Exploring Factors Associated With Depressive Symptoms Among Patients With Chronic Pain

A Cross-Sectional Multicenter Study

Mohamed Al Shukaili, MD,* Mohammed Al Alawi, MD,† Salim Al Huseini, MD,* Ahmed Al Shukaili, MD,‡
Maya Al Muharrami, MD,§ Marwa Al Abdali, MD,* Hiba Al Harthi, MD,* AlKhatib Al Saadi, MD,*
Rasheeda Al Balushi, MD,§ Fatma Al Kasbi, MD,‖ Amal Al-Fahdi, MD,¶
Sathiya Murthi Panchatcharam, PhD,# Angie Cucchi, DPsych,** and Samir Al-Adawi, PhD†

Abstract: This cross-sectional study examined the factors associated with depression among people with chronic pain (PwCP) attending specialized pain clinics in Muscat, Oman. Two-hundred eighty-seven participants were recruited for the study, and univariate analyses were used to investigate the difference between individuals who scored above/below the cutoff points for depressive symptoms. A multiple regression analysis was used to detect the independent predictors. Twenty-six percent of participants scored above the cutoff point. Further analysis indicated that unstable family relationships pre-existing depressive symptoms (odds ratio [OR], 2.86; $p = 0.044$), a family history of depression (OR, 4.75; $p = 0.019$), severe pain (OR, 4.21; $p < 0.006$), having fibromyalgia (OR, 28.29; $p = 0.005$), and lumbago/truck (OR, 2.41; $p = 0.039$) were independent predictors of depressive symptoms. This study indicates that one in four patients with chronic pain also presents with depressive symptoms. However, the role of culture needs to be taken into consideration when interpreting these findings and when building on these data.

Key Words: Chronic pain, depressive symptoms, epidemiology, predictors, culture

(*J Nerv Ment Dis* 2021;00: 00–00)

A recent systematic review of the literature across five continents suggests that pain is among the 10 most common reasons people seek medical support in primary health care (Finley et al., 2018), and it has been regarded as the leading cause of disability and disease globally, with significant economic implications for societies (Gorczyca et al., 2013; GBD 2016 Disease and Injury Incidence and Prevalence Collaborators, 2017). Those who experience pain can experience acute, chronic, or intermittent aching or a combination of the three, and estimates suggest that, globally, 20% of adults experience chronic pain at any given moment in time (Gorczyca et al., 2013). Higher prevalence rates have been reported in single studies in Europe (for a review of the literature, see GBD 2015 Disease and Injury Incidence and Prevalence Collaborators, 2016), and even higher rates were found in non-Western populations with up to 39% of the population in Brazil (de Souza et al., 2017), 61% of the population in Cambodia and the north of Iraq, and 90.8% of the population in China experiencing pain (Mohamed Zaki and Hairi, 2015).

Although the initial conceptualizations regarded pain as the result of damage and/or sensitization to the autonomic nervous system (de Souza et al., 2017), the International Association for the Study of Pain extended this definition to include the understanding of pain as "an aversive, personal, subjective experience, influenced by many emotional, social and cognitive variables" (Merskey and Bogduk, 1994). In support of the latter view, studies emerged to suggest that pain is not a reliable indicator of tissue damage and nociception. Conversely, tissue damage and nociception are not reliable indicators of the intensity and severity of pain (Aydede, 2019; Scholz and Woolf, 2002). These claims and the associated evidence consolidated the notion of pain as a multidimensional health condition (de Souza et al., 2017) that has biological, sensory, psychological, and emotional roots. Pain is no longer considered just a symptom, but also a disease, a stance that is encapsulated by the fact that the new *ICD-11* (World Health Organization, 2018) was the first version to include chronic pain.

Notwithstanding the recent sophisticated biopsychosocial (Engel, 1980) development in professionals' understanding of chronic pain, the latter still prompts bewilderment in observers (De Ruddere and Craig, 2016). The literature suggests that people who experience chronic pain attract less sympathy than people with acute pain, that they are suspected of deception or overplaying the symptoms (Goubert et al., 2005), and that they are thus less supported (De Ruddere et al., 2014; Desai and Chaturvedi, 2012). The consequential strong stigmatization of chronic pain (De Ruddere and Craig, 2016; Van Alboom et al., 2021) that results from these dynamics has been associated with greater disability (Serbic and Pincus, 2014), feelings of helplessness, and pain catastrophizing (Quartana et al., 2009). The above variables are, in turn, associated with worse clinical outcomes (Waugh et al., 2014).

It is now widely recognized that pain has multiple, significant sequelae including a significant deterioration in mood, a negative impact on relationships and work/academic performances, as well as an increase in suicidal ideations (Dueñas et al., 2016; Mills et al., 2019). The relationship between mood and pain, in particular, has received a lot of attention in the last few decades, and it is generally accepted that mood, negative affect, stigma, and pain are entangled in complex ways (Martucci, 2017; Quartana et al., 2009). Although mood is broadly associated with more transient states compared with affect, both mood and affect seem to be intrinsically connected to chronic pain conditions (Aydede, 2019; de Souza et al., 2017) in a "chicken and egg" riddle. Interestingly, research suggests that analgesic medications are not effective unless patients' mood also improves (Kolodny, 1963; Sturgeon et al., 2018), prompting a reflection on what is the relationship between pain and mood. Similarly, the literature demonstrates that individuals who experience persistent and more significant low moods such as depression report an increase in pain conditions and that the intensity of

the pain correlates to the intensity of the psychological symptoms (Gorczyca et al., 2013).

From a biological perspective, recent evidence has emerged to suggest that chronic pain and depression share similar changes in neuroplasticity and involve overlapping neurobiological mechanisms such as a decrease in monoamine neurotransmitters such as serotonin, dopamine, and norepinephrine (Haase and Brown, 2015). Indeed, both a review (Bair et al., 2003) and a meta-analysis of the literature (Stubbs et al., 2017) had indicated high comorbidity between depression and chronic pain and revealed that individuals who presented with both chronic pain and depression fared worse than individuals who presented with only one condition. Various studies have explored the extent of depressive mood in people with chronic pain (PwCP) (Chen et al., 2012), suggesting comorbidity of up to 22% in population-based studies and up to 46% in primary care settings (Bair et al., 2003; Rayner et al., 2016). These figures reach peaks of up to 72% when specialist pain settings are taken into consideration (Rayner et al., 2016). By contrast, up to 75% of people with depression also complain of chronic pain (Lépine and Briley, 2004).

