Original Article

A survey of cancer patients undergoing a radical course of radiotherapy, to establish levels of anxiety and depression

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Abstract

This research aims to establish the prevalence and aetiology of anxiety and depression in cancer patients within their first 2 weeks of a radical course of radiotherapy. Depression followed by anxiety is the two most frequent psychological disorders experienced by cancer patients. However, these two disorders are frequently undiagnosed and untreated in patients undergoing a course of radiotherapy possibly because the treatment side effects often simulate those of anxiety and depression; the consequences of this can be reduced patient prognosis and increased health care costs. A questionnaire was administered to a sample of 100 eligible cancer patients and this yielded a 68% response rate. The Hospital Anxiety and Depression (HAD) scale was integrated into the questionnaire to accurately establish levels of anxiety and depression in the respondents of the study. The study identified six respondents with clinically significant levels of anxiety (9%) and six with depression (9%); 21% ($n = 14$) of participants had higher than normal levels of anxiety and 21% for depression ($n = 14$). Correlations were then identified between levels of psychological distress and the four independent variables; age, diagnosis, adjuvant medication and pain. Four predisposing factors were established–breast cancer diagnosis, age range 40—50 years, the presence of pain and adjuvant chemotherapy regimes.

Keywords

INTRODUCTION

Cancer is a powerful word which can inflict a whole range of emotions upon someone diagnosed with it. Unfortunately, recent statistics suggest that as many as one in three people will be diagnosed with cancer in his/her lifetime[1], with the incidence thought to be increasing. Approximately 50% of these people will undergo radiation treatment for the disease.[2]

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A diagnosis of cancer brings with it incredible loss of personal identity and bodily integrity.[3] There is also the fear and anxiety that comes with the unknown. Furthermore, cancer is greatly associated with mortality,[4] the incidence of which is said to be one in four of those affected.[1] Unfortunately, this emotional turmoil is common and an expected reaction to cancer diagnosis. The two most reported emotions associated with a cancer diagnosis are depression, followed by anxiety.[5] Thus, the diagnosis and management of these two psychiatric disorders needs to be addressed.

BACKGROUND

Anxiety and depression

According to the Online Medical Dictionary,[6] anxiety is defined as:

> The unpleasant emotional state consisting of psychophysiology responses to anticipation of unreal or imagined danger, ostensibly resulting from intrapsychic conflict. Psychological concomitants include feelings of impending danger, powerlessness, apprehension and tension.

To distinguish between these two terms, depression can be described as:

> A mental state of depressed mood characterised by feelings of sadness, despair and discouragement. There are often feelings of low self esteem, guilt and self reproach, withdrawal from interpersonal contact and somatic problems such as eating and sleep disturbances.

Absolute definitions of mental illness cannot be made as they are subject to interpretation[7] relative to individual cultural contexts. Nevertheless, these two definitions manage to encompass the main aspects of the two psychological disorders.

The exact incidence of anxiety and depression in cancer populations is inconsistent and reportedly ranges from 0 to 49% in literature.[8,9] Furthermore, it has been proposed that as much as 80% of psychiatric disorders go undetected and subsequently remain untreated.[10] This figure highlights the importance and need for the development and utilisation of psychosocial screening programmes in radiotherapy, an area historically neglected by researchers.

The implications of anxiety and depression remaining undiagnosed

Depression is potentially a co-morbid, disabling syndrome,[11] which can impede a cancer patient's prognosis and functional status and may lead to poor adherence to treatment recommendations.[12] Studies have demonstrated a reduced prognosis in women with breast cancer, supporting the need for further identification and study.[12] Furthermore, depression is an expensive psychopathology and when combined with medical illness, health care costs are elevated as a result of longer hospital stays which incur monetary expense.[13]

METHODOLOGY

Research design

This study can be described as a non-randomised, cross-sectional survey of 100 eligible cancer patients—within their first 2 weeks of a radical course of radiotherapy—over the age of 18 years and with an outpatient status. A questionnaire was used to identify how the independent variables (age, diagnosis, levels of pain and adjuvant medication) correlated with the dependant variables (anxiety and depression) in an attempt to support or refute current literature. A convenience sample was used to expedite collection of data. Although this sampling method is non-probability, suggesting less representative data and even possible bias, it was deemed to be the most feasible and practical method with regard to time constraints.

