

Prevalence of psychological distress and associated factors among orthopedic trauma patients at Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia: A cross-sectional study

Mengesha Srahbzu Biresaw^{1*}, Tolesa Fanta Jilcha² and Enguday Tirfeneh Gebeyehu³

¹MSC in Integrated Clinical and Community Mental Health, Department of psychiatry, University of Gondar, college of medicine and health science, Gondar, Ethiopia

²MSC in Integrated Clinical and Community Mental Health, Department of research, Amanuel mental specialized hospital, Addis Ababa, Ethiopia

³MSC in Integrated Clinical and Community Mental Health, Department of psychiatry, Aksum University, college of medicine and health science, Aksum, Ethiopia

Abstract

Background: Orthopedic Trauma exerts a holistic influence on survivors' physical health including a range of mental health problems that interfere with survivors' recovery. Psychiatric disorders and behavioral disturbances are reported to be 3-5 times more common among people with injuries and are a predictor of poor outcome and ongoing disability. Assessing psychological distress among orthopedic trauma patients plays a pivotal role to implement further intervention.

Methods: Institutional based cross-sectional study was conducted at Tikur Anbessa specialized hospital. Hospital anxiety and depression scale was used to assess psychological distress by using face to face interview. A systematic sampling technique was used to select a total of 407 participants. Data has been analyzed using SPSS 20. Bivariate and multivariate logistic regression was done to identify associated factors. Variables with p-value <0.05 have been considered as statistically significant.

Result: prevalence of psychological distress was 35.4%. independent variables like being female (adjusted odd ratio (AOR)=1.65 95% confidence interval (CI) (1.89,3.04)), poor social support (AOR=3.51 95%CI (1.39,8.88)), moderate social support (AOR=2.75 95%CI (1.13,6.72)), having chronic medical illness (AOR=2.24 95%CI (1.16,4.32)), presence of amputation (AOR=2.90 95%CI (1.97,8.73)) and having severe pain (AOR=2.50 95%CI (1.20,5.18)) found to have significant association at p-value <0.05 with psychological distress.

Conclusion and recommendation; the prevalence of psychological distress was high. Being female, having poor social support, having a chronic medical illness, the presence of amputation and having severe pain were significantly associated factors with psychological distress. It is good if clinicians give emphasis to orthopedic patients especially for females and with chronic medical illnesses.

Abbreviations: AOR: Adjusted Odd Ratio, CI: Confidence Interval, HADS: Hospital Anxiety and Depression Scale, NPRS: Numeric Pain Rating Scale; BDI: Beck Depression Inventory

Background

Injuries to the musculoskeletal system constitute 16% of the total burden of disease worldwide [1], this makes it the leading cause of morbidity. Most orthopedic traumas may lead to death even though some of them survive with different unpleasant health outcomes [2]. One world health organization data indicates that 20-50 million people have experienced non-fatal musculoskeletal injuries annually throughout the world [3].

The burden of orthopedic trauma is enormous on survivors, their families and the society at large. It greatly affects the survivors' mental health which interferes with their recovery [4]. Survivors may develop psychological distresses soon with months and years after experiencing the trauma [5]. Globally, the mental health problem in orthopedic trauma survivors is reported to be as common as three to five times than the general population [6].

Even though a significant number of orthopedic trauma survivors develop serious psychiatric disorders, only a few of them are praised

to get the appropriate mental health service by trained professionals [7]. Millions of traumatic injury victims suffer from physical disabilities which may last longer during their year of work-life [8].

Different emotional and behavioral conditions in sufferers following experiencing musculoskeletal system is a common source of patient complaints [9,10]. The magnitude of psychological distresses after sustaining orthopedic trauma varies depending on the screening tool, site of injury and the duration of the study period to the injury. A study conducted in India found that 1 in 5 (22%) patients met the criteria for psychological illness. Mental health problems has been reported to have an association with reduced health-related quality of life [11,12].

***Correspondence to:** Mengesha Srahbzu Biresaw, MSC in Integrated Clinical and Community Mental Health, Department of psychiatry, University of Gondar, college of medicine and health science, Gondar, Ethiopia, E-mail: mengusew@gmail.com

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In another study that was conducted after sufferers experienced severe orthopedic trauma, psychological distress has been found in 14% of them [13]. Psychological distress has been also studied among male orthopedic trauma survivors. According to the result, 30% satisfied the criteria for psychological distress [14].

A 24-month follow-up study among severe orthopedic trauma survivors reported a 42% prevalence of psychological disorder. Among this, only 22% of such patients reported receiving mental health services [10]. In a study conducted at the Philippines among medically ill patients prevalence of psychological distress in the orthopedic unit was found to be 43.9% [15].

Little attention has been given to the negative mental health outcomes of orthopedic trauma in Ethiopia which is against its burden. This might be due to the reason that there are limited researches in this area showing its burden. Therefore, this study described the prevalence of psychological distress and associated factors among the orthopedic population in the study area. The results of this study will serve as a source of direction for intervention by being input in planning future services for survivors of orthopedic trauma.

