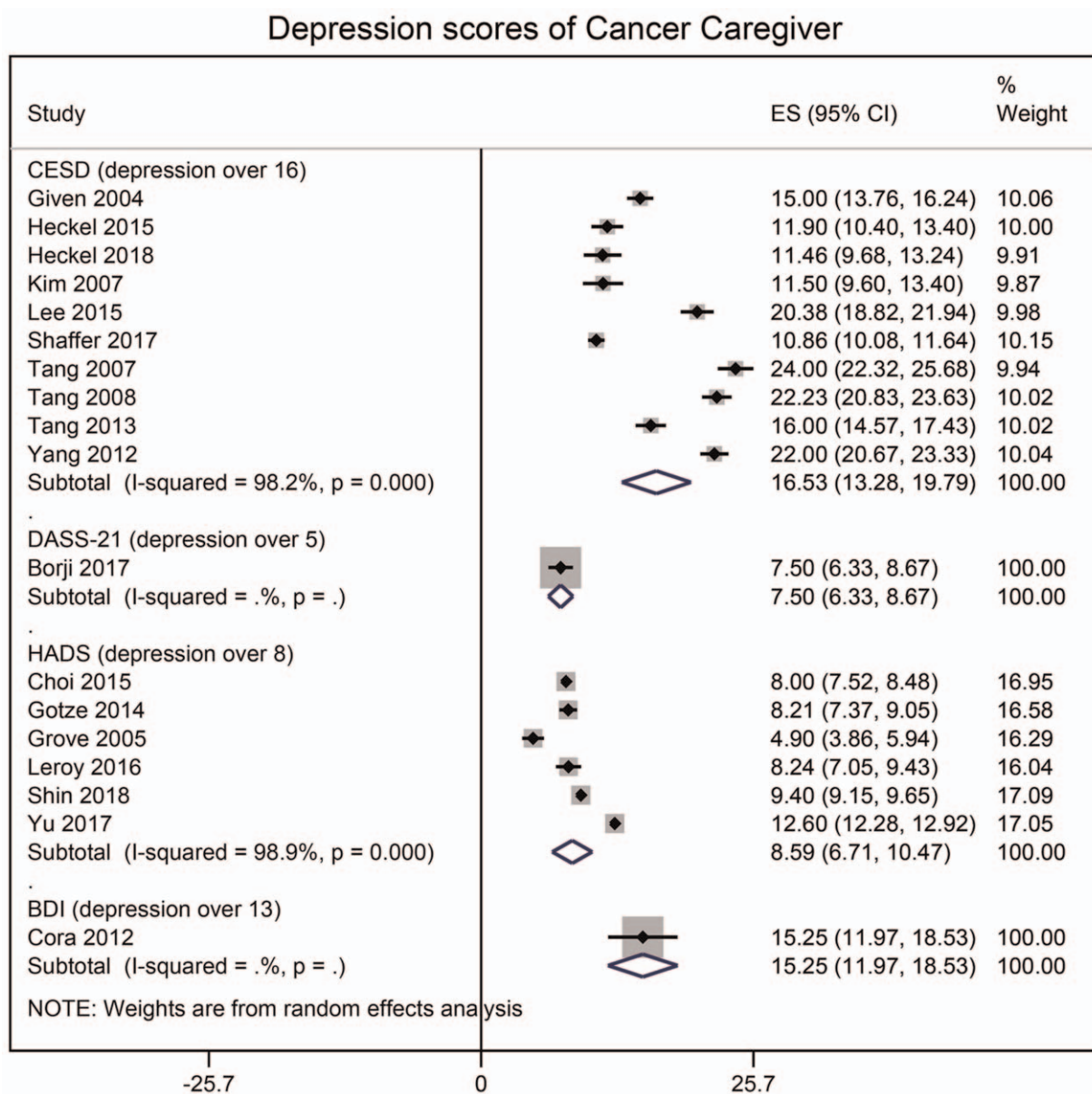
Figure 2. (*Continued*)

especially for women, and healthcare support can improve the quality of caregiving as well as quality of life of caregivers. However, for designing training or interventional programs, it will be necessary to further refine this knowledge.

Among the limitations of the present study, less availability of categorical data, use of a variety of psychometric tools and high statistical heterogeneity are important considerations. The prevalence estimates for depression were available for 16 studies and for the prevalence of anxiety even less number of studies reported data. Similarly, data pertaining to the quality of life measured with a validated tool was available for only 6 studies. Anxiety and depression scores were measured with a variety of tools which may also have affected the overall estimates achieved in the present study. Such variations have given the meta-analyses a high statistical heterogeneity which necessitates further studies to be performed for arriving at conclusive evidence. Moreover, because data were insufficient to study individual life factors

affecting depression of caregivers by using metaregression or any meta-analytical method, the present study could only synthesize the present-day knowledge by identifying significant associations observed in individual studies. Several factors are identified in the present systematic review but the number of studies identifying a particular factor was less. Moreover, individual authors used variable definitions and nomenclatures of life attributes. Use of standardized tools in future studies can better generate information that could be used to design interventional programs for caregivers.