Questionnaire

Section A: patient demographics
Section 'A' of the questionnaire aimed to gather personal, demographic data from each respondent. It contained a mixture of both open- and closed-type questions, a format frequently used by researchers to obtain both quantitative and qualitative data which is suggested to increase the validity of a study.[14] Three of the independent variables—age, adjuvant medication and diagnosis, were chosen to establish continuity as current findings prove to be inconsistent in these areas of research. The fourth independent variable, pain had been studied explicitly and a strong positive correlation between this and psychological dysfunction was well documented.[15] Therefore, a correlation was expected between pain and psychological status to be able to maintain some level of validity and reliability within this study. It is acknowledged by the researcher that the response to this question is subjective and relies heavily on personal interpretation of pain. Consequently, only four set answers were

available to be able to provide some structure to the response and caution was applied when interpreting the research findings.

Section B: the hospital anxiety and depression (HAD) scale
Section 'B' of the questionnaire contained the well-established HAD scale, which consists of a series of 14 multiple choice questions, where the patient is asked to circle one of the four set answers that best describes how they are feeling. There is a maximum score of 21 for each psychological state. The scale is composed of two sub-sections: one which measures anxiety, and the other depression. A score of >11 on either sub-section indicates significant levels of anxiety and/or depression, which is when psychological intervention may be necessary. This cut-off point has been traditionally used in literature to achieve a sensitivity of $70-95\%$ for identifying a case of anxiety disorder or depression.[16] This screening tool is quick and easy to complete in this format and is self-explanatory which was thought to raise the appeal of the questionnaire and hence increase response rate. The scale also generates numerical data to facilitate data analysis.

However, the results of the pilot study revealed that one participant felt the options in the HAD scale were inconsistent and assumed some level of anxiety and depression, which may not be present. This was seen as a fault of the scale, and manipulation of it could jeopardise the validity of the psychometric screening tool, so this point unfortunately could not be addressed but was certainly accounted for during data analysis.

Patient anonymity
The researcher made a list of the first 100 patients who adhered to the eligibility criteria. Their names where then securely stored in a log book and each questionnaire coded to preserve patient anonymity. All one hundred potential participants were approached by the researcher and encouraged to take the information home to read to fully understand the implications of the study. All completed questionnaires and consent forms were returned to a collection box placed in the waiting room of

each radiotherapy treatment machine within 5 days. During data analysis, if the researcher identified any score above 11 on either sub-section of the HAD scale, the code on the questionnaire was used to reveal the patient's identity and clinical oncologist (both stored in the log book). The researcher personally disclosed the patient's name and score to the consultant clinical oncologist and relevant members of the team. Thus, the patient's data was no longer anonymous. All patients had agreed to this disclosure when signing the consent form and it was verbally reiterated when the potential participants were introduced to the researcher.

Ethical considerations
Approval from the Local Research and Ethics Committee (LREC) as well as the Hospital Research and Development Committee (R&D) has to be sought before conducting any study on patients in the hospital setting. Written permission was also required from the head of department, and the consultant clinical oncologists also had to sign to consent to their patient's participation in the research as they are responsible for their safety and welfare.

RESULTS

The Statistical Package for Social Sciences (SPSS) was utilised to analyse the data. The study identified six respondents with clinically significant levels of anxiety (9%) and six with depression (9%) (Table 1). However, it is important to acknowledge all patients with raised levels of anxiety and depression, even those whose symptoms are not clinically significant.[17] Subsequently, the incidence of anxiety considered to exceed normal levels has been identified as 21% ($n = 14$) for anxiety and 21% for depression ($n = 14$). The large majority

Table 1. *Summary of the incidence of anxiety and depression*

	Normal (0–7)	Mild-moderate (8–10)	Clinically significant (11+)
Anxiety	79% (n = 54)	12% (n = 8)	9% (n = 6)
Depression	79% (n = 54)	12% (n = 8)	9% (n = 6)

of respondents (79%, $n = 54$) expressed levels of anxiety and depression that were considered normal.