Methods

Study setting and population

Institutional based cross-sectional study was conducted at Tikur Anbessa specialized hospital. The study population includes orthopedic trauma patients visiting Tikur Anbessa specialized hospital during the data collection period. Those orthopedic trauma patients who are on follow up and aged 16-65 were tried to be included in the study and those orthopedic trauma patients who were severely sick and unable to communicate were excluded from the study.

Sample size determination

The sample size was calculated by using a single population proportion formula, Considering the following assumptions; prevalence $p=50\%$ because no similar study done in our country among orthopedic population, 95% confidence interval, margin of error 5%, a nonresponse rate 10%. Therefore the final sample size was 423. A systematic sampling technique was applied to select study units at the orthopedic outpatient clinic during the study period. Sampling interval (k) was determined by dividing the total study population during the one-month data collection period by a total sample size then the starting point was randomly selected.

Data collection

A structured interviewer-administered questionnaire was used which has five subsections: a socio-demographic questionnaire to assess the patients' background information. Hospital anxiety and depression scale (HADS) were applied to determine psychological distress [16]. The reliability of HADS found to have Cronbach's α of 0.78. A cutoff point of ≥ 16 is considered for participants to be positive for psychological distress [17]. Substance use history was assessed by yes/no answers of respondents and is operationalized according to different literatures. Similarly, chronic medical illness and family mental illness were assessed by yes/no answers of respondents. Social support was measured by the Oslo-3 social support scale. It has the sum score ranging from 3-14 [18]. The numeric pain rating scale (NPRS) was used to measure the intensity of pain. The scoring ranges from 0-10 and classified into four scales as no pain, mild pain, moderate and severe pain [19].

Data processing, analysis, interpretation, and presentation

The completed data was entered using Epi-info 7 then it was exported to SPSS 20 version statistical software for analysis. Descriptive statistics, bivariate analysis, and multivariate logistic regression were used. The significance was declared at $p\text{-value} < 0.05$. The strength of association was described using the adjusted odds ratio (AOR) with its respective 95% CI. Results are presented in the form of tables and graphs using frequency and summary statistics such as mean and percentage to describe the study population in relation to relative variables and discussed with previous results.

Results

Socio-demographic characteristics

A total of 407 participants with a response rate of 96.21% were included in the study. Among this 260 (63.9%) were males. The mean age of the participants was 37 years with standard deviation of ($SD = \pm 13.5$ yrs) ranges from 16 to 65 years, more than one fourth 109 (26.8%) were in age group of 26-35 years, 266 (65.4%) were orthodox Christian religion followers, 227 (55.8%) were married, 257 (63.1%) reported as they have children which range from 1 to 11, 162 (39.8%) were Amhara by ethnicity followed by Oromo accounted for 133 (32.7%) of participant (Table 1).

Clinical and substance-related factors of participants

According to clinical factors, 99 (24.3%) of them have reported as they had comorbid medical illness among this half 49 (49.5%) of the participants were hypertension patients followed by diabetes mellitus patients which were 34 (34.3%) and 18 (18.2%) of them had other cardiac problems.

Regarding current and lifetime substance use, 99 (24.3%) of them used khat in their lifetime and 25 (6.1%) of them used khat within the last 3 months, more than half 222 (54.5%) of the respondents were lifetime alcohol users, and 69 (17.0%) were current alcohol users. 43 (10.6%) of participants used tobacco products in their lifetime and 10 (2.5%) were current tobacco product users.

Psychosocial and trauma-related factors of participants

From the total participants, 167 (41.0%) had poor social support among this 68 of them were females, 164 (40.3%) had moderate social support and among this 62 of them were females and 76 (18.7%) had good social support in which females accounted for almost half 34. According to trauma-related factors of respondents, 133 (32.7%) had upper extremity injury, 294 (72.2%) had lower extremity injury and 16 (3.9%) had injuries from both upper and lower extremity. Road traffic accident was the cause for injury in 174 (42.8%) of study participants followed by a falling accident which was responsible for orthopedic injury in 110 (27.0%) of participants.

Regarding the type of injury, 290 (71.3%) were fractured among these closed fractures accounted for almost half 143 (49.3%). 67 (16.5%) developed complication and among these 60 (89.6%) developed an infection. A total of 36 (8.8%) have undergone amputation, in which 13 (34.2%) have undergone amputation in their upper extremity and 25 (65.8%) have undergone amputation in their lower extremity. Pain was reported by 257 (63.1%) of study participants. The mean pain intensity score was 4.51 ($SD=2.34$) which ranges from 1-10, among those 110 (27.0%) had mild pain, 83 (20.4%) of them has moderate pain and 64 (15.7%) had severe pain within the past 12 hours (Table 2).

Prevalence of psychological distress

My study showed that the prevalence of psychological distress was 144 (35.4%) with 95% CI (30.5, 40.0). The prevalence rate was higher among females since 77/164 (47.0%) is higher when compared to 67/243 (27.6%) of males met the screening criteria for psychological distress in the study.

Factors associated with psychological distress

Bivariate analysis of factors for depression revealed that independent variables; sex, marital status, educational status, monthly income, social support, chronic medical illness, pain