Depression in patients with colorectal cancer in Saudi Arabia

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Abstract

Objective: **Persons with colon cancer experience considerable psychological stress due to physical and social changes brought on by illness, increasing their risk of depressive disorder (DD). We examine the prevalence of DD and depressive symptoms and determine baseline demographic, social, psychological, and physical health correlates.**

Methods: **A convenience sample of 70 cancer patients in Jeddah, Saudi Arabia, was screened for DD using an abbreviated version of the Structured Clinical Interview for Depression (SCID) and for depressive symptoms using the Hamilton Depression Rating Scale (HDRS). Demographic, psychosocial, psychiatric, and physical health characteristics were also assessed, along with past treatments for colon cancer. Bivariate and multivariate analyses identified predictors of DD and symptoms.**

Results: **The 1-month prevalence of DD was 30.0% (12.9% major depression, 5.7% minor depression, and 11.4% for dysthymia) and significant depressive symptoms were present in 57.1% (HDRS 8 or higher), including having persistent suicidal thoughts for 2 weeks or longer wthin the past month (14.3%) . Low social support and having a co-morbid psychiatric illness (particularly anxiety) independently predicted DD based on the SCID. Saudi nationality, poor financial situation, low social support, and co-morbid psychiatric illness independently predicted depressive symptoms on the HDRS. Surprisingly, stage of cancer, duration of cancer, and treatments for cancer were unrelated to DD or depressive symptoms.**

Conclusions: **DD and significant depressive symptoms are common in patients with colon cancer in Saudi Arabia, and are predicted by a distinct set of demographic and psychosocial risk factors that may help with identification. Demographic and psychological risk factors were more likely to be associated with depression than cancer characteristics in this sample.**
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Depression is a potent risk factor for disease morbidity, as medical patients with depression have double the mortality of non-depressed patients, most of which is not from suicide [1,2]. This may be particularly true for those with cancer, where a decrease in depressive symptoms has been shown to increase survival [3]. In cancer patients, the point prevalence of major depression ranges from 0% to 38%, and for clinically significant depressions of all severity (i.e. depression spectrum) the range is 0% to 58% [4] (on average 25%). For colorectal cancer, the prevalence of depression in Western countries is reported to be between 13% and 25% [4]. Colorectal cancer is one of the most prevalent malignancies in Saudi Arabia, and the most common cancer in males [5]. The predominance of colorectal cancer (compared to other cancers) in this

country may be due to dietary factors and cultural influences affecting other health habits (e.g. less alcohol use and less cigarette smoking, for religious reasons, reducing lung cancer rates, and other cancers).

Most of what we know about depression in Saudi Arabia comes from studies of patients in primary care settings, where the prevalence ranges from 18% to 39%, depending on the measure used and whether subthreshold disorders are included [6,7]. Patients with colorectal cancer in Saudi Arabia may likewise be at high risk for depression, given the life-threatening nature of the disease, the side-effects of treatment, and the changes in life that occur after diagnosis. Overall, 13% to 40% patients with gastrointestinal cancers are thought to experience significant depressive symptoms (25% on average, based on

studies of cancer worldwide and in Saudi Arabia) [8–11]. However, there have been few studies of depression in patients with colorectal cancer in Saudi Arabia (particularly those diagnosing depression using a structured psychiatric interview based on standard DSM-IV criteria), and there is no information about the characteristics of patients that place them at high risk for depressive disorder. The present study helps to fill this gap.

Objectives

The present study aims to (a) determine the prevalence of depressive symptoms and disorders in patients with colorectal cancer in Jeddah, Saudi Arabia, and (b) examine demographic, psychosocial, and physical health correlates of depression in this sample.

Methods

Sample

Between March 1, 2013, and January 31, 2014, we recruited 70 outpatients with colorectal cancer being seen in the clinics of two facilities in Jeddah, King Abdulaziz University Hospital and Bakhish Hospital. This was a sample of convenience in that participants were enrolled into the study if they consented and interviewers were available to recruit them. Patients were included if they were between the ages of 18 and 85, had a diagnosis of colorectal cancer documented in their medical record by a physician, were are able to communicate without difficulty (no tracheostomy, aphasia, severe hearing deficit), and were physically able and willing to undergo a 45-min interview. Patients over age 85 were excluded because of concern that cognitive impairment may limit the accuracy of the data collected (much of which involved retrospective self-report).