5. Conclusion

The prevalence of anxiety and depression in cancer patient caregivers, as measured with validated instruments, is approximately 47% and 42%, respectively. This high prevalence of anxiety and depression affects the quality of life of the caregiver.
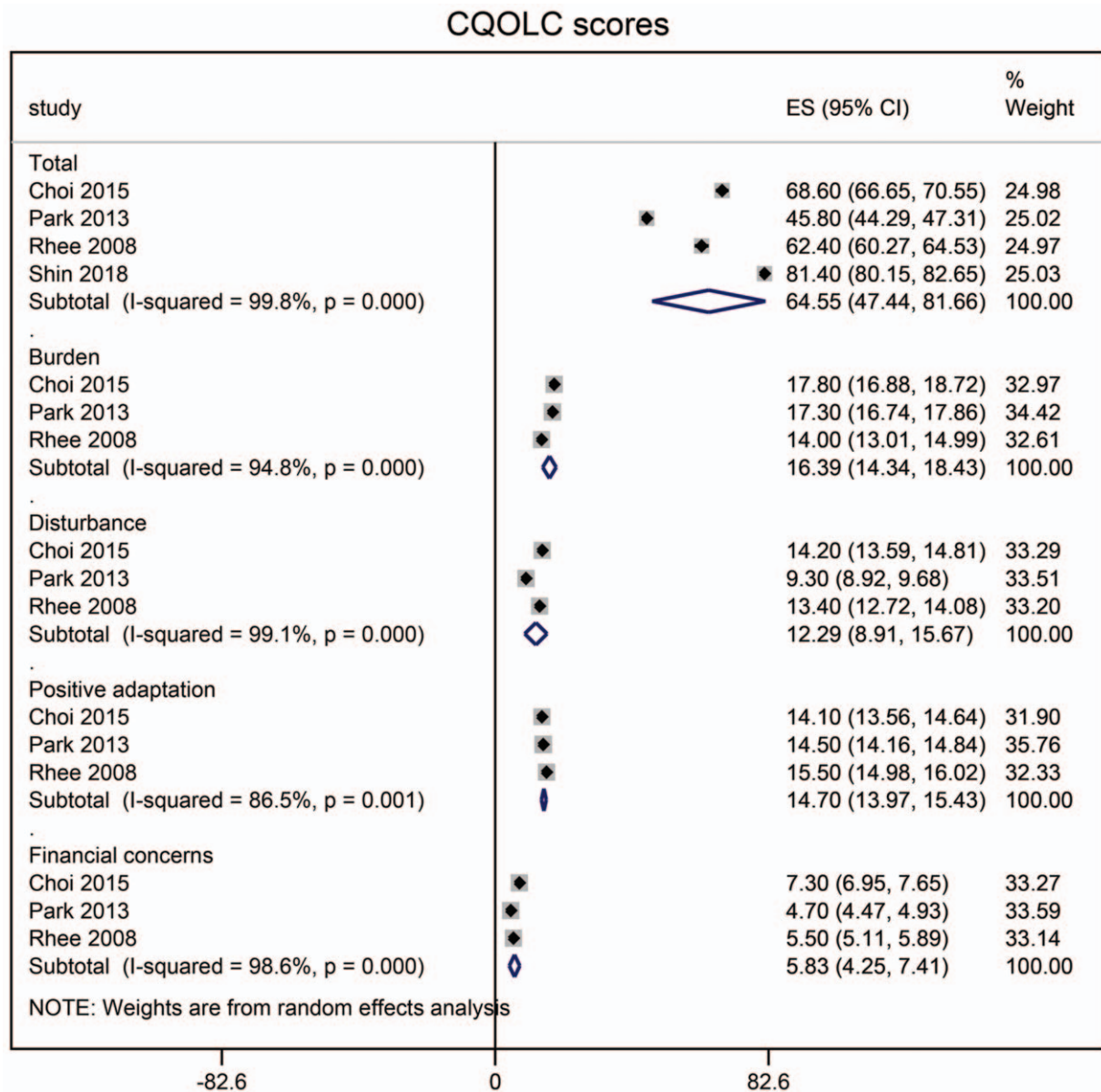
Figure 3. A forest graph showing the pooled estimates of the quality of life score, as measured with Caregiver Quality of Life—Cancer scale.

Several associations have been identified between depression and life factors including caregiver's sleep quality, burden; duration of caregiving; spouse caregiver; caregiver being unemployed; caregiver with chronic disease; financial problems, and female sex. Negative associations with depressive symptoms included overall quality of life of caregiver; pre-loss grief; caregiver's education level; caregiver's age; caregiver's sense of coherence; caregiver's bondage with patient; and caregiver's social support. These factors are needed to be further studied in future because a wide range of domains is reported by these studies but with less endorsement from other studies.

Author contributions

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Validation: Yang Yang.
Visualization: Yang Yang.
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Writing – review & editing: Wei-min Liu, Li-hui Liu.

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