RESEARCH ARTICLE

A Comparison of Two Scales to Determine Prevalence of Mood Disorders in Omani Patients Recently Diagnosed with Cancer

Ikram A Burney[1], Zena M Al-Sharbati[2], Zainab Al-Rawahi[1], Somaia Al-Hatmi[1], Syed G Rizvi[3], Mohammad-Rachid Boulassel[4,5]*

Abstract

Objectives: Studies on the prevalence rate of mood disorders in patients recently diagnosed with cancer from Middle East are scare in the literature. Therefore, this study assesses the prevalence rates of anxiety and depression, and their associations with socio-demographic factors, in recently diagnosed patients with cancer living in the Sultanate of Oman. **Methods:** In this prospective study, adult patients were interviewed within the first three months of diagnosis of cancer using the Hospital Anxiety and Depression Scale (HADS), and the Centre for Epidemiological Studies Depression (CES-D) Scale. Associations were studied among symptoms of anxiety and depression, and the socio-demographic factors, along with levels of agreement between the two scales. **Results:** Eighty-nine patients were interviewed, and 65% were females. Using the HADS tool, 41.6% of patients had anxiety, 28% had depression, whereas 5.6% displayed severe depression. Using the CES-D tool, 41.6% of patients had depression, and 11.2% had severe depression. A fair correlation between the CES-D and HADS tools was evidenced with a Cohen's Kappa coefficient value of 0.37 (P<0.001). The socio-demographic factors were not significantly associated with the presence of anxiety and depression (P >0.05). **Conclusion:**Collectively, these findings indicate high prevalence rates of anxiety and depression in Omani patients recently diagnosed with cancer along with a significant correlation between the two scales. These results support the implementation of screening tools early in the trajectory of cancer illness to improve the overall healthcare of these patients.

Keywords: Anxiety- depression- cancer- HADS- CES-D- Omani patients

Introduction

Anxiety and depression are common mood disorders found in one quarter of patients with cancer, leading to a poorer quality of life (Brown et al., 2010; Smith, Gomm and Dickens, 2003; Walker et al., 2013). Indeed, it has been reported that depression can increase the mortality rate by up to 39%, and even cancer patients with a few depressive symptoms may exhibit as much as 25% increased risk of mortality (Satin, Linden and Phillips, 2009; Watson et al., 1999). Several risk factors can influence the rate of depression in patients with cancer (van't Spijker, Trijsburg and Duivenvoorden 1997; Linden et al., 2012; Lloyd et al., 1984). It has been shown that depression is very common among pancreatic and lung cancer patients, but lower in skin cancer (Linden et al., 2012). Compared to children, adult cancer patients are more likely to become depressed, and female patients are two to three times more likely then males to get depressive disorders (Lloyd et al., 1984).

Although, depression varies considerably across the course of the disease, it was found to be highest around the time of diagnosis (Linden et al., 2012; Stafford et al., 2014). Therefore, a critical part of routine cancer care is the recognition of the levels of depression, and determination of the appropriate level of intervention required, ranging from counselling or support groups to medication and psychotherapy. Even in the absence of any symptoms, many cancer patients express interest in supportive counselling, and mild or subclinical levels of depression may also warrant interventions.

Currently, several validated screening tools are used to improve detection of mood disorders, such as the Hospital Anxiety and Depression Scale (HADS), the Center for Epidemiological Studies Depression Scale (CES-D), the Psychological Distress Inventory (PDI), the Edinburgh Depression Scale (EDS), and the Brief Symptom

[1]Department of Medicine, Sultan Qaboos University Hospital, College of Medicine and Health Sciences, Sultanate of Oman. [2]Department of Behavioural Medicine, Sultan Qaboos University Hospital, College of Medicine and Health Sciences, Sultanate of Oman. [3]Department of Family Medicine & Public Health Sultan Qaboos University Hospital, College of Medicine and Health Sciences, Sultanate of Oman. [4]Department of Allied Health Sciences, Sultan Qaboos University, Muscat, Oman. [5]Department of Haematology, Sultan Qaboos University Hospital, College of Medicine and Health Sciences, Sultanate of Oman. *For Correspondence: boulassel@squ.edu.om

Inventory (BSI). However, there are several caveats in the accurate diagnosis and comparison of screening tools among different populations such as, definitions of depression, cancer type and stage, time since cancer diagnosis, varying cancer treatments, personal history of depression, and concurrent treatment for depression (McDaniel and Nemeroff, 1993; McDaniel et al., 1995; Newport and Nemeroff, 1998). It is therefore important that screening instruments be validated in different cancer populations living in different geographical areas.