Figure 1 displays a linear correlation between anxiety and the independent variable: pain and a less linear but still positive correlation between pain and depression. Differences between the two can be observed; anxiety levels display a steady exponential increase and are greater than depression in the participants of this study. Depression only follows this linear trend until the pain becomes mild, without the need for painkillers, it then proceeds to increase at a slower rate.
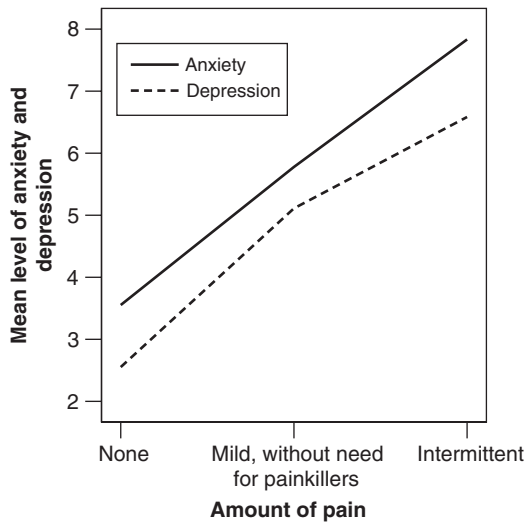
One tailed Spearman's Rank Correlation Coefficient tests were performed to establish the statistical significance of the correlation between pain and anxiety and depression. The results suggest that the relationship between pain and anxiety is statistically significant ($\rho = 0.406$, $p = 0.000$). For the results to be statistically significant to a 99% confidence interval, the p value should be <0.01 and the minimum ρ value for this sample size is 0.2782 at the levels of 0.01 to be significant.[18] The correlation between depression and pain is also statistically significant ($\rho = 0.357$, $p = 0.001$) to the level of 0.01, giving a 99% confidence interval that the results were not due to chance.

The majority of respondents [$n = 38$ (56%)] are experiencing no pain, as illustrated in Figure 2. There was also the option to describe the pain as 'severe, continual/long lasting'. However, none of the respondents selected this option so it has been omitted from analysis.

Figure 3 looks at the effect that adjuvant medication has on mean levels of anxiety and depression within the sample population. The bar graph shows that, overall, anxiety and depression levels are greater in respondents taking adjuvant medication. The graph represents a rapid mean increase in levels of anxiety after the administration of chemotherapy agents. Levels of depression were less affected. From the graph, it can be assumed that anxiety levels are generally greater than depression levels. The exception is respondents undergoing chemotherapy regimes who appear to be slightly more depressed than anxious.
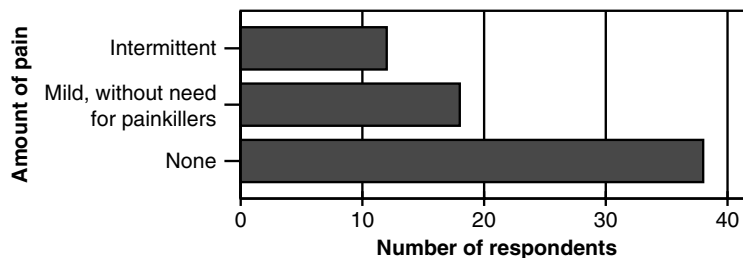

Figure 1. Positive correlation between pain and anxiety and depression.