Procedure

The interviews were administered by either a psychiatry resident (90% of cases) or a psychiatry intern, both fluent in English and Arabic. Both interviewers were extensively and repeatedly trained by psychiatry faculty on how to obtain informed consent and conduct the structured psychiatric interviews. Patients were interviewed in-person while attending the hospital outpatient clinics (70%), chemotherapy day care clinics (25%), or as inpatients (5%). The interview, conducted entirely in Arabic, involved the collection of demographic information, the administration of the structured psychiatric interview, and the administration of other study measures (depression severity, social support, past psychiatric history, and treatment information). Consent was obtained from all participants, and the research committee of the Unit of Biomedical Ethics of King Abdulaziz University's Faculty of Medicine approved the study.

Measures

Demographic information included age, gender, education level (from illiterate to completing a master's degree in college), financial situation (from very poor to being well-satisfied with finances), living situation (with spouse and children vs. other situation), and nationality (emigrant vs. Saudi). Financial situation was assessed rather than income since many people in this culture are reluctant to report annual income.

Depression

Major and minor depressive disorders were diagnosed using the Structured Clinical Interview for DSM-IV (SCID-I/NP, Version 2.0 [12]. *Major depressive disorder and dysthymia* was defined by standard DSM-IV criteria; *minor depressive disorder* was determined using DSM-IV criteria as specified in Appendix B of the manual; and *subthreshold depression* was defined as experiencing one or more of the nine depression criterion symptoms above for 2 weeks or longer during the past month, but not fulfilling criteria for either major depression, minor depression, or dysthymia.

Because of the physical frailty of some patients and their inability to withstand a protracted psychiatric interview, interviewers administered only the depressive disorders section of the SCID. Other psychiatric disorders were identified using a DSM-IV criteria checklist of disorders currently being experienced (delirium, dementia, bipolar disorder, anxiety disorder, schizophrenia, delusional disorder, other psychotic disorder, and alcohol or drug abuse). The DSM-IV checklist displayed the primary criteria for the above disorders that allowed relatively rapid screening to identify the conditions, while not placing too much of a burden on these patients due to the already long interview. In addition, interviewers rated depression severity using the clinician-rated Hamilton Depression Rating Scale (HDRS) [13].

Personal and family psychiatric history

Patients were asked if they had ever experienced a mental or nervous condition *other than depression* that required some form of treatment (yes or no). In addition, they were asked how many times in their life (excluding the current episode, if present) they had been depressed nearly every day for at least 2 weeks and had several of the nine criterion symptoms of major depression. *History of depression* was coded as yes if patients indicated at least one prior episode of depression. *Family psychiatric history* was determined by asking if any first degree relative (parents, siblings, children, and grandchildren) had ever had a mental or nervous condition, was ever seen a psychiatrist, admitted to a psychiatric hospital, took nerve medicine for 3 months or more, made a suicide attempt or committed suicide, or ever had a problem with drugs or alcohol (yes or no).

Cancer stage, duration, and treatments

Duke's colorectal cancer stage [14] was recorded from the medical record: stage A, mucosal involvement only; stage B, mucosa plus muscle involvement; stage C, involvement of lymph nodes; and stage D, distant metastasis. For analysis, stage was dichotomized between A and B vs. C and D. Length of illness since diagnosis was inquired about. Past treatments for colorectal cancer were also asked about, including surgery, chemotherapy, radiation therapy, or other treatments.

Social factors

Marital status (married vs. not married) was recorded, along with number of children (both as an indicator of possible support). An 11-item version of the Duke Social Support Index (DSSI) was also administered that assessed social network (4 items) and subjective support (7 items) (score range 7–49), which has been validated in adults with chronic medical illness [15]. The DSSI was translated into Arabic for administration (Cronbach's alpha = 0.89, standardized), although the psychometric properties of this measure in Arabic-speaking populations have not been previously reported.

Statistical analyses

The Student's t-test and chi-square statistic were used to examine bivariate associations with depressive disorder (major, minor, and dysthymia) diagnosed by the SCID. Pearson correlation was used to produce a correlation matrix of all variables. Logistic regression was used to examine multivariate correlates of depressive disorder. Given the relatively small sample size, blocks of variables were entered into four models: Model 1, demographics; Model 2, social factors; Model 3, present and past psychiatric history; and Model 4, cancer stage, duration, and treatment; significant correlates from these models were then entered into a final Model 5. Using a similar variable entry procedure, linear regression was used to examine multivariate correlates of depressive symptoms assessed using the HDRS. Level of statistical significance was set at $p < 0.05$. Given the exploratory nature of these analyses, significance levels were not adjusted for multiple comparisons. The SAS statistical package (version 9.3; SAS Institute Inc, Cary, North Carolina) was used to manage the data and perform the analyses.