Precise evaluation of self-administered screening tools is crucial for developing effective counseling plans to support cancer care by providing a valuable source of additional information when making treatment decisions in patients with cancer. To fill this gap to at least a minimum extent in our primary healthcare center, this study was designed to examine the prevalence rates of anxiety and depression in patients recently diagnosed with cancer, within the first three months, using two scales, the HADS and the CES-D. In addition, it assesses whether there was a correlation between the two scales, and factors associated with anxiety and depression, in a hope to enhance the early diagnosis of these disorders, and to improve treatment outcomes in Omani patients with cancer.

Materials and Methods

Ethical considerations

This study was performed according to the Declaration of Helsinki and approved by the Institutional Research Ethic Committee of the Sultan Qaboos University (SQU), Sultanate of Oman. Further approval was obtained from the hospital management before accessing the medical records of patients.

Study design

This was a prospective study conducted at the SQU Hospital (SQUH) between 2018 and 2019. Of note, SQUH provides treatments free for all indigenous population. Consecutive adult patients over 18 years, diagnosed with cancer, and admitted to either the in-patient or the day care unit were invited to participate in the study within three months of diagnosis. Patients had to provide a consent form, and have a normal cognitive status that allow them to complete the screening tools, as determined by a routine clinical mental examination. Patients who did not speak or understand Arabic, who were sick enough not to be able to participate, e.g. sepsis, patients with cognitive difficulties or mental illness, treatment with steroids, uncontrolled brain metastases, and those who were unable to provide consent, were excluded. A standardised demographic form was used to collect data on age, gender, marital status, education level, employment status, financial status, and co-morbidities. Since this is a pilot study, an estimated sample size of eighty participants was found adequate at a power of 85%.

Study instruments

The data were obtained by using two screening tools, the HADS, and the CES-D. Each patient was interviewed face-to-face using the two scales. Validated Arabic translation of both HADS and CES-D scales was used for the interview by one of the two authors (SAH & ZAR), after having received the training from a psychologist (ZMS). The reliability values of the Arabic validated versions of HADS and CES-D tools were 0.78 and 0.88, respectively.

HADS is a 14-question scale, which has seven items for depression and seven questions for anxiety and their scores are calculated separately. Out of the 7 items assessing depression, 5 are in positive direction (e.g., 'I feel cheerful'), whereas, 2 are in negative direction (e.g., 'I feel as if I am slowed down). Items which may be common with somatic symptoms of illness, such as fatigue and insomnia are not included. A total score of 0-7 indicates no depression or anxiety, a score of 8-10 indicates mild depression or anxiety, a score of 11-14 indicates moderate depression or anxiety and a score of 15-21 indicates severe depression or anxiety (BjellandI, Dahl, Haug and Neckelmann, 2002). CES-D scale has 20 questions for assessment of depression only, and the total score is calculated by getting the sum of each question score obtained according to the patient's answer. Few items related to somatic symptoms, such as restless sleep are also included. A score of 16 or more indicates depression. If the patient does not answer more than 4 out of the 20 questions, CES-D is not valid. In this scale the points are distributed in the following manner: for question numbers 4, 8, 12, 16; for those who select rarely (less than 1 day) - three points; some (1-2 days) - two points; occasionally (3-4 days) - one point; and most (5-7 days) - no point. For the rest of questions: rarely (less than 1 day) - zero point; some (1-2 days) - one point; occasionally (3-4 days) - two points; and most (5-7 days) - three points (Radloff, 1977; Hann, Winter and Jacobsen, 1999).

Statistical analysis

The data were analysed using SPSS version 23 software. Continuous variables were displayed as mean ± standard deviation (SD), and categorical variables as percentages. Cohen's kappa test was used to evaluate the level of agreement between the two depression scales. Chi-square test was applied to test the significance of association between demographic/clinical characteristics and categorized depression/anxiety variables. Non-parametric correlation was obtained to assess the relationship between depression and anxiety, and a p value of 0.05 or less was considered statistically significant.