Although the relationship between depression and pain is widely recognized in the literature (Bair et al., 2003), a few studies have emerged from the Arabian Gulf countries. To our knowledge, the association and the covariates influencing the relationship between chronic pain and depression have only been investigated in a study in Saudi Arabia (Al-Maharbi et al., 2018) that suggested a prevalence rate of depression of 71% in chronic pain patients. The study also confirmed that covariates such as age, marital status, and socioeconomic status significantly contributed to the trajectory of depressive symptoms and the severity of the pain. To address the gap in the literature, the aim of the present study is to explore factors associated with depressive of depressive symptoms among patients with chronic pain attending specialized pain clinics in Muscat, Oman.

METHODS

Study Design, Settings

This was a cross-sectional study conducted between June 2019 and January 2020 at three specialist pain clinics situated in tertiary care hospitals in Muscat (Sultan Al Qaboos University Hospital, Royal Hospital, and Khoula Hospital). Referrals to these clinics come from all over Oman. Oman has universal free health care delivery and a compartmentalized and centralized health care system under the auspice of the Ministry of Health. Health care delivery falls under primary, secondary, and tertiary care centers that are distributed all over the country (Alshekaili et al., 2020). The present three tertiary care centers serve as national catchment with referral from primary and secondary care settings from different regions of the country. Three centers are located in the most populous region of Oman—Al Batinah Region and the Muscat governorate (Bontenbal, 2016). With recent urbanization, this region is populated with diverse ethnicities and social strata of Oman (Bontenbal, 2016). The geography and its population, therefore, constitute the most representative sample of Oman.

The inclusion criteria for the study were age (>18), the capacity to give informed consent, and have a verifiable diagnosis of chronic pain. Exclusion criteria included those who did not consent to the study and those who experienced cognitive impairments that prevented them from responding to the study survey.

Sample Size Calculation

For sample size calculation, we based on an expected proportion from 20% to 25% with a 95% confidence interval and a 5% precision. The required samples of this study were from 246 to 289 participants for 20% to 25%, respectively. The required sample size was calculated using the OpenEpi computer program. Due to the time limitation, this study recruited 287 subjects. That fell into the range of the required sample sizes.

Data Collection and Handling

Potential participants were informed of the nature and the goals of this research, and they were reminded of their right to anonymity and their right to withdraw at any stage of the process. When and only after participants understood and were happy with the information provided, signed consent forms were collected. Anonymized data are kept on a password-protected electronic database and will be securely destroyed following the code of conduct for handling research data (UK Research Integrity Office, 2009). Signed consent forms are kept separately in a locked compartment.

Measures

The study survey includes three parts—sociodemographic factors, a measure to quantify the presence of chronic pain (Universal Pain Assessment Tool), and an instrument to tap into depressive symptoms (Patient Health Questionnaire-9 [PHQ-9]). The three parts of the survey are detailed below in tandem. The assigned research assistants for each respective center invited the consenting participants in a cloistered room to fill the study survey. Although literacy seems to be on the rise in Oman, particularly for the younger generation, there are still pockets of illiteracy for the older generation (Schnitzler and Heise, 2021). As shown in Table 1 below, 23.9% of the participants were illiterate. Therefore, respective research assistants from each center were available to read the questionnaires to those who requested so. Thus, to accommodate diverse literacy needs, this study used self-reported data and otherwise. In addition to accommodating for diverse literacy needs, this study survey was both in English and Arabic. The rationale for including both English and Arabic questionnaires is the following. First, despite the protracted exercises to translate the instrument into another language, its accuracy could still be undermined by certain subtle linguistic and conceptual misunderstandings that might not have been apparent during translation. Second, Omani society is multilingual. In general, both Arabic and English are taught in schools. Therefore, the study survey was given in both languages. Psychometric properties of the outcome measures solicited using the Arabic version of the Patient Health Questionnaire. The latter has been reported to have a high concordance with the English version in terms of the factor structures and internal reliability (tau equivalent reliability = 0.857) (AlHadi et al., 2017).

Sociodemographic and Clinical Factors

The present study also collected sociodemographic and clinical factors. The sociodemographic factors included age, sex, marital status, educational status, occupation, type and place of occupation, satisfaction with the occupation, financial status (income), and satisfaction with the income. The significant medical history and psychiatric history were as explored as follow: 1) "Have you been treated for major depressive disorder?" (yes, no); 2) "Do you suffer from other medical conditions?" (yes, no); 3) "Do you have a family member who is being treated for depressive illness? (yes, no). The rest of the risk factors and clinical variables included are shown in Table 1.

Universal Pain Assessment Tool

The presence and type of pain were ascertained through the use of the same instrument adapted by Al-Maharbi et al. (2018). In the present context, chronic pain ("How long have you had the pain?") should manifest at least half the days for at least 3 to 6 months (Treede et al., 2015). In addition to its persistent and pervasive nature, patients with pathological pain should answer yes to the following questions ("Do you currently have pain?") for him or her to be eligible for inclusion

TABLE 1. Frequency Distribution of Sociodemographic and Clinical Variables

Variables	*n* (287)	%
Age		
≤40 yrs	87	30.3
41–60 yrs	151	52.6
>60 yrs	49	17.1
Sex		
Male	94	32.8
Female	193	67.2
Marital status		
Single	30	10.5
Married	210	73.4
Widowed/divorced	46	16.1
Education level		
Illiterate	68	23.9
Less than high school	69	24.2
High school	76	26.7
Diplomat and above	72	25.3
Occupation		
Unemployed	95	37.8
Employed	104	41.4
Retired/unable to work	52	20.7
Satisfaction with the occupation		
Satisfied	113	49.3
Unsatisfied	116	50.7
Family relations		
Stable	267	95.0
Unstable	14	5.0
Have you been treated for major depressive disorder?		
Yes	42	14.8
No	241	85.2
Do you suffer from other medical conditions?		
Yes	115	41.2
No	164	58.8
Do you have a family member who is being treated for depressive illness?		
Yes	22	7.9
No	258	92.1
Smoking status		
Nonsmoker	249	91.2
Ex-smoker	19	7.0
Current smoker	5	1.8
Do you suffer from pain currently?		
Yes	266	94.7
No	15	5.3
Osteoarthritis		
Yes	89	34.4
No	170	65.6
Spine or disc problem		
Yes	158	60.8
No	102	39.2
Neuropathic pain		
Yes	100	38.5
No	160	61.5

TABLE 1. *(Continued)*

Variables	*n* (287)	%
Autoimmune syndromes		
Yes	5	1.9
No	255	98.1
Fibromyalgia		
Yes	10	3.8
No	250	96.2
Abdominal conditions		
Yes	22	8.5
No	238	91.5
Cancer		
Yes	9	3.5
No	251	96.5
Blood-related disorders		
Yes	19	7.3
No	240	92.7
Skin diseases		
Yes	5	1.9
No	254	98.1
No. regions		
1–2	121	51.7
>2	113	48.3
Pain severity		
Moderate	105	39.6
Severe	160	60.4
Duration of treatment		
≤3 mos	86	35.8
≥3 mos	154	64.2
Head and neck		
Yes	94	34.2
No	181	65.8
Lumbago		
Yes	220	79.7
No	56	20.3
Peripherals		
Yes	173	62.9
No	102	37.1
Depression (≥12)		
Yes	75	26.1
No	212	73.9

criteria. The severity of the pain was determined via the use of the Universal Pain Assessment Tool (Ohrbach et al., 2011). An edited version of the questionnaire was used (mild [1–2], moderate [3–6], and severe [≥7]).