Results

The majority of patients were recruited from King Abdulaziz University Hospital (75.7%), and the others were obtained from Baksh Hospital (a private facility) (Table 1). The average age of patients was 53.6 years (SD 12.2), and gender was evenly split between males

Table 1. Characteristics of sample ($n = 70$)

Demographics	% (n)	Mean (SD)
Gender (female)	51.4 (36)	
Age, years		53.6 (12.2)
Education, high school graduate or higher	50.0 (36)	
Financial situation (satisfactory)	62.9 (44)	
Nationality (emigrant)	58.6 (41	
Hospital		
King Abdulaziz University	75.7 (53)	
Bakhsh (private)	24.3 (17)	
Social factors		
Marital status (married)	77.1 (54)	
Living situation (with spouse and children)	70.0 (49)	
Number of children		4.8 (3.1)
Social support (social network)		31.4 (6.4)
Mental health		
Type of current depression		
Major depression	12.9 (9)	
Minor depression, present	5.7 (4)	
Dysthymia	11.4 (8)	
Subthreshhold depression	11.4 (8)	
Hamilton Depression Scale (range 0–52)		14.9 (13.0)
Other psychiatric disorder (concurrent)		
Anxiety disorder	14.3 (10)	
Alcohol/drug addition	1.4 (1)	
Psychiatric history		
Past psych history (excl depression)	11.4 (8)	
Past depression (1 or more episode)	27.1 (19)	
Family psychiatric history (incl depression)	18.6 (13)	
Cancer stage and treatment		
Cancer stage		
Duke's stage A (mucosa)	2.9 (2)	
Duke's stage B (mucosa + muscle)	37.1 (26)	
Duke's stage C (lymph nodes)	31.4 (22)	
Duke's stage D (distant metastasis)	28.6 (20)	
Duration of colorectal cancer, months		28.5 (30.4)
Cancer treatments (at present)		
Surgery, yes	95.7 (67)	
Chemotherapy, yes	78.6 (55)	
Radiation, yes	18.6 (13)	
Other, yes	2.9 (2)	

and females (51.4%). The majority were emigrants (58.6%), while the remainder were Saudi nationals (41.4%). Half of the sample had completed high school (50.0%). The majority indicated that their financial situation was satisfactory (62.9%). The majority of patients were married (77.1%), the average number of children was 4.8 (SD 3.1), and 70% lived with their spouse and children. Most patients had Duke's stage B, C, or D colorectal cancer, and the average time since the diagnosis was over 2 years (28.5 months). The most common cancer treatment in the past experienced by patients was surgery (95.7%), with the next most common treatment being chemotherapy (78.6%), and the least common one radiation therapy (18.6%).

Prevalence of depression

Major depressive disorder was present in 12.9% ($n = 9$), minor depression in 5.7% ($n = 4$), dysthymia in 11.4% ($n = 8$), and subthreshold depression in 11.4% ($n = 8$). More common were depressive symptoms with over half (57.1%) rated as having significant depressive symptoms on the HDRS. Mild symptoms were present in 25.7% (HDRS = 8–17), moderate symptoms in 8.6% (HDRS = 18–24), and severe symptoms were present in 22.9% (HDRS = 25–43) [16]. For the first item on the HDRS that assesses depressed mood, interviewers rated 30.0% of patients as a 3 or above on a 0–4 scale (i.e. 'non-verbal signs of depression or at times overpowered by helplessness or hopelessness' or 'despondency & helplessness dominate interview'). Likewise, 30.0% of patients had some level of suicidal thoughts or desire to die, with 14.3% meeting the threshold for a criterion symptom (i.e. the suicide item on the SCID). The average HDRS score for patients with major depression was 38.7 (SD 4.4). The most common psychiatric disorder present other than depression was anxiety disorder (14.3%).

Personal and family psychiatric history

Over one-quarter of patients (27.1%) had a history of depression similar to the current episode (if present), and approximately one out of ten patients (11.4%) had a history of psychiatric problems other than depression. A history of depression or other psychiatric disorder was also present in first degree family members of nearly 20% of patients.