Results

Patient sociodemographic characteristics

Over the study period, 89 recently diagnosed cancer patients met the inclusion criteria, and they were interviewed within the first weeks of the diagnosis. The baseline characteristics of the participants at study enrolment are presented in Table 1. Overall, the majority of patients were Omani in origin (97.7%, n=87), and females, with a median age of 41 years and a range from 18-60 years. Nearly one-third had completed some form of postsecondary education. Almost half of the study patients

were employed and only 10% live on rent. Of interest, one-quarter had co-morbidities including diabetes, hypertension and heart disease.

Cancer types and treatments

As depicted in Table 1, the most common cancer was breast, followed by colon and lymphomas, while other types of cancer were relatively rare such as leukaemias, liver and thyroid. At the time of interview, 30 patients (33.7%) started chemotherapy only, and 26 patients (29.2%) had undergone surgery and received chemotherapy. Of note, 11 patients (12.3%) had received

Table 1. Baseline Sociodemographic Characteristics of Study Population

Characteristics	Study population (n=89)
Age (Years)	41±10 (18-60)
Gender (n, %)	
Females	58 (65.2)
Marital status (n, %)	
Unmarried	13 (14.6)
Married	76 (85.4)
Educational level (n, %)	
Uneducated	12 (13.5)
School educated	51 (57.3)
College and above educated	26 (29.2)
Employment status (n, %)	
Unemployed	47 (52.8)
Employed/retired	42 (47.2)
Financial status (n, %)	
Rented house	9 (10.1)
Owed house	80 (89.9)
Co-morbidities (n, %)	
Yes	20 (22.5)
No	69 (77.5)
Cancer types (n, %)	
Breast	34 (38.2)
Colon	17 (19.1)
Lymphoma	7 (7.9)
Sarcoma	5 (5.7)
Lung	3 (3.4)
Leukemia	3 (3.4)
Ovary	3 (3.4)
Kidney	3 (3.4)
Liver	3 (3.4)
Head and neck	2 (2.2)
Stomach	2 (2.2)
Pancreas	2 (2.2)
Brain	2 (2.2)
Thyroid	1 (1.1)
Testis	1 (1.1)
Oesophagus	1 (1.1)

Data are presented as mean ± standard deviation (SD) and range.

more than two treatment modalities, nine patients (10.1%) had undergone surgery only, and three patients (3.3%) had received chemotherapy and radiotherapy. Interestingly, ten 10 patients (11.2%) were interviewed when the treatment had not been commenced yet.

Prevalence rates of anxiety and depression

As assessed with HADS instrument, the anxiety prevalence rate was 41.6% among the study participants. Of note, 19 (21.3%) patients exhibited borderline anxiety. Using HADS tool, the prevalence rate of depression was 28.1%, while it was 41.6% using CES-D instrument (Figure 1). The prevalence rates of severe depression were found to be 5.6% and 11.2% using HADS, and CES-D tools, respectively.

Factors associated with depression and anxiety

The prevalence rates of depression and anxiety were studied according to socio-demographic characteristics of the study population to further explore the potential risk factors associated with depression and anxiety. Compared to the older age groups, the prevalence rates of anxiety were higher in the younger age groups (54%, 43% and 30%), but did not reach statistical significance (Table 2). Similarly, in both scales the prevalence rates of depression were higher in the younger age groups compared to the older age groups, but did not reach statistical significance (Table 2). Likewise, other factors including gender, marital status, education, occupation, financial status and comorbidities, had no associations with anxiety and depression rates. Of note, anxiety was more common amongst patients with breast cancer (27%), while depression was more prevalent amongst patients with colon cancer (28%). A significant, but weak inverse relationship was observed between age of the patients and the CES-D depression score (r = -0.21, p = 0.048). In addition, there was a significant association between symptoms of anxiety and depression (P<0.0005).

To assess the comparability between the two scales to detect the presence of depression, the level of agreement between the HADS, and CES-D instruments was studied. The observed proportion of agreement was 67.3% with a Cohen's Kappa coefficient value of 0.37 (P<0.001), indicating a fair agreement between the two scales (Figure 2).