Patient Health Questionnaire

The Arabic version of the PHQ-9 was used to screen for depressive symptoms (Al-Ghafri et al., 2014). The PHQ-9 is a self-administered questionnaire that scores each of the nine *DSM-4* criteria on a scale from "0" (not at all) to "3" (nearly every day), reaching a maximum severity of symptoms of 27 (Kroenke et al., 2001). Following the PHQ-9, depressive illness is diagnosed if five or more of the nine depressive symptom criteria have been present at least "more than half the days" in the past 2 weeks, and one of the symptoms is depressed mood or anhedonia. Subclinical depression is diagnosed if two, three, or four depressive symptoms have been present at least "more than half the days" in the past 2 weeks, and one of

the symptoms is depressed mood or anhedonia. The question "Have you experienced thoughts that you would be better off dead or of hurting yourself in some way?" counts if present at all, regardless of duration.

A meta-analysis of the literature confirmed that the PHQ-9 has acceptable diagnostic properties for detecting depressive illness for cutoff scores between 8 and 11 (Manea et al., 2012). For the present purpose, internal consistency was examined and Cronbach's alpha was 0.76. This suggests an acceptable reliability level for the present cohort. The PHQ-9 was previously psychometrically tested among an Omani sample, with a cutoff score of ≥12 resulting in a sensitivity of 80.6% and a specificity of 94.0% (Al-Ghafri et al., 2014). Thus, this study used cutoff point of ≥12 to differentiate caseness to noncaseness.

Statistical Analysis

Data were analyzed with IBM SPSS Statistics for Windows (version 23.0, IBM Corp, Armonk, NY). Descriptive statistics were generated, and the differences between the group that scored below and the group that scored above the cutoff point for depressive symptoms were explored under univariate analysis using the chi-square test. These differences were explored for various categorical variables. The relationship between depressive symptoms and risk factors was investigated through multiple binary logistic regression models, using a backward conditional approach and odds ratios (ORs) with 95% confidence intervals. Wald statistics provided the statistical significance of the predictor variables. A p value of less than 0.05 (two-tailed tests) was considered statistically significant.

Ethical Approval

Ethical approval was granted by the College of Medicine and Health Sciences at Sultan Qaboos University, Muscat, Oman (MREC#1851) and by the Centre of Studies and Research at the Ministry of Health, Muscat, and the Sultanate of Oman (MoH/CSR/19/10009). Written informed consent was collected from all participants. The study was conducted following the Declaration of Helsinki with regards to ethical human research, including confidentiality, privacy, and data management. All authors certify responsibility for the study and the final manuscript.

RESULTS

A total of 287 participants fulfilled the inclusion criteria. Table 1 shows the results of the subjects' demographic variables.

Of 287 subjects, 26% ($n = 75$) scored above the cutoff point for depressive symptoms. Women represented the majority of the sample: 67.2% ($n = 193$) compared with 32.8% men ($n = 94$). Participants' ages were categorized into three groups, and the mean age was 47.89 (SD ± 12.915). A total of 25.3% ($n = 72$) of the participants were educated to diploma level and higher, 38.3% ($n = 88$) were employed by the government, whereas 41.4% ($n = 104$) of the sample was employed. A total of 49.3% ($n = 113$) of the participants were satisfied with their job. A total of 73.4% ($n = 210$) of the participants were married, and 95% ($n = 267$) of them reported having stable family relationships.

The majority of the participants did not have a diagnosis of depressive symptoms (85.2% [$n = 241$]), and only 7.9% ($n = 22$) of the total sample reported a family history of diagnosed clinical depression. Just over half of the sample (58.8% [$n = 164$]) did not present with any other medical comorbidity. The majority of the participants (91.2% [$n = 249$]) were nonsmokers, and 95% ($n = 266$) reported experiencing pain at that time. The reader is referred to Table 1 for further details on clinical variables. The most common type of pain originated from disc problems (60.8% [$n = 158$] of the participants), whereas the most frequent site of pain was in the lumbago area (79.7% [$n = 220$] of the participants). A total of 51.7% ($n = 121$) of the participants complained of experiencing pain in two different body parts.

Table 2 shows univariate and multivariate logistic regression analyses of the clinical and sociodemographic predictors of depressive symptoms among patients with chronic pain.

In the univariate analysis, significant associations were found between depressive symptoms and family relationships (OR, 5.59; $p = 0.002$), individuals who had been treated for depressive illness (OR, 3.15; $p = 0.001$), family history of depression (OR, 3.16; $p = 0.012$), pain severity (OR, 2.33; $p = 0.007$), fibromyalgia (OR, 4.18; $p = 0.030$), and lumbago (OR, 2.41; $p = 0.039$). The multivariate logistic analysis showed that four clinical variables were significant risk factors for depressive symptoms. First, individuals who had been treated for depression in the past were 2.9 times (OR, 2.86; $p = 0.044$) more likely to score above the cutoff point for depressive symptoms. Second, participants with a family history of depression were 4.8 times (OR, 4.75; $p = 0.019$) more likely to score above the cutoff point for depressive symptoms compared with individuals without a family history of depression. Third, individuals with fibromyalgia are 28 times more likely to score above the cutoff point for depressive symptoms (OR, 28.29; $p = 0.005$). Lastly, individuals who reported severe pain were four times (OR, 4.21; $p < 0.006$) more likely to score above the cutoff point for depressive symptoms than individuals who reported experiencing moderate pain.

DISCUSSION

The current study investigated the prevalence and predictors of depressive symptoms among PwCP seeking consultation at specialized pain clinics in tertiary hospitals in Muscat, Oman's capital. Results suggest that just over one fourth of the sample (26%) scored above the cutoff point for depressive symptoms, as measured by the PHQ-9. Surprisingly, the current prevalence rate is much lower compared with the 71% reported in Saudi Arabia (Al-Maharbi et al., 2018), but falls within the documented ranges (15%–100%) reported in the literature for depressive symptoms in PwCP (Bair et al., 2003). The present study suggests that, although the findings from Saudi Arabia fall in the upper range, the current ones are among the lowest, and certainly much lower than the mean prevalence of 65% reported in a recent systematic review of the literature (Jackson et al., 2015).