Risk factors for depressive disorder

Bivariate analyses revealed that patients indicating their financial situation was very poor to somewhat poor were more likely to have depressive disorder (major, minor, or dysthymia) compared to those who indicated they had a satisfactory financial situation (50.0% vs. 18.2%, $p = .005$), as were those with another psychiatric disorder present (anxiety or substance abuse) (63.6% vs. 23.7%, $p = .008$) (Table 2). In contrast, higher social support appeared protective ($p < 0.0001$) against depressive disorder. In multivariate analyses (Table 3), financial situation lost significance when co-morbid psychiatric disorder and social support were controlled for. Those with a concurrent psychiatric disorder were over five times more likely to have a depressive disorder (OR = 5.12, 95% CI 1.02–25.71). For every one point increase on the social support scale, the likelihood of depressive disorder decreased by 20% (OR = 0.80, 95% CI 0.70–0.92).

Risk factors for depressive symptoms

Depressive symptoms on the HDRS were more prevalent than rates of depressive disorder. A correlation matrix

Table 2. Bivariate associations with depressive disorder (minor, major, or dysthymia)

	Depressed	Not depressed	*p* value
Demographic			
Gender, % (*n*)			
Male	29.4 (10)[a]	70.6 (24)	ns
Female	30.6 (11)	69.4 (25)	
Age, years (SD)	53.2 (13.5)	53.7 (11.7)	ns
Education, % (*n*)			
Low (less than high school)	31.4 (11)	68.6 (24)	ns
High (high school or more)	28.6 (10)	71.4 (25)	
Financial situation, % (*n*)			
Poor	50.0 (13)	50.0 (13)	.005
Satisfactory	18.2 (8)	81.8 (36)	
Nationality, % (*n*)			
Saudi	27.6 (8)	72.4 (21)	ns
Emigrant	31.7 (13)	68.3 (28)	
Hospital, % (*n*)			
King Abdulaziz University	32.1 (17)	67.9 (36)	ns
Bakhsh (private)	23.5 (4)	76.5 (13)	
Social factors			
Marital status, % (*n*)			
Not married	37.5 (6)	62.5 (10)	ns
Married	27.8 (15)	72.2 (39)	
Number of children (SD)	4.2 (3.2)	5.0 (3.0)	ns
Living situation, % (*n*)			
Other living situation	38.1 (8)	61.9 (13)	ns
With spouse and children	26.5 (13)	73.5 (36)	
Social support	26.0 (22.8)	33.7 (32.3)	<.0001
Mental health			
Hamilton Depression Rating Scale (SD)	27.0 (13.3)	9.7 (8.7)	<.0001
Other psychiatric disorder (concurrent)			
No	23.7 (14)	76.3 (45)	.008
Yes	63.6 (7)	36.4 (4)	
Psychiatric history			
Past depression, % (*n*)			
None	25.5 (13)	74.5 (38)	ns
1 or more episode	42.1 (8)	57.9 (11)	
Past psychiatric history, % (*n*)			
No	27.4 (17)	72.6 (45)	ns
Yes (other than depression)	50.0 (4)	50.0 (4)	
Family psychiatric history, % (*n*)			
No	26.3 (15)	73.7 (15)	ns
Yes (including depression)	46.2 (6)	53.9 (7)	
Cancer stage and treatments			
Cancer stage			
Duke's A or B	32.1 (9)	67.9 (19)	ns
Duke's C or D	28.6 (12)	71.4 (30)	
Duration of colorectal cancer, months	28.8 (15.4)	28.4 (31.1)	ns
Cancer treatments (current)			
Chemotherapy	27.3 (15)	72.7 (40)	ns
Other treatments	40.0 (6)	60.0 (9)	

[a]Row percents.
ns = not significant ($p > 0.05$).
SD = standard deviation.

Table 3. Logistic analyses predicting depressive disorder (major, minor, dysthymia)