Discussion

Screening for mode disorders is becoming an important aspect of healthcare for further improving clinical outcomes and management of patients with cancer. However, many questions are only partially answered, especially those related to factors associated with anxiety and depression in recently diagnosed patients with cancer, which may vary considerably across countries. To the best of the researchers' knowledge, this study was the first to address this issue in Omani cancer patients.

Using the HADS instrument, the current study revealed a high prevalence rate of anxiety disorder amongst the recently diagnosed Omani patients with different types of cancer. These results are consistent with previous studies

Table 2. Socio-Demographic Characteristics and Their associations with Depression and Anxiety, Using the HADS and the CES-D Scales in the Study Population.

Sociodemographic characteristics	Depression (CES-D scale)			Depression (HADS scale)			Anxiety (HADS scale)		
	Not depressed	Depressed	P-value	Not depressed	Depressed	P-value	No anxiety	Anxiety	P-value
	52 (58.4%)	37 (41.6%)		64 (71.9%)	25 (28.1%)		52 (58.4%)	37 (41.6%)	
Age (years)									
18 – 30 (n=13)	05 (38.5%)	08 (61.5%)	0.198	08 (61.5%)	05 (38.5%)	0.659	06 (46.2%)	07 (53.8%)	0.378
31 – 50 (n=56)	33 (58.9%)	23 (41.1%)		41 (73.2%)	15 (26.8%)		32 (57.1%)	24 (42.9%)	
>50 (n=20)	14 (70.0%)	06 (30.0%)		15 (75.0%)	05 (25.0%)		14 (70.0%)	06 (30.0%)	
Gender									
Males (n=31)	16 (51.6%)	15 (48.4%)	0.467	20 (64.5%)	11 (35.5%)	0.375	18 (58.1%)	13 (41.9%)	1
Females (n=58)	36 (62.1%)	22 (37.9%)		44 (75.9%)	14 (24.1%)		34 (58.6%)	24 (41.4%)	
Marital status									
Unmarried (n=13)	05 (38.5%)	08 (61.5%)	0.202	09 (69.2%)	04 (30.8%)	1	07 (53.8%)	06 (46.2%)	0.954
Ever-married (n=76)	47 (61.8%)	29 (38.2%)		55 (72.4%)	21 (27.8%)		45 (59.2%)	31 (40.8%)	
Education									
Uneducated (n=12)	06 (50.0%)	08 (50.0%)	0.379	10 (83.3%)	02 (16.7%)	0.142	07 (58.3%)	05 (41.7%)	0.677
School educated (n=51)	33 (64.7%)	23 (35.3%)		39 (76.5%)	12 (23.5%)		28 (54.9%)	23 (45.1%)	
College & above (n=26)	13 (50.0%)	06 (50.0%)		15 (57.7%)	11 (42.3%)		17 (65.4%)	09 (34.6%)	
Employment status									
Un-employed (n=47)	30 (63.8%)	17 (36.2%)	0.38	37 (78.7%)	10 (21.3%)	0.202	26 (55.3%)	21 (44.7%)	0.679
Employed/Retired (n=42)	22 (54.2%)	20 (45.8%)		27 (64.3%)	15 (35.7%)		26 (61.9%)	16 (38.18%)	
Financial status									
Rented house (n=9)	05 (55.6%)	04 (44.4%)	1	09 (100.0%)	00 (00 %)	0.057	07 (77.8%)	02 (22.2%)	0.295
Owned house (n=80)	47 (58.8%)	33 (41.2%)		55 (68.8%)	25 (31.2%)		45 (56.3%)	35 (42.7%)	
Co-morbid disease									
No (n=69)	43 (62.3%)	26 (37.7%)	0.26	49 (71.0%)	20 (29.0%)	0.947	38 (55.1%)	31 (44.9%)	0.35
Yes (n=20)	09 (45.0%)	11 (55.0%)		15 (75.0%)	05 (25.0%)		14 (70.0%)	06 (30.0%)	

showing higher prevalence of anxiety in the immediate post-diagnosis period of cancer, despite using different diagnostic tools (Linden et al., 2012; Stafford et al., 2014; Nikbakhsh, Moudi, Abbasian and Khafri 2014). In an early study, Linden et al., reported that 19% of patients with different types of cancer showed clinical levels of anxiety and another 22.6% had subclinical symptoms (Linden et al., 2012). Similarly, in a study conducted by Nikbakhsh et al., 29.3% of patients with cancer exhibited mild anxiety, and 16.7% had symptomatic anxiety