As often the case, the prevalence rate is invariably influenced by studies' methodological choices and by the type and severity of the presenting problem (Wu et al., 2021). Hence, the lower prevalence rate in our study might be due to the fact that the Al-Maharbi et al. (2018) study used a cutoff point of >5 in the PHQ-9. It is also possible that the present cutoff ≥12 may have reduced those who fall under the caseness for depressive symptoms. The present cutoff derived of ≥12 was based on a psychometric study that explored the psychometric qualities of the PHQ-9 among Omanis (Al-Ghafri et al., 2014). Alternatively, efforts are needed to devise disease-specific instruments for measuring depressive symptoms among PwCP.

Furthermore, previous evidence suggested that medically unexplained physical symptoms are more frequent than psychological complaints among attendees of primary health care settings in Muscat (Al-Lawati et al., 2000). In traditional societies such as those in Oman, which often fall under the label of a collectivist society, depressive symptoms as conceived in Western psychiatric nomenclature (characterized with mental or mood symptoms) tend to be inconsistently endorsed (Oates et al., 2004) and experience higher stigmatization (Al Alawi et al., 2017; Musharrafi et al., 2017). In such a collective society, the idiom of distress for something akin to depressive symptoms has been reported to be mantled in the "somatopsychic" realm, which, in turn, may manifest as masked depression (Abu-Kaf and Shahar, 2017; Brown et al., 2020; Naeem et al., 2012). It could be argued that the participants in our study reported psychological distress in somatic terms, hence conflating the prevalence rates for chronic pain and depressive symptoms.

TABLE 2. Univariate and Multivariate Logistic Regression Analysis of the Clinical and Sociodemographic Predictors of Depression Among Patients With Chronic Pain

Variables	Depression (n = 75)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age			
≤40 yrs	22 (29.3)	1.03 (0.56–1.89)	
41–60 yrs	39 (52.0)	1.18 (0.54–2.59)	
>60 yrs	14 (18.7)		
Sex			
Male	21 (28.0)	0.74 (0.42–1.32)	
Female	54 (72.0)		
Marital status			
Single	9 (12.0)	1.36 (0.49–3.83)	
Married	55 (73.3)	1.13 (0.54–2.38)	
Widowed/ divorced	11 (14.7)		
Education level			
Illiterate	18 (24.0)	1.0 (0.47–2.13)	
Less than high school	20 (26.7)	1.14 (0.54–2.38)	
High school	18 (24.0)	0.87 (0.41–1.82)	
Diplomat and above	19 (25.3)		
Occupation			
Unemployed	21 (32.3)	1.12 (0.58–2.16)	0.41 (0.14–1.26)
Employed	25 (38.5)	2.03 (0.96–4.27)	0.51 (0.18–1.47)
Retired/unable to work	19 (29.2)		
Satisfaction with the occupation			
Satisfied	27 (46.6)	1.16 (0.64–2.11)	
Unsatisfied	31 (53.4)		
Family relations			
Stable	65 (87.8)	5.59 (1.81–17.29)	1.35 (0.24–7.73)
Unstable	9 (12.2)		
Have you been treated for clinical depressive disorder			
Yes	20 (27.0)	3.15 (1.60–6.20)	2.86 (1.03–7.96)
No	54 (73.0)		
Do you suffer from other medical conditions?			
Yes	30 (40.5)	0.96 (0.56–1.65)	
No	44 (59.5)		
Do you have a family member who is being treated for clinical depression?			
Yes	11 (15.1)	3.16 (1.31–7.65)	4.75 (1.29–17.45)
No	62 (84.9)		
Smoking status			
Nonsmoker	62 (91.2)	0.80 (0.26–2.51)	
Ex-smoker	4 (5.9)	2.01 (0.33–12.31)	
Current smoker	2 (2.9)		
Do you suffer from pain currently?			
Yes	71 (97.3)	2.37 (0.52–10.75)	
No	2 (2.7)		
No. regions			
1–2	22 (40.7)	1.78 (0.96–3.30)	1.18 (0.44–3.17)
>2	32 (59.3)		

TABLE 2. (Continued)

Variables	Depression (n = 75)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Pain severity			
Moderate	18 (25.7)	2.33 (1.27–4.27)	4.21 (1.51–11.73)
Severe	52 (74.3)		
Duration of treatment			
≤3 mos	26 (41.3)	0.73 (0.40–1.32)	
≥3 mos	37 (58.7)		
Osteoarthritis			
Yes	27 (37.5)	1.21 (0.69–2.13)	
No	45 (62.5)		
Spine or disc problem			
Yes	17 (23.6)	2.67 (1.44–4.94)	2.45 (0.85–7.07)
No	55 (76.4)		
Neuropathic pain			
Yes	32 (44.4)	1.41 (0.81–2.45)	
No	40 (55.6)		
Autoimmune syndromes			
Yes	1 (1.4)	0.65 (0.07–5.90)	
No	71 (98.6)		
Fibromyalgia			
Yes	6 (8.3)	4.18 (1.14–15.28)	28.29 (2.69–297.24)
No	66 (91.7)		
Abdominal conditions			
Yes	5 (6.9)	0.75 (0.27–2.12)	
No	67 (93.1)		
Cancer			
Yes	3 (4.2)	1.32 (0.32–5.42)	
No	69 (95.8)		
Blood-related disorders			
Yes	4 (5.6)	0.69 (0.22–2.15)	
No	67 (94.4)		
Skin diseases			
Yes	2 (2.8)	1.75 (0.29–10.71)	
No	70 (97.2)		
Head and neck			
Yes	30 (42.9)	1.65 (0.95–2.89)	1.24 (0.48–3.19)
No	40 (57.1)		
Lumbago			
Yes	63 (88.7)	2.41 (1.08–5.38)	1.41 (0.33–6.04)
No	8 (11.3)		
Peripherals			
Yes	46 (65.7)	1.18 (0.67–2.08)	
No	24 (34.3)		

The present data suggest that one in four patients with chronic pain also presents with depressive symptoms. Because a relatively high number of participants endorsed much ostracized mental or mood symptoms, two factors are worthwhile to contemplate. First, although seeking consultation from medical settings (pain clinic) rather than psychiatric clinic and the fact that pain itself is preceded by the alleged objective physical trigger, the stigma of having depressive symptoms would be minimal and therefore depressive symptoms (via PHQ-9) were endorsed. Future studies should examine whether the presentation of depressive symptoms might be influenced by external factors such as being in a psychiatric setting or otherwise. Further, studies are needed to examine whether the instrument tapping into somatic v's mood

symptoms has a direct bearing on constructs such as individualistic and collectivistic. Second, it is also possible that recent rapid modernization and increased Western-style education with individualistic persuasion may invariably affect social norms for responding to survey assessments tapping into mood symptoms. There is the suggestion that changing social norms have "destigmatized" depression symptoms (Eloul et al., 2009).