	Model 1 B (SE)	Model 2 B (SE)	Model 3 B (SE)	Model 4 B (SE)	Model 5 B (SE)
Demographics					
Gender (female)	3.39 (2.94)				
Age	−0.01 (0.02)				
Education	−0.01 (0.19)				
Financial situation	−0.96 (0.37)**				−0.26 (0.37)
Nationality (emigrant)	−0.70 (0.68)				
Hospital (KAU)	0.33 (0.70)				
Social factors					
Marital status (married)		1.04 (1.34)			
Living situation (spouse & children)		−0.65 (1.23)			
Number of children		−0.02 (0.11)			
Social support		−0.26 (0.07)***			−0.22 (0.07)**
Present/past psychiatric hx					
Other psychiatric disorder (current)			1.56 (0.72)*		1.63 (0.82)*
Past psych history (excl depression)			0.27 (0.90)		
Past depression (1 or more episode)			0.49 (0.65)		
Family psychiatric history (incl dep)			0.77 (0.68)		
Cancer stage and treatments					
Cancer stage (C or D)				0.13 (0.60)	
Duration of colorectal cancer, months				0.00 (0.01)	
Treatment (chemotherapy)				−0.65 (0.72)	
Model likelihood ratio (df)	9.1 (6)	23.8 (4)****	8.7 (4)	0.9 (3)	28.0 (3)****

N for all models = 70.
KAU = King Abdulaziz University Hospital; B = unstandardized beta; SE = standard error of mean.
$*p < .05$, $**p < .01$, $***p < .001$, $****p < .0001$.

involving all variables including depressive symptoms was developed (see Table in supplemental materials). After identifying the strongest correlates among each group of covariates (demographic factors, social factors, past and present psychiatric history, and cancer characteristics), these were entered into a multivariate analysis (Table 4). The final model (Model 5) explained nearly half (47%) of the variance in depressive symptoms. All correlates from the preceding models retained their statistical significance. Poorer financial situation, being a Saudi national, having less social support, and having another co-morbid psychiatric disorder (anxiety, primarily) increased the risk of depressive symptoms.

Discussion

Although our sample size was modest, to our knowledge this is the largest study of depression in colorectal cancer patients in Saudi Arabia, the first to use a structured psychiatric interview (SCID) to diagnose depressive disorder, and the first to examine correlates of depressive disorder and symptoms in Saudi Arabia.

Prevalence

The prevalence of depressive disorder (major, minor, and dysthymia) identified by structured psychiatric interview (30.0%) and subthreshold depressions (11.4%) is similar to that reported in other countries. In a review and meta-analysis of 70 studies involving 10,071 patients in oncology and haematological settings across 14 countries, researchers reported that the prevalence of interview defined depressive disorders based on DSM or ICD9 criteria was 16.3% (range 13.4–19.5%) for DSM major depression, 19.2% (range 9.1–31.9%) for minor depression, and 2.7% for dysthymia (range 1.7–4.0) [11]. The combined prevalence of mood disorder of any kind (including adjustments disorders—similar to our subthreshold depressions) was estimated to be 38.2% (range 28.4–48.6%).

To our knowledge, since 2004 there has been no more recent reviews of the prevalence of depression in colorectal cancer. In that earlier review, the prevalence rate was estimated to be 13–25%, although based primarily on symptom scales not structured psychiatric interviews based on clear diagnostic criteria [4]. There have, however, been several studies published since then on the prevalence of depression in colon cancer. For example, in 2006, researchers in Italy studied mental disorders in 165 cancer patients (35% with colon CA, the most common cancer) in the oncology division of a major medical center [17]. Patients were screened using the Hospital Depression and Anxiety Scale (HADS) (a self-rated symptom scale). Of those 45 screened positive, and received

Table 4. Multiple regression analyses predicting depressive symptoms (Hamilton Depression Rating Scale)

	Model 1 B (SE)	Model 2 B (SE)	Model 3 B (SE)	Model 4 B (SE)	Model 5 B (SE)
Demographics					
Gender (female)	0.02 (2.89)				
Age	0.03 (0.13)				
Education	0.60(0.97)				
Financial situation	−7.98 (1.70)****				−4.74 (1.50)**
Nationality (emigrant)	−6.17 (3.16)				−7.18 (2.65)**
Hospital (KAU)	2.69 (3.30)				
Social factors					
Marital status (married)		1.07 (5.70)			
Living situation (spouse and children)		−2.54 (5.21)			
Number of children		−0.01 (0.44)			
Social support		−1.11 (0.22)****			−0.91 (0.21)****
Present/past psychiatric hx					
Other psychiatric disorder (current)			9.94 (4.20)*		6.86 (3.26)*
Past psych history (excl depression)			8.10 (5.18)		
Past depression (1 or more episode)			−3.43 (3.64)		
Family psychiatric history (incl dep)			2.33 (3.88)		
Cancer stage and treatments					
Cancer stage (C or D)				3.64 (3.79)	
Duration of colorectal cancer, months				0.05 (0.05)	
Treatment (chemotherapy)				−0.28 (4.42)	
Model R-square	.28**	.32****	.14*	.03	0.47****

N for all models = 70.
KAU = King Abdulaziz University Hospital; B = unstandardized beta; SE = standard error of mean.
*$p < .05$ **$p < .01$ ***$p < .001$ ****$p < .0001$.

the SCID, which identified 5 patients with major depression and 26 with minor depression, giving a prevalence of around 20%.