(Nikbakhsh, Moudi, Abbasian and Khafri 2014). Another study from Levant reported prevalence of anxiety to be 41.3% among patients with different types of cancer (Akel et al., 2017). Collectively, the conclusions drawn from the aforementioned studies and ours indicate that anxiety is affecting more than one third of patients with cancer. This raised the need for implementing an early systematic screening tool for anxiety for all patients recently diagnosed with cancer, in order to help them to cope, and prevent the decline of their mental health status,
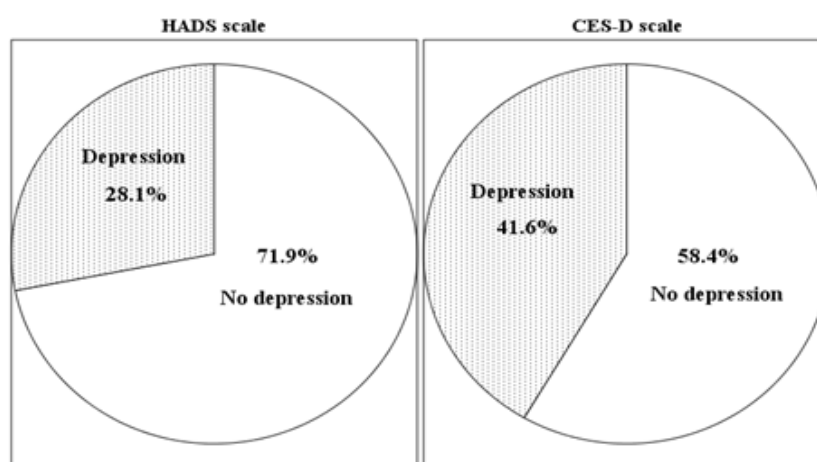

Figure 1. Prevalence Rates of Depression According to the HADS and the CES-D Scales. Abbreviation: HADS, Hospital Anxiety and Depression Scale; CES-D, Center for Epidemiological Studies Depression Scale.
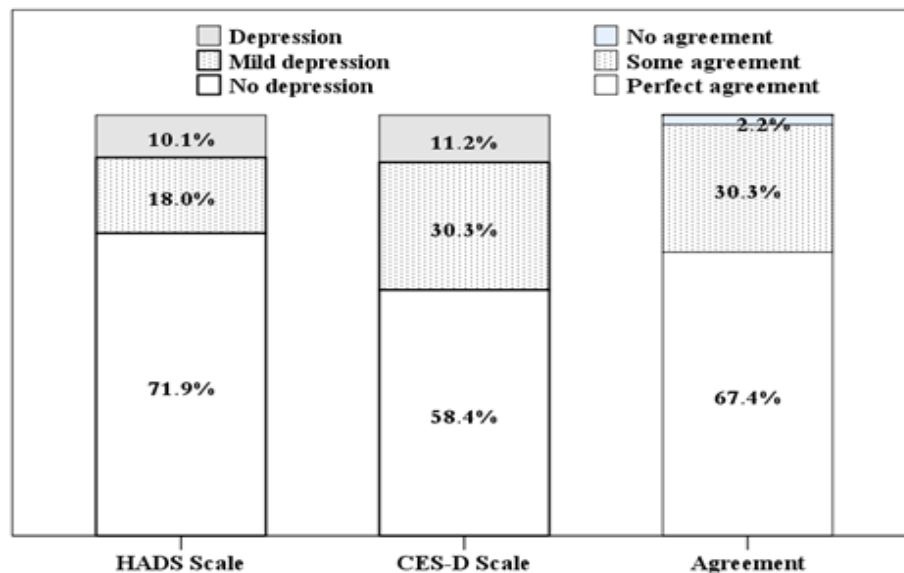
Figure 2. Levels of Agreement between the HADS and the CES-D Scales. Abbreviation: HADS, Hospital Anxiety and Depression Scale; CES-D, Center for Epidemiological Studies Depression Scale.

thereby maximizing the treatment outcomes.