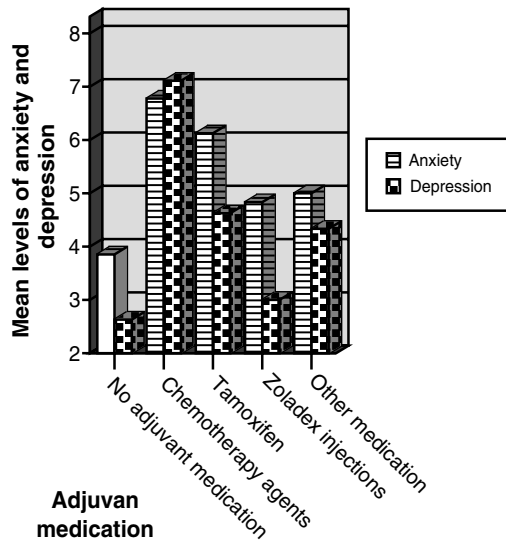Figure 2. The amount of pain experienced by the respondents.

Figure 3. The effect of adjuvant medication on psychological distress.

Table 2. *Relationship between age and mean levels of anxiety and depression*

Age Range (years)	Anxiety (mean)	Depression (mean)	*n*
18–28	Mild-Moderate	Clinically Significant	1
29–39	Normal	Normal	4
40–50	Mild-Moderate	Mild-Moderate	13
51–61	Normal	Normal	20
62–72	Normal	Normal	26
73–83	Normal	Normal	3

Most of the respondents (*n* = 27; 40%) were receiving no adjuvant medication. *n* = 18 participants (27%) did not receive any other medication. *n* = 9 (13%) respondents were undergoing various adjuvant chemotherapy regimes. *n* = 8 (12%) respondents have adjuvant tamoxifen intervention and *n* = 6 (9%) respondents were undergoing adjuvant zoladex injections.

It can be seen in Table 2 that most respondents experience normal levels of anxiety and depression, regardless of their age. The exceptions are patients in the 40–50 year age range and respondents aged 18–28. Mild to moderate levels were seen in these age ranges and

clinically significant levels of depression were identified in the 18–28 age range.

Figure 4 illustrates that the respondents with cancer of the head and neck suffer the greatest amount of anxiety and depression. Once again, respondents can be identified as suffering from more anxiety than depression; the only exception is head and neck respondents. However, Figure 5 below shows the different sample sizes for each diagnosis. As there were only four respondents with cancers of the bone and oesophagus, these two diagnoses were omitted from analysis.

DISCUSSION

The three diagnoses found to exhibit clinically significant levels of anxiety and depression, all shared two common predisposing characteristics; they all reportedly suffered the greatest amounts of pain, concurring with previous literature.[15] They also each contained patients currently undergoing adjuvant chemotherapy regimes, supporting Yarbro[19] who proposed that concurrent therapy exacerbates treatment toxicity and subsequent psychological morbidity.

Pain

Pain can be debilitating, limiting normal functioning and subsequently hindering quality of life.[15,20] Subsequently, pain has been frequently linked to depression in literature,[20–22] but interestingly, the effect of pain on levels of anxiety is not documented. On the contrary, pain was found to have a stronger correlation with anxiety than depression in this current research. This may be a consequence of the subjectivity of self-reported pain,[23] in addition to overall heightened levels of anxiety exhibited by the participants of this study. Nevertheless, the correlation between anxiety, depression and pain was found to be statistically significant in this research.

Cervical participants

The other group of respondents seen to exhibit significant levels of anxiety and depression were cervical patients. These findings of this study are consistent with reports that gynaecological
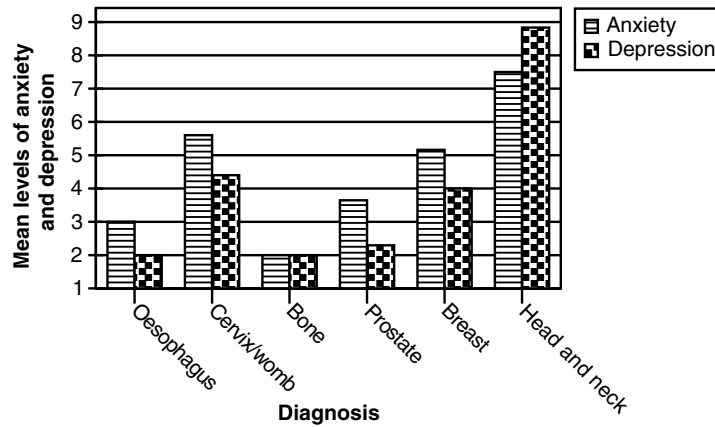
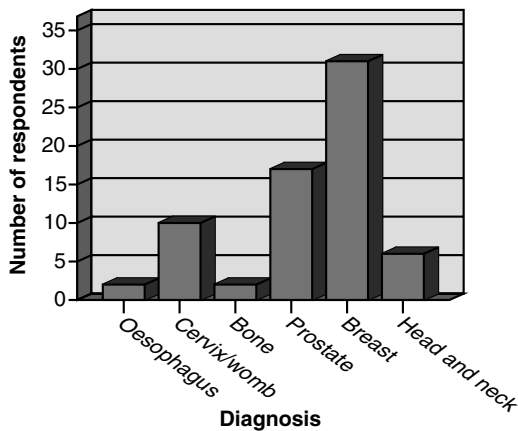*Figure 4. The effect of diagnosis on psychological distress.*