In addition, the present study used an assessment tool, the PHQ-9, that was devised in the West and that heavily relies on the Cartesian dualism between the mind and the body. The PHQ-9 is only equipped to detect the cognitive or emotional aspects of depression, hence neglecting an important element of non-Western idioms of distress. Given the role of culture in shaping private and public pain experiences, behaviors, and their language, it seems crucial to consider these issues when interpreting the data. Furthermore, it is also possible that the stigma toward mental illness, that is pervasive in the Arabian Gulf population, may play a part in the reported lower rate of depression in this study (Al Alawi et al., 2016). It can be argued that, in cultures where the stigma toward mental health is widespread, somatic symptoms might be more socially acceptable. Hence, future studies need to use culture-sensitive and disease-specific instruments to solicit the presence of depressive symptoms in PwCP. Deconstructing the role of culture will enable researchers and clinicians alike to meet people's needs with compassion, understanding, and respect of cross-cultural ethical considerations.

Despite more women than men scoring above the cutoff point for depressive symptoms (72% *vs*. 28%), sex did not significantly increase the risk of developing depression. This result is in line with previous findings (Edwards et al., 2000; Rayner et al., 2016; Tsang et al., 2008). However, the literature also yields conflicting findings, and a few studies have reported that the relationship between depression and pain is greater in men than in women (Hirsh et al., 2006; Riley et al., 2001). Given that an explanation for the conflicting results is not readily apparent, more studies are warranted to examine the role of gender and gender roles in comorbid chronic pain and depressive symptoms in non-Western societies.

In fact, although there is evidence that links pain sensitivity and symptoms of depression to reproductive hormones in women (Freeman, 2002), the role of social learning and gender socialization should not be overlooked. Although girls are traditionally socialized to be relational and emotional, boys are praised for being stoic and independent (Nascimento et al., 2020). These socialization roles tend to be even more pronounced in traditional societies (Marks et al., 2009), arguably impacting the likelihood that negative emotional states may be disclosed by men. Clarifying the influence of gender roles in pain/depression disclosure rates would offer valuable insight to devise effective preventative and treatment strategies.

The second aim of this study was to examine which covariate would independently predict depressive symptoms. Six clinical variables were found; these are as follows: 1) having unstable family relationships, 2) being treated for preexisting depressive symptoms; 3) a family history of depression; 4) fibromyalgia; 5) lumbago; and 6) severe pain. Sadly, the present data seem to suggest that being treated for preexisting symptoms of depression was not a protective factor against chronic pain, nor it prevented the persistence of the clinically significant low mood. This result promotes the idea that chronic pain and depressive symptoms might be independent of one another despite the evidence that shows similar changes in neuroplasticity and overlapping neurobiological mechanisms (Haase and Brown, 2015) and pathways (Sheng et al., 2017) for both conditions. As this study was not equipped to explore this issue in depth, studies with more robust methodologies are therefore warranted.

In other populations, family functioning has long been postulated to impact both variations of depressive symptom and chronic pain, and most significantly, these two conditions seem to have a temporal relationship and poorer family functioning (Keitner and Miller, 1990; Lewandowski et al., 2010). Although the nature of family functioning needs to be further elaborate, this study suggests that having an unstable family seems to be an independent predictor of depressive symptoms in PwCP. Family in Oman is central to an individual's identity. Being a collective society, individuals tend to be less self-centered and to have social values that revolve around what is best for a community and society (El-Islam, 1978). Thus, being part of society in Oman is to be preoccupied with "otherness." There is evidence to suggest that, when social stress emerges, the conflict is likely to be directed toward the family circles than rather external or otherness (Al-Saadoon et al., 2020). If the present observation that family functioning has a direct impact on depressive symptoms in PwCP, then studies are needed to document the family functioning.

The present multivariate regression analysis indicates that having a family member treated for clinical depression constitutes a risk factor for scoring above the PHQ-9 cutoff point. Although the present study did not fully qualify what constitutes a family member, it nevertheless echoes vast empirical data suggesting that vulnerability to depressive illness and chronic pain have been shown to run in the family (McGuffin et al., 2003). At the same time though, in addition to the hereditary hypothesis, the role of social learning (Bandura, 1977) and the stress of living with a debilitating disease could also play a part (Marangell et al., 2011). People who are brought up by a depressed parent may learn coping skills that predispose them to depression. Indeed, a study by McGuffin et al. (2003) showed that both nature (genetic) and nurture (shared family environment) play significant roles in the development of depressive symptoms.

At the same time, the literature also shows that family members can positively influence the health of individuals with chronic illnesses (Dumit et al., 2015; Lee et al., 2017), and indeed, more recent systemic conceptualizations engage the family nucleus as the "solution to the problem" (Adams, 1985). Concepts such as the "dyadic affair" and "dyadic coping" (Bodenmann, 1995, 1997; Lyons et al., 1998)—that locate stressful events and coping strategies in a relational context—can offer important insights, particularly for preventative strategies. In fact, chronic pain research suggests that supportive dyadic coping is negatively correlated with depression (Mittinty et al., 2020). Given the crucial role of the family in Oman, early systemic psychosocial interventions geared toward improving coping in couples and extended families might positively impact psychological outcomes in PwCP.

Although widely recognized, the relationship between chronic pain and depressive symptoms seems complex and far from being understood. The present data suggest that 96.2% of participants had fibromyalgia and that fibromyalgia was a significant predictor of developing depressive symptoms. The literature suggests that fibromyalgia and clinically significant low mood are intertwined and that they share critical underlying pathophysiology (Clauw, 2014). Interestingly though, Marangell et al. (2011) reported that selective serotonin and norepinephrine reuptake inhibitor antidepressants resulted in a 69% improvement in reported pain, as well as mood in patients with comorbid symptoms. Given that the pain reported in fibromyalgia seems to improve with antidepressants, but that being treated for symptoms of depression does not make someone immune to chronic pain, it would be important to devise more specific studies that compare different types of pain and their relationship to symptoms of depression.

The occurrence of pain in the lumbar has been documented to be one of the most common types of chronic pain (Paterson, 2006). Lumbago accounts for approximately 60% of the pain reported in the torso region and is a strong contributor to disability (Tomazoni et al., 2020). Watrous et al. (2020) compared 4397 US service members with low back pain and those without and discovered that the former had poorer mental health outcomes, including depressive symptoms, compared with the latter. In line with this finding, the present study suggests that lumbago is a strong risk factor for the presence of depressive symptoms.