The findings of the present study also extend to previous investigation on depression in cancer patients screened at different time points in the trajectory of the disease. They confirm our and other reports showing a significant association between anxiety and depression, where more than half of patients exhibited both mental health problems (Boehm, Cramer, Staroszynski and Ostermann, 2014; Pasquini and Biondi, 2007; Smith, 2015). The reported prevalence of depression in cancer patients varies greatly across the studies in the Middle-East region, ranging from 16.1% to 57.1% (Nikbakhsh, Moudi, Abbasian and Khafri 2014; Akel et al., 2017; El-Hadidy et al. 2012; Abuelgasim et al., 2016; Bener , Alsulaiman, Doodson and El Ayoubi HR, 2016; Wondimagegnehu, Abebe, Abraha and Teferra, 2019; Farooqui et al., 2019; Khalil et al., 2016; Malak, Tawalbeh and Al-Amer RM, 2021; Shaheen et al., 2015). This variation can be linked to a number of reasons such as different settings, study population, cancer types, cancer stage and the screening tools. Overall, these findings and ours reinforce a hypothesis in which a regional difference may account for variability in the prevalence of depression among cancer patients in the Middle-East region. It is therefore better to compare the prevalence rate of depression drawn from the present study to that deduced from regional studies using the same screening tool and cancer stage. So far, there is only one study on the prevalence of depression in the Middle-East region in recently diagnosed patients with cancer. Using HADS instrument, Nikbaksh et al., reported a prevalence rate of depression in recently diagnosed cancer patients to be 48% (Nikbakhsh, Moudi, Abbasian and Khafri 2014). These findings are at variance with our results and could be attributed to a number of reasons. In fact, their study differs significantly from ours in terms of demographic characteristics and sample size of study population. The patients in their study were interviewed close to the time of diagnosis, but were significantly older than our patients and the majority of patients were scheduled for surgery. Altogether, these differences highlight that meaningful change in prevalence rates of depression in recently diagnosed patients with cancer may vary according to the study population and context. As a result, the prevalence rate should be obtained from the specific local populations that share the same cultural, and ethnic characteristics, as well as socioeconomic status.

Previous studies have shown lack of significant associations between depression and anxiety and various demographic factors such as age, gender, marital status, education, income, occupation, mode of treatment, type of cancer and co-morbidities (Khalil et al., 2016; Jadoon, Munir, Shahzad and Choudhry, 2010). Our findings reinforce these conclusions, and further indicate that both HADS and CES-D screening tools provide comparable results in terms of associations between different demographic factors and the presence of depression. In addition, our results indicate a significant agreement between the two scales, HADS and CES-D, supporting previous observations showing an excellent inter-correlation between the two instruments for identifying any depressive disorder among patients recently diagnosed with different types of cancer (Stafford et al., 2014). This observation has clinical implications, suggesting that all cancer patients should be screened for anxiety and depression using either HADS or CES-D screening tool. In line with this observation is the recommendations of the American society of Clinical Oncology stating that all patients with cancer should be evaluated for symptoms of anxiety and depression at different times across the trajectory of illness, including at the time of diagnosis (Andersen et al., 2014).

Although a major strength of the current study is that it offers a clear landscape of the prevalence rates of anxiety and depression among Omani patients recently diagnosed with cancer using two different screening tools, there were some limitations. In addition to its cross-sectional study