In a much larger study of 8265 cancer outpatients being seen at the Johns Hopkins Oncology Center in Baltimore, Maryland, from 1984 to 2000, researchers screened patients for depressive symptoms using the Brief Symptom Inventory, which contained six questions on depression and six questions on anxiety (self-rated), reporting the percentage who scored above the cutoff for significant depressive symptoms on the depression and anxiety subscales [18]. Among those patients were 737 with colon cancer. The prevalence of depressive and anxiety symptoms in colon cancer patients compared to the entire sample of cancer patients was 8.6% for depression (vs. 6.0% for entire sample), 9.5% for anxiety (vs. 11.6%), and 11.0% for mixed depression-anxiety (vs. 12.4%). Thus, the prevalence of depression and mixed depression-anxiety was 19.6% in colon cancer patients vs. 18.4% for all cancer patients (i.e. not much difference).

Finally, in one of the few studies from the Middle East, researchers surveyed 142 patients with gastrointestinal cancer (54 with colorectal cancer) in Tehran, Iran [19]. The HADS was used to assess depressive symptoms, as in the Italian study above. A cutoff of 11 on the HADS was considered to be significant depression. Over half of

patients (57%) scored above the cutoff for significant depressive symptoms. Little research has examined depression in cancer patients in Saudi Arabia, particularly those with colonrectal cancer (for a review, see Sehlo and Al Ahwal) [20]. We could locate only three studies that even peripherally addressed the topic.

In a small study of 30 terminally ill cancer patients at King Khalid National Guard Hospital in Jeddah that reported 33% of all cancers were of the GI tract (second most common type of cancer after breast). Of the 30 cancer patients overall, 12 had a depressive disorder (nine with adjustment disorder and three with major depression). This would make the point prevalence 40% (but this study provided no information on GI or colorectal cancer specifically) [8]. The Hamilton Depression Rating Scale (HDRS) was the depression measure in this study, and DSM-IV clinical criteria were also used to make diagnoses (although no structured psychiatric interview was used). Interestingly, depressive symptoms were significantly higher among cancer patients than among a control group of 30 patients with chronic medical illness ($p < 0.01$ on HDRS).

In the second study, researchers from the Oncology Center at King Faisal Specialist Hospital surveyed 124 cancer patients (12 with gastrointestinal cancer) attending a primary care outpatient clinic in Riyadh [9]. A single

question asked about depression as a symptom with a rating from 0 to 10. Overall, 50.8% of patients reported above a 0 on this scale, with an average rating of 4.2 (SD 2.2). Correlates of the depressive symptom were not reported.

Finally, in a study that did examine colon cancer specifically, researchers from King Saud University surveyed 32 colon cancer patients in remission (average age 45), comparing them to 36 healthy controls [10]. Anxiety and depressive symptoms were measured using the Hospital Anxiety and Depression Scale. Results indicated no difference in anxiety or depressive symptoms between patients and healthy controls, causing the researchers to conclude 'Neither colon cancer, nor its treatment, has any significant impact on psychological well-being.' Based on the present study's results, we would strongly disagree with this conclusion. Interviewers in our study (psychiatrists in training) indicated that nearly one-third of patients (30%) had non-verbal signs of depression, at times appeared overpowered by helplessness or hopelessness, or had despondency and helplessness that dominated the interview. The same percentage (30%) had thoughts of suicide or wanting to die, about half of whom met the suicide symptom criteria on the SCID. These results suggest that colorectal cancer clearly has a significant impact on psychological well-being, at least among our sample in Jeddah.

Correlates

Few studies have examined correlates of depressive symptoms or disorder on colorectal patients. In a review of the literature now nearly 20 years old, cancer patients at higher risk for depression were reported to be those with poor physical health more generally, inadequately controlled pain, advanced stages of illness, and a history of pre-existing mood disorders [21]. In the more recent meta-analysis of 70 studies involving 10,071 oncology patients cited earlier, few consistent correlates of depression were found [11]. There was no evidence that age or clinical setting had any effect on depressive symptoms, except for a small association between gender and adjustment disorders (slightly more prevalent in women). In the Iranian study of 142 patients with gastrointestinal cancers, no correlation was found between self-rated depressive symptoms and gender, education, marital status, cancer site, age, time since diagnosis, or treatment (surgery, chemotherapy, and radiation) [18].