Figure 5. Bar graph showing respondents by diagnosis.

patients suffer more modest, but still significant, levels of anxiety and depression.[24] The one cervical patient who was identified as clinically anxious and depressed was in the age range of 18−28 years, concurring with Hann et al.'s[25] findings. It seems likely that younger cervical patients may suffer greater levels of psychological distress than those of an older age range as radiotherapy side effects such as infertility and inability to fulfil sexual relationships may be more relevant to them. However, the small sample size means caution must be applied when interpreting this finding as the sample could quite possibly be unrepresentative, giving an anomalous result.

Head and neck participants

In this study, head and neck patients were found to suffer the greatest mean levels of anxiety and depression than any other diagnosis. This finding supports previous research into this psychological area which links higher levels of anxiety and depression to patients with cancer of the head and neck.[26]

The physical side effects of radiotherapy in patients with cancer of the head and neck (xerostomia, dysphagia, mucositis and adverse pain)[27] can be disabling and a great hindrance to quality of life. With the addition of concurrent chemotherapy, treatment toxicity is enhanced and patients are most at risk of developing psychological illness.[27,28] However, only one head and neck patient underwent adjuvant chemotherapy intervention in this research, so this study is unlikely to display a true reflection of this effect.

Depression and anxiety were both raised in the head and neck respondents of this research; however, depression appeared more potent and prevailed. The reliability of the finding is maintained by Anderson and Franke[29] who propose that patients with cancer of the head and neck are more prone to depression than any other psychiatric disorder. It has been suggested that the majority of these patients are likely to have a history of excessive tobacco

and alcohol consumption and may feel guilty for their health risk behaviours.[30] Levels of depression were only just found to exceed anxiety for this group of patients in this research so the reliability of this finding is uncertain. Caution should be applied especially as the sample consisted of only six head and neck respondents. This limitation may also be responsible for the low incidence of clinically significant levels of anxiety and depression ($n = 1$) detected in this study. However, the one head and neck patient identified with clinically significant symptoms reported the highest levels of anxiety and depression in the whole study, scoring 19 for anxiety and 17 for depression. This may be an anomalous result as the lack of control over extraneous variables means their influence cannot be undermined. Nevertheless, this finding cannot be disregarded as there is always the possibility that it is valid.

Breast participants

Sixty-seven percent ($n = 8/12$) of respondents identified as exhibiting clinically significant levels of anxiety and depression were breast patients, supporting findings from current research.[31]

Even though tamoxifen is renowned for its numerous hormonal side effects which can induce menopausal symptoms such as depression[32] the use of tamoxifen did not appear to increase mean levels of depression in the breast cancer patients sampled, when compared to those taking other medication. This concurred with findings from a much larger nationwide study which found no distinct difference in levels of anxiety or depression between the experimental group (those administered tamoxifen) and the control group (those administered a placebo drug).[33] However, anxiety levels did appear to be heightened. Overall, only 26% ($n = 8/31$) of patients with breast cancer were taking adjuvant medication, subsequently, other predisposing factors must have been present to heighten levels of psychological distress in the breast cancer respondents. The psychological impact of surgical disfigurement cannot be underestimated in breast cancer patients.[34] The

subsequent feelings of loss of femininity, shame and embarrassment can induce depressive and anxious symptoms. However, this could not be determined by this research.