Ikram A Burney et al

design, patients recently diagnosed with cancer were recruited in one single institution. This may generate a bias toward enrolling patients who were only committed to this clinical setting or to one geographic area. However, this may be unlikely because cancer patients attending SQUH are coming from all over the country, with a disease burden equitably similar across all regions, and thus the sample used in this study is at least representative of different types of cancer in Oman. Another limitation is the sample size, which was relatively small, but it reflects the routine care in our clinical settings. This may have affected the statistical power to discriminate the effects of tested associations between the analysed groups. However, the low level of statistical dispersion of the results suggests that increasing the number of patients would not have had a major effect on the significance of the obtained results. Moreover, the present study included only limited demographic factors in the analysis. Therefore, the results of the study could not be generalized to other Middle-Eastern regions, and further studies are needed to reduce these limitations, and better understand the effects of other factors. Finally, although prevalence was studied, but intervention or results of intervention were not suggested. Although, the study was not designed to measure the effects of intervention, patients diagnosed to have depression were routinely referred for counselling and treatment. Several interventions other than referral to a psychiatrist have been reported, including mindfulness and self-counselling. It has been increasingly recognized that mindfulness-based techniques may be effective in increasing psychological well-being (Hofmann et al, 2010). A meta-analysis of 14 randomized trials including cancer patients at different stages of disease trajectory was recently reported (Yadav and Kumar, 2021). The conclusions of this study suggest a medium size effect in reducing both anxiety and depression in cancer patients and survivors.

In conclusion, the findings presented here are the first to demonstrate that Omani patients recently diagnosed with different types of cancer exhibited high prevalence rates of anxiety and depression using two different screening tools. Additionally, the known socio-demographic factors were not significantly associated with the presence of anxiety and depression, despite a fair correlation between the CES-D and HADS instruments. Overall, the findings of this study clearly support implementation of an early screening tool for anxiety and depression as part of standard cancer care in all patients recently diagnosed, so that appropriate measures could be early initiated to improve the overall care and the quality of life of these cancer patients.

Author Contribution Statement

IAB, ZMAS and MRB conceived and planned the study. IAB identified the patients, and ZAR and SAH collected the data. IAB, SGR and MRB contributed to statistical analysis. IAB, ZMAS, ZAR, SAH, SGR and MRB contributed to the interpretation of the results. IAB and MRB took the lead in writing the manuscript. All authors provided critical feedback and helped shape the

research, analysis and manuscript.

References

Abuelgasim KA, Ahmed GY, Alqahtani JA, et al (2016). Depression and anxiety in patients with hematological malignancies, prevalence, and associated factors. *Saudi Med J*, **37**, 877-81.

Akel R, El Darsa H, Anouti B, et al (2017). Anxiety, Depression and Quality of Life in Breast Cancer Patients in the Levant. *Asian Pac J Cancer Prev*, **1**, 2809-16.

Andersen BL, DeRubeis RJ, Berman BS, et al (2014). Screening, assessment, and care of anxiety and depressive symptoms in adults with cancer: an American Society of Clinical Oncology guideline adaptation. *J Clin Oncol*, **32**, 1605-19.

Bener A, Alsulaiman R, Doodson LG, El Ayoubi HR (2016). Comparison of Reliability and Validity of the Breast Cancer depression anxiety stress scales (DASS-21) with the Beck Depression Inventory-(BDI-II) and Hospital Anxiety and Depression Scale (HADS). *Int J Behav Res Psychol*, **4**, 196-202.

Bjelland I, Dahl AA, Haug TT, Neckelmann D (2002). The validity of the Hospital Anxiety and Depression Scale. An updated literature review. *J Psychosom Res*, **52**, 69-77.

Boehm K, Cramer H, Staroszynski T, Ostermann T (2014). Arts therapies for anxiety, depression, and quality of life in breast cancer patients: a systematic review and meta-analysis. *Evid Based Complement Alternat Med*, **2014**,103297.

Brown LF, Kroenke K, Theobald DE, et al (2010). The association of depression and anxiety with health-related quality of life in cancer patients with depression and/or pain. *Psychooncology*, **19**, 734-41.

El-Hadidy MA, Elnahas W, Hegazy MA, et al (2012). Psychiatric morbidity among Egyptian breast cancer patients, their partners, and its impact on surgical decision-making. *Breast Cancer*, **4**, 25-32.

Farooqui AA, Waqas M, Iftikhar A, Tariq MJ, Anwer F (2019). Prevalence of major depression among cancer patients: Single center tertiary care hospital experience from Lahore,

Pakistan. *Blood*, **134**, 5784.

Hann D, Winter K, Jacobsen P (1999). Measurement of depressive symptoms in cancer patients: evaluation of the Center for Epidemiological Studies Depression Scale (CES-D). *J Psychosom Res*, **46**, 437-43.