Thus, very little is known about factors that increase the risk of depression in cancer patients in general and colorectal patients in particular, making it difficult to compare our findings with those in the literature. The findings reported here, however, are consistent with what one might expect. Patients in poor financial circumstances and those with other co-morbid psychiatric disorders (anxiety in particular) were more likely to experience depressive symptoms. Likewise, low social support was a strong predictor of both depressive symptoms and depressive disorder, as has been reported elsewhere in patients with life-threatening medical illness [22].

Perhaps the most surprising finding in the present study was that of a higher risk of depressive symptoms in colorectal patients of Saudi nationality. This replicates the finding reported recently of a higher risk of depression in Saudi chronic renal patients on dialysis compared to emigrant patients [23]. Might the hardships experienced by patients emigrating from other countries to Saudi Arabia have helped them develop coping strategies for dealing with adversity, including the adversity of serious life-theratening medical illness? While this is a possibility, the finding needs further exploration in both qualitative studies and prospective cohort studies.

The prevalence of depressive disorder and subthreshold depression in colorectal patients in Saudi Arabia documented in our sample (41%) is about the same as that in Western countries, and the correlates (primarily low social support and presence of other co-morbid psychiatric disorder) are also similar. The presentation and correlates of depression in Middle Eastern countries such as Saudi Arabia will be influenced by religious and cultural factors, and more research in larger samples that track dialysis patients over time is needed to identify those more subtle influences, which no doubt will influence both diagnosis and treatment.

Limitations

The biggest weakness of the present study is the small sample that may not have been representative of colorectal cancer patients throughout Saudi Arabia, so care must be taken in applying these results more generally. Since only those willing to make the effort to participate were included, the prevalence rates reported here may be an underestimate, as depressed persons may have been less willing to participate. The cross-sectional design prohibits any statements regarding causality, particularly with regard to the correlates identified here. We did not assess other important patient characteristics, such as their physical functioning or other co-morbid illnesses, or treatments for depression, so much work remains. However, the study also has a number of strengths, including the relatively large sample compared to other studies of gastrointestinal cancer in Saudi Arabia, the selection of patients from several different outpatient and inpatient settings, the use a structured psychiatric interview (SCID), a well-validated observer-rated measure of depressive symptoms (HDRS), a standard measures of psychosocial variables, and careful controlling for covariates in multivariate analyses.

Conclusions

The prevalence of depressive disorder and depressive symptoms among colorectal patients in Jeddah is high. Over one-third of patients suffer from depressive disorder (major, minor, dysthymia) or subthreshold depression, and many more experience significant depressive symptoms based on the observer-rated Hamilton Depression Rating Scale (57.1%). Of particular concern is that a significant proportion of these patients experience suicidal thoughts that may affect their willingness to seek care and motivation to comply with treatment. Few primary care patients (regardless of diagnosis) with emotional disorders are detected or treated in Saudi Arabia [24,25]. We have identified a distinct profile of characteristics that place colorectal patients at high risk for depression (poor finances, other comorbid psychiatric disorders, low social support, and Saudi nationality), which may help clinicians to diagnose depressed patients in this setting and manage them appropriately. Of particular interest is that demographic and psychological risk factors are more associated with depression than are characteristics of the cancer itself (stage, duration, and treatment).