In contradiction with the hypothesis that chronic pain and depression are independent of one another is the fact that participants with more severe pain had an increased fold of developing depressive symptoms compared with individuals who experienced less intense pain.

This was concordant with Sharpe et al. (2017) who found a strong association between pain severity and depressive symptoms and with further studies that found that increased severity of physical pain was correlated with increased severity of depression (García-Campayo et al., 2008; Vietri et al., 2015). In conclusion, it seems that the more in pain a person is, the more depressed they become.

LIMITATIONS

There are some limitations to this research. The study survey both for mood and pain has roots in Western conceptualizations of pain and illness, which do not capture non-Western nuances. In addition, the PHQ-9 is not as reliable as clinical interviews in uncovering symptoms of depression (Wu et al., 2021). Hence, future studies should use more culturally suitable conceptualization of illness and pain and more sensitive assessment tools, and/or culturally relevant criterion standard clinical interviews. Second, this study did not compare the severity of the depressive symptoms before and after the incidence of chronic pain. It would, therefore, be important to explore whether the development of pain may change the preexisting symptoms. Third, the study survey was meant to be self-rated, and as there were 23.9% of participants who could not read and write, the research assistants read the survey to the participant. This has likely compromised the anonymity of the survey and increased social-desirability bias. Oman is a closed-knit society, and individuals under scrutiny may hide their true feeling. Future studies should have internal mechanisms to circumvent such limitations. Related to this, some risk factors were assessed subjectively rather than objectively. The confounder such as recall bias remains a source of contention here. Future qualitative research should assess such information so that the temporal relationships between these variables can be better understood. Last but not least, this study was conducted in one region of the country. Although the aforementioned clinics receive referrals from all over Oman, participants from urban areas (*e.g.*, Muscat) were likely to be overrepresented. This might hamper the generalization of the findings.

CONCLUSIONS

To date, this is one of the few studies that have explored the prevalence of depressive symptoms among patients with chronic pain in the Arabian Peninsula. Using Western-based conceptualization of pain and mood, this study suggested that 26% of the participants reported the presence of depressive symptoms as tapped by PHQ-9. A number of variables, among which 1) unstable family relationship, 2) having been previously treated for depressive symptoms, 3) a family history of depressive symptoms, 4) marked with severe pain, and 5) presenting with fibromyalgia or lumbago, were found to increase the risk of developing symptoms of depression. Both pain and moods are, however, experienced in sociocultural contexts. Hence, studies such as this one ought to be replicated with more culturally sensitive and suitable assessment tools and methodologies.

REFERENCES

Abu-Kaf S, Shahar G (2017) Depression and somatic symptoms among two ethnic groups in Israel: Testing three theoretical models. *Isr J Psychiatry Relat Sci*. 54:32–39.

Adams B (1985) The family: Problems and solutions. *J Marriage Fam*. 47:525–529.

Al Alawi M, Al Senawi H, Al Adawi S, Jeyaseelan L, Murthi Panchatcharam S (2017) Public perception of mental illness in Oman: A cross-sectional study. *Eur Psychiatry*. 41:S511.

Al Alawi M, Al Sinawi H, Al Maqbali M, Al Hatmi H (2016) Perception of stigma among attendees of tertiary care psychiatric clinic in Oman. *Int J Pub Heal Safety*. 1:108.

Al-Ghafri G, Al-Sinawi H, Al-Muniri A, Dorvlo AS, Al-Farsi YM, Armstrong K, Al-Adawi S (2014) Prevalence of depressive symptoms as elicited by Patient Health Questionnaire (PHQ-9) among medical trainees in Oman. *Asian J Psychiatr*. 8:59–62.

AlHadi AN, AlAteeq DA, Al-Sharif E, Bawazeer HM, Alanazi H, AlShomrani AT, Shuqdar RM, AlOwaybil R (2017) An Arabic translation, reliability, and validation of Patient Health Questionnaire in a Saudi sample. *Ann Gen Psychiatry*. 16:32.

Al-Lawati J, Al-Lawati N, Al-Siddiqui M, Antony SX, Al-Naamani A, Martin RG, Kolbe R, Theodorsson T, Osman Y, Al-Hussaini AA, Al-Adawi S (2000) Psychological morbidity in primary health care in Oman: A preliminary study. *Sultan Qaboos Uni Med J*. 2:105–110.

Al-Maharbi S, Abolkhair AB, Al Ghamdi H, Haddara M, Tolba Y, El Kabbani A, Al Sadoun A, Pangilinan E, Joy J, Khait SA, Al-Khudhairy MW (2018) Prevalence of depression and its association with sociodemographic factors in patients with chronic pain: A cross-sectional study in a tertiary care hospital in Saudi Arabia. *Saudi J Anaesth*. 12:419–425.

Al-Saadoon M, Al-Adawi M, Al-Adawi S (2020) Socio-cultural constraints in protecting child rights in a society in transition: A review and synthesis from Oman. *Child Indic Res*. 1–29. doi: 10.1007/s12187-020-09759-z.

Alshekaili M, Hassan W, Al Said N, Al Sulaimani F, Jayapal SK, Al-Mawali A, Chan MF, Mahadevan S, Al-Adawi S (2020) Factors associated with mental health outcomes across healthcare settings in Oman during COVID-19: Frontline versus non-frontline healthcare workers. *BMJ Open*. 10:e042030.

Aydede M (2019) Does the IASP definition of pain need updating? *Pain Rep*. 4:e777.

Bair MJ, Robinson RL, Katon W, Kroenke K (2003) Depression and pain comorbidity: A literature review. *Arch Intern Med*. 163:2433–2445.

Bandura A (1977) Self-efficacy: Toward a unifying theory of behavioral change. *Psychol Rev*. 84:191–215.

Bodenmann G (1995) A systemic-transactional conceptualization of stress and coping in couples. *Swiss J Psychol*. 54:34–49.

Bodenmann G (1997) Dyadic coping: A systemic-transactional view of stress and coping among couples: Theory and empirical findings. *Eur Rev Applied Psychol*. 47: 137–140.

Bontenbal M (2016) Population, migration and urbanization in Oman. Urban Oman— trends and perspectives of urbanisation in Muscat Capital Area. *Habitat Int*. 21: 29–40.

Brown B, Ramaiya AK, Cronkright P (2020) Chronic disease management. In Annamalai A (Ed). *Refugee Health Care: An Essential Medical Guide* (pp 143–169). New Haven: Springer.

Chen X, Cheng HG, Huang Y, Liu Z, Luo X (2012) Depression symptoms and chronic pain in the community population in Beijing, China. *Psychiatry Res*. 200: 313–317.

Clauw DJ (2014) Fibromyalgia: A clinical review. *JAMA*. 311:1547–1555.

De Ruddere L, Craig KD (2016) Understanding stigma and chronic pain: A state-of-the-art review. *Pain*. 157:1607–1610.

De Ruddere L, Goubert L, Stevens MA, Deveugele M, Craig KD, Crombez G (2014) Health care professionals' reactions to patient pain: Impact of knowledge about medical evidence and psychosocial influences. *J Pain*. 15:262–270.

de Souza JB, Grossmann E, Perissinotti DMN, de Oliveira JO Junior, da Fonseca PRB, Posso IP (2017) Prevalence of chronic pain, treatments, perception, and interference on life activities: Brazilian population-based survey. *Pain Res Manag*. 2017:4643830.

Desai G, Chaturvedi SK (2012) Pain with no cause! Nurses' perception. *Indian J Palliat Care*. 18:162–164.

Dueñas M, Ojeda B, Salazar A, Mico JA, Failde I (2016) A review of chronic pain impact on patients, their social environment and the health care system. *J Pain Res*. 9: 457–467.

Dumit NY, Abboud S, Massouh A, Magilvy JK (2015) Role of the Lebanese family caregivers in cardiac self-care: A collective approach. *J Clin Nurs*. 24:3318–3326.

Edwards R, Augustson EM, Fillingim R (2000) Sex-specific effects of pain-related anxiety on adjustment to chronic pain. *Clin J Pain*. 16:46–53.

El-Islam MF (1978) Transcultural aspects of psychiatric patients in Qatar. *Comp Med East West*. 6:33–36.

Eloul L, Ambusaidi A, Al-Adawi S (2009) Silent epidemic of depression in women in the Middle East and North Africa region: Emerging tribulation or fallacy? *Sultan Qaboos Univ Med J*. 9:5–15.

Engel GL (1980) The clinical application of the biopsychosocial model. *Am J Psychiatry*. 137:535–544.

Finley CR, Chan DS, Garrison S, Korownyk C, Kolber MR, Campbell S, Eurich DT, Lindblad AJ, Vandermeer B, Allan GM (2018) What are the most common conditions in primary care? Systematic review. *Can Fam Physician*. 64:832–840.

Freeman E (2002) Treatment of depression associated with the menstrual cycle: Premenstrual dysphoria, postpartum depression, and the perimenopause. *Dialogues Clin Neurosci*. 4:177–191.

García-Campayo J, Ayuso-Mateos JL, Caballero L, Romera I, Aragonés E, Rodríguez-Artalejo F, Quail D, Gilaberte I (2008) Relationship of somatic symptoms with depression severity, quality of life, and health resources utilization in patients with major depressive disorder seeking primary health care in Spain. *Prim Care Companion J Clin Psychiatry*. 10:355–362.

GBD 2015 Disease and Injury Incidence and Prevalence Collaborators (2016) Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 388:1545–1602.

GBD 2016 Disease and Injury Incidence and Prevalence Collaborators (2017) Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: A systematic analysis for the Global Burden of Disease Study 2016. *Lancet*. 390:1211–1259.

Gorczyca R, Filip R, Walczak E (2013) Psychological aspects of pain. *Ann Agric Environ Med*. 1:23–27.

Goubert L, Craig KD, Vervoort T, Morley S, Sullivan MJL, Williams CAC, Cano A, Crombez G (2005) Facing others in pain: The effects of empathy. *Pain*. 118: 285–288.

Haase J, Brown E (2015) Integrating the monoamine, neurotrophin and cytokine hypotheses of depression—A central role for the serotonin transporter? *Pharmacol Ther*. 147:1–11.

Hirsh AT, Waxenberg LB, Atchison JW, Gremillion HA, Robinson ME (2006) Evidence for sex differences in the relationships of pain, mood, and disability. *J Pain*. 7:592–601.

Jackson T, Thomas S, Stabile V, Han X, Shotwell M, McQueen K (2015) Prevalence of chronic pain in low-income and middle-income countries: A systematic review and meta-analysis. *Lancet*. 385:S10.

Keitner GI, Miller IW (1990) Family functioning and major depression: An overview. *Am J Psychiatry*. 147:1128–1137.

Kolodny AL (1963) Importance of mood amelioration in relief of pain. A controlled comparative study of three analgesic agents. *Psychosomatics*. 4:230–233.

Kroenke K, Spitzer RL, Williams JB (2001) The PHQ-9: Validity of a brief depression severity measure. *J Gen Intern Med*. 16:606–613.

Lee AA, Piette JD, Heisler M, Janevic MR, Langa KM, Rosland AM (2017) Family members' experiences supporting adults with chronic illness: A national survey. *Fam Syst Health*. 35:463–473.

Lépine JP, Briley M (2004) The epidemiology of pain in depression. *Hum Psychopharmacol*. 19:S3–S7.

Lewandowski AS, Palermo TM, Stinson J, Handley S, Chambers CT (2010) Systematic review of family functioning in families of children and adolescents with chronic pain. *J Pain*. 11:1027–1038.

Lyons RF, Mickelson KD, Sullivan MJL, Coyne JC (1998) Coping as a communal process. *J Soc Pers Relat*. 15:579–605.

Manea L, Gilbody S, McMillan D (2012) Optimal cut-off score for diagnosing depression with the Patient Health Questionnaire (PHQ-9): A meta-analysis. *CMAJ*. 184: E191–E196.

Marangell LB, Clauw DJ, Choy E, Wang F, Shoemaker S, Bradley L, Mease P, Wohlreich MM (2011) Comparative pain and mood effects in patients with comorbid fibromyalgia and major depressive disorder: Secondary analyses of four pooled randomized controlled trials of duloxetine. *Pain*. 152:31–37.

Marks J, Bun LC, McHale SM (2009) Family patterns of gender role attitudes. *Sex Roles*. 61:221–234.

Martucci KT (2017) Disentangling mood and pain: A commentary on 2 manuscripts. *Pain*. 158:4–5.

McGuffin P, Rijsdijk F, Andrew M, Sham P, Katz R, Cardno A (2003) The heritability of bipolar affective disorder and the genetic relationship to unipolar depression. *Arch Gen Psychiatry*. 60:497–502.

Merskey H, Bogduk N (1994) *Classification of chronic pain IASP Task Force on Taxonomy* (2nd ed). Seattle: IASP Press.

Mills SEE, Nicolson KP, Smith BH (2019) Chronic pain: A review of its epidemiology and associated factors in population-based studies. *Br J Anaesth*. 123:e273–e283.