The six (19%) patients with breast cancer who were also undergoing adjuvant chemotherapy treatment were found to be more anxious and depressed than those undergoing any other adjuvant medication. Once again, the onset of psychological distress has been attributed to the side effects of chemotherapy—alopecia, fatigue, nausea and vomiting and loss of libido can undoubtedly hinder quality of life.[35]

Prostate patients

Interestingly, prostate patients were found to be least at risk of developing abnormal levels of anxiety and depression, which can be attributed to the patient characteristics of this population of cancer patients. They are all male, 76% ($n = 13$) are aged between 62 and 72 years and 82% ($n = 14$) are experiencing no pain; hence, the majority of this sample were not exposed to any previously identified predisposing characteristics of psychological distress. Older prostate patients are less likely to suffer psychological disturbances than their younger counterparts.[36] This has been attributed to the greater amounts of social support available to older patients.[37] However, the effect of social support cannot be established by this study as the researcher felt that the different aspects of this variable make it too complicated and subjective to be able to justify its inclusion.

Gender

Eighty-three percent (10/12) of the patients identified as being clinically anxious and/or depressed were females. Even though gender was not one of the independent variables which the researcher chose to study, it could not be ignored as its influence on levels of anxiety and depression appeared significant in this research. The exact cause of the gender divide is uncertain in literature although hormonal imbalances as well as women's willingness to express emotions has been suggested,[38]

making them more open to psychiatric identi-fication.

Validity and reliability

The data from this current study is obtained from cancer patients within their first 2 weeks of radiotherapy, before the onset of physical radiation side effects, a potential precursor of psychological dysfunction.[39] Thus, the cross-sectional design limits the generalisability of the results to only those patients who are within their first few weeks of radiation treatment. It may also suggest that these results only modestly reflect the suffering of patients at later stages. On the contrary it has been suggested that anxi-ety levels may be at their greatest at this early stage,[40] offering a possible explanation for why anxiety levels tend to exceed depression in the results of this cross-sectional survey.

As predicted, convenience sampling was a limiting factor in the results and a methodologi-cal flaw to the study. This limitation has been highlighted above when unrepresentative sam-ple sizes were obtained making the strength and presence of correlations difficult to establish and resulted in the data presented largely as fre-quencies in the results section of this study as this was deemed the more representative option.

The sensitivity of the HAD scale is largely determined by the cut-off point chosen by the researcher.[41] However, the cut off point of 11 used in this study has been extensively utilised by other researchers using the HAD scale and is the traditional cut-off score achieving 70—95% sensitivity and an 83% reliability.[42] Patients who scored above 8 were also noted as this increases the sensitivity of the scale to 81+%.[41] Overall, the HAD screening tool is a reliable measure of anxiety and depression among cancer patients with good internal con-sistency.[43]

CONCLUSION

The research confirmed the under-diagnosis of anxiety and depression within cancer patients in their first 2 weeks of a radical course of radio-therapy. It also identified specific patient char-acteristics which make them more at risk of developing these psychiatric disorders—breast diagnosis, adjuvant chemotherapy regimes, pain and age range 40—50 years. Pain, in parti-cular, was found to be a significant precursor to the development of such disorders. However, as with all psychological research, extraneous vari-ables can impact heavily on the findings as they prove difficult for the researcher to identify and thus control.

The study can be considered a pilot on which to base future research as it has identified many areas which require further study. Further large-scale research with similar aims and objectives would be necessary to confirm the findings of this small-scale research and their subsequent generalisability, particularly the findings sug-gesting that patients with cancer of the cervix and head and neck may also be at high risk of developing psychological dysfunction. Overall, the results highlight the efficacy of psychiatric screening and its urgent utility required. This identification can be used to facilitate future screening for these patients.

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