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References

1. Wulsin LR, Vailant GE, Wells VE. A systematic review of the mortality of depression. *Psychosom Med* 1999;**61**:6–17.
2. Koenig HG, Shelp F, Goli V, *et al.* Survival and healthcare utilization in elderly medical inpatients with major depression. *J Am Geriatr Soc* 1989;**37**:599–606.
3. Giese-Davis J, Collie K, Rancourt KM, *et al.* Decrease in depression symptoms is associated with longer survival in patients with metastatic breast cancer: a secondary analysis. *J Clin Oncol* 2011;**29**(4):413–420.
4. Massie MJ. Prevalence of depression in patients with cancer. *J Nat Cancer Inst Monogr* 2004;**32**:57–71.
5. Al-Eid HS, Arteh SA. Cancer incidence report Saudi Arabia, 2004. Riyadh: Kingdom of Saudi Arabia, Ministry of Health, Saudi Cancer Registry, 2008. (Available from: https://www.kfshrc.edu.sa/wps/wcm/connect/40dcba804a8d741fb731f7e404c39865/SCR2004W.pdf?MOD=AJPERES&lmod=1265914960&CACHEID=40dcba804a8d741fb731f7e404c39865 last accessed 9-26-14.)
6. Al-Shammari SA, Al-Subaie A. Prevalence and correlates of depression among Saudi elderly. *Int'l J Geriatr Psychiatry* 1999;**14**:739–747.
7. Al-Kathami AD, Ogbeide DO. Prevalence of mental illness among Saudi adult primary care patients in central Saudi Arabia. *Saudi Med J* 2002;**23**(6):721–724.
8. Sherif T, Jehani T, Saadani M, Andejani AW. Adult oncology and chronically ill patients: comparison of depression, anxiety, and caregiver quality of life. *Eastern Med Hlth J* 2001;**7**:502–509.
9. Al-Shahri MZ, Eldali AM, Al-Zahrani O. Nonpain symptoms of new and follow-up cancer patients attending a palliative care outpatient clinic in Saudi Arabia. *Indian J Palliat Care* 2012;**18**(2):98–102.
10. Abanmy N, Gard P, Macadam A, *et al.* CPC-092 Neuropsychology of Saudi colon cancer patients. *Eur J Hosp Pharm* 2013;**20**:A198.
11. Mitchell AJ, Chan M, Bhatti H, *et al.* Prevalence of depression, anxiety, and adjustment disorder in oncological, haematological, and palliative-care settings: a meta-analysis of 94 interview-based studies. *Lancet Oncol* 2011;**12**(2):160–174.
12. First MB, Spitzer RL, Gibbon M, *et al. Structured Clinical Interview for DSM-IV Axis I Disorders* - Non-patient Edition (SCID-I/NP, Version 2.0), Biometrics Research Department, New York State Psychiatric Institute: NY NY, 1996.
13. Hamilton M. Development of a rating scale for primary depressive illness. *Br J Soc Clin Psychol* 1967;**6**:278-296.
14. Dukes CE. The classification of cancer of the rectum. *J Pathol Bacteriol* 1932;**35**:323–332.
15. Koenig HG, Westlund RE, George LK, *et al.* Abbreviating the Duke Social Support Index for use in chronically ill older adults. *Psychosomatics* 1993;**34**:61–69.
16. Zimmerman M, Martinez JH, Friedman M, *et al.* How can we use depression severity to guide treatment selection when measures of depression categorize patients differently? *J Clin Psychiatry* 2012;**73**(10):1287–1291.
17. Pasquini M, Biondi M, Costantini A, *et al.* Detection and treatment of depression and anxiety disorders among cancer patients. *Depress Anxiety* 2006;**23**:441–448.
18. Brintzenhofe-Szoc KM, Levin TT, Li Y, *et al.* Mixed anxiety/depression symptoms in a large cancer cohort: prevalence by cancer type. *Psychosomatics* 2009;**50**(4):383–391.
19. Tavoli A, Mohagheghi MA, Montazeri A, *et al.* Anxiety and depression in patients with gastrointestinal cancer: does knowledge of cancer diagnosis matter? *BMC Gastroenterol* 2007;**7**:28. DOI:10.1186/1471-230X-7-28
20. Sehlo MG, Al Ahwal MS. Depression in patients with colorectal cancer. *Saudi Med J* 2013;**34**(4):341–347.
21. Minagawa H, Uchitomi Y, Yamawaki S, *et al.* Psychiatric morbidity in terminally ill cancer patients: a prospective study. *Cancer* 1996;**78**:1131–1137.
22. Vardanjani SE, Khalili F, Dehkordi FG, *et al.* Perceived social support and depression factors in hemodialysis patients. *World Appl Sci J* 2013;**25**(3):434–440.
23. Al Zaben F, Khalifa DA, Sehlo MG, *et al.* Depression in patients with chronic kidney disease on dialysis in Saudi Arabia (in submission).
24. Al-Faris EA, Al-Shammari SA, Al-Hamad A. Prevalence of psychiatric disorders in an academic primary care department in Riyadh. *Saudi Med J* 1992;**13**(1):49–53.
25. Al-Faris EA, Al-Hamad A, Al-Shammari SA. Hidden and conspicious psychiatry morbidity in Saudi primary health care (a pilot study). *Arab J Psychiatry* 1995;**6**:162–176.

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