Mittinty MM, Kindt S, Mittinty MN, Bernardes S, Cano A, Verhofstadt L, Gouber L (2020) A dyadic perspective on coping and its effects on relationship quality and psychological distress in couples living with chronic pain: A longitudinal study. *Pain Med*. 21:e102–e113.

Mohamed Zaki LR, Hairi NN (2015) A systematic review of the prevalence and measurement of chronic pain in Asian adults. *Pain Manag Nurs*. 16:440–452.

Musharrafi S, Al Ruzaiqi W, Al Adawi S (2017) Mental health stigma among Oman Medical Speciality Board (OMSB) residents. *Euro Psychiatry*. 41:S516.

Naeem F, Ayub M, Kingdon D, Gobbi M (2012) Views of depressed patients in Pakistan concerning their illness, its causes, and treatments. *Qual Health Res*. 22:1083–1093.

Nascimento MG, Kosminsky M, Chi M (2020) Gender role in pain perception and expression: An integrative review. *Braz J Pain*. 3:1.

Oates MR, Cox JL, Neema S, Asten P, Glangeaud-Freudenthal N, Figueiredo B, Gorman LL, Hacking S, Hirst E, Kammerer MH, Klier CM, Seneviratne G, Smith M, Sutter-Dallay AL, Valoriani V, Wickberg B, Yoshida K, TCS-PND Group (2004) Postnatal depression across countries and cultures: A qualitative study. *Br J Psychiatry Suppl*. 46:s10–s16.

Ohrbach R, Fillingim RB, Mulkey F, Gonzalez Y, Gordon S, Gremillion H, Lim PF, Ribeiro-Dasilva M, Greenspan JD, Knott C, Maixner W, Slade G (2011) Clinical findings and pain symptoms as potential risk factors for chronic TMD: Descriptive data and empirically identified domains from the OPPERA case-control study. *J Pain*. 12:T27–T45.

Paterson JK (2006) Lower trunk pain. In *Musculoskeletal medicine in clinical practice*. London: Springer.

Quartana PJ, Campbell CM, Edwards RR (2009) Pain catastrophizing: A critical review. *Expert Rev Neurother*. 9:745–758.

Rayner L, Hotopf M, Petkova H, Matcham F, Simpson A, McCracken LM (2016) Depression in patients with chronic pain attending a specialised pain treatment centre: Prevalence and impact on health care costs. *Pain*. 157:1472–1479.

Riley JL, Robinson ME, Wade JB, Myers CD, Price DD (2001) Sex differences in negative emotional responses to chronic pain. *J Pain*. 2:354–359.

Schnitzler TJ, Heise CL (2021) Educational challenges in Jordan and Oman. *IJTCS*. 12:63–74.

Scholz J, Woolf CJ (2002) Can we conquer pain? *Nat Neurosci*. 5:1062–1067.

Serbic D, Pincus T (2014) Pain-related guilt in low back pain. *Clin J Pain*. 30:1062–1069.

Sharpe L, McDonald S, Correia H, Raue PJ, Meade T, Nicholas M, Arean P (2017) Pain severity predicts depressive symptoms over and above individual illnesses and multimorbidity in older adults. *BMC Psychiatry*. 17:166.

Sheng J, Liu S, Wang Y, Cui R, Zhang X (2017) The link between depression and chronic pain: Neural mechanisms in the brain. *Neural Plast*. 2017:9724371.

Stubbs B, Vancampfort D, Veronese N, Thompson T, Fornaro M, Schofield P, Solmi M, Mugisha J, Carvalho AF, Koyanagi A (2017) Depression and pain: Primary data and meta-analysis among 237 952 people across 47 low- and middle-income countries. *Psychol Med*. 47:2906–2917.

Sturgeon JA, Hah JM, Sharifzadeh Y, Middleton SK, Rico T, Johnson KA, Mackey SC (2018) Predictors of daily pain medication use in individuals with recurrent back pain. *Int J Behav Med*. 25:252–258.

Tomazoni SS, Almeida MO, Bjordal JM, Stausholm MB, Machado CDSM, Leal-Junior ECP, Costa LOP (2020) Photobiomodulation therapy does not decrease pain and disability in people with non-specific low back pain: A systematic review. *J Physiother*. 66:155–165.

Treede RD, Rief W, Barke A, Aziz Q, Bennett MI, Benoliel R, Cohen M, Evers S, Finnerup NB, First MB, Giamberardino MA, Kaasa S, Kosek E, Lavand'homme P, Nicholas M, Perrot S, Scholz J, Schug S, Smith BH, Svensson P, Vlaeyen JWS, Wang SJ (2015) A classification of chronic pain for *ICD-11*. *Pain*. 156:1003–1007.

Tsang A, Von Korff M, Lee S, Alonso J, Karam E, Angermeyer MC, Borges GL, Bromet EJ, Demytteneare K, de Girolamo G, de Graaf R, Gureje O, Lepine JP, Haro JM, Levinson D, Oakley Browne MA, Posada-Villa J, Seedat S, Watanabe M (2008) Common chronic pain conditions in developed and developing countries: Gender and age differences and comorbidity with depression-anxiety disorders. *J Pain*. 9:883–891.

UK Research Integrity Office (2009) UK integrity research office. Available at: https://ukrio.org/wp-content/uploads/UKRIO-Code-of-Practice-for-Research.pdf. Accessed April 18, 2021.

Van Alboom M, De Ruddere L, Kindt S, Loeys T, Van Ryckeghem D, Bracke P, Mittinty MM, Goubert L (2021) Well-being and perceived stigma in individuals with rheumatoid arthritis and fibromyalgia: A daily diary study. *Clin J Pain*. 37:349–358.

Vietri J, Otsubo T, Montgomery W, Tsuji T, Harada E (2015) Association between pain severity, depression severity, and use of health care services in Japan: Results of a nationwide survey. *Neuropsychiatr Dis Treat*. 11:675–683.

Watrous JR, McCabe CT, Jones G, Farrokhi S, Mazzone B, Clouser MC, Galarneau MR (2020) Low back pain, mental health symptoms, and quality of life among injured service members. *Health Psychol*. 39:549–557.

Waugh OC, Byrne DG, Nicholas MK (2014) Internalized stigma in people living with chronic pain. *J Pain*. 15:550.e1–550.e10.

World Health Organization (2018) *International classification of diseases for mortality and morbidity statistics* (11th revision). Available at: https://icd.who.int/browse11/l-m/en. Accessed September 15, 2020.

Wu Y, Levis B, Ioannidis JPA, Benedetti A, Thombs BD, DEPRESsion Screening Data (DEPRESSD) Collaboration (2021) Probability of major depression classification based on the SCID, CIDI, and MINI diagnostic interviews: A synthesis of three individual participant data meta-analyses. *Psychother Psychosom*. 90:28–40.