Hofmann SG, Sawyer AT, Witt AA, Oh D (2010). The Effect of Mindfulness-Based Therapy on Anxiety and Depression: A Meta-Analytic Review. *J Consulting Clin Psychol*, **78**, 169-83.

Jadoon NA, Munir W, Shahzad MA, Choudhry ZS (2010). Assessment of depression and anxiety in adult cancer outpatients: a cross-sectional study. *BMC Cancer*, **10**, 594.

Khalil A, Faheem M, Fahim A, et al (2016). Prevalence of Depression and Anxiety amongst Cancer Patients in a Hospital Setting: A Cross-Sectional Study. *Psychiatry J*, **2016**, 3964806.

Linden W, Vodermaier A, Mackenzie R, Greig D (2012). Anxiety and depression after cancer diagnosis: prevalence rates by cancer type, gender, and age. *J Affect Disord*, **141**, 343-51.

Lloyd GG, Parker AC, Ludlam CA, McGuire RJ (1984). Emotional impact of diagnosis andnearly treatment of lymphomas. *J Psychosom Res*, **28**, 157-62.

Malak MZ, Tawalbeh LI, Al-Amer RM (2021). Depressive symptoms among older Jordanian patients with cancer undergoing treatment. *Clinical Gerontologist*, **44**, 133-42.

McDaniel JS, Musselman DL, Porter MR, et al (1995). Depression in patients with cancer. Diagnosis, biology, and treatment. *Arch Gen Psychiatry*, **52**, 89-99.

McDaniel SJ, Nemeroff CB (1993). Depression in the cancer patient: diagnostic, biological, and treatment aspects. In: Chapman CR, Foley KM, editors. Current and emerging issues in cancer pain: research and practice. New York (NY): Raven Press, p 1–19.

Newport DJ, Nemeroff CB (1998). Assessment and treatment of depression in the cancerpatient. *J Psychosom Res*, **45**, 215-37.

Nikbakhsh N, Moudi S, Abbasian S, Khafri S (2014). Prevalence of depression and anxiety among cancer patients. *Caspian J Intern Med*, **5**, 167-70.

Pasquini M, Biondi M (2007). Depression in cancer patients: a critical review. *Clin Pract Epidemiol Ment Health*, **3**, 2.

Radloff LS (1977). The CES-D scale: A self-report depression scale for research in the general population. *Appl Psychological Measurement*, **1**, 385-401.

Satin JR, Linden W, Phillips MJ (2009). Depression as a predictor of disease progression and mortality in cancer patients: a meta-analysis. *Cancer*, **115**, 5349-61.

Shaheen Al Ahwal M, Al Zaben F, et al (2015). Depression in patients with colorectal cancer in Saudi Arabia. *Psychooncology*, **24**, 1043-50.

Smith EM, Gomm SA, Dickens CM (2003). Assessing the independent contribution to quality of life from anxiety and depression in patients with advanced cancer. *Palliat Med*, **17**, 509-13.

Smith HR (2015). Depression in cancer patients: Pathogenesis, implications and treatment (Review). *Oncol Lett*, **9**, 1509-14.

Stafford L, Judd F, Gibson P, et al (2014). Comparison of the hospital anxiety and depression scale and the center for epidemiological studies depression scale for detecting depression in women with breast or gynecologic cancer. *Gen Hosp Psychiatry*, **36**, 74-80.

van't Spijker A, Trijsburg RW, Duivenvoorden HJ (1997). Psychological sequelae of cancer diagnosis: a meta-analytical review of 58 studies after 1980. *Psychosom Med*, **59**, 280-93.

Walker J, Holm Hansen C, Martin P, et al (2013). Prevalence of depression in adults with cancer: a systematic review. *Ann*

Oncol, **24**, 895-900.

Watson M, Haviland JS, Greer S, et al (1999). Influence of psychological response on survival in breast cancer: a population-based cohort study. *Lancet*, **354**, 1331-6.

Wondimagegnehu A, Abebe W, Abraha A, Teferra S (2019). Depression and social support among breast cancer patients in Addis Ababa, Ethiopia. *BMC Cancer*, **19**, 836.

Yadav K, Kumar Jena SP (2021). Mindfulness Based Therapy in Cancer Patients: Meta-Analysis. *Asian Pac J Cancer Care*, **6**, 329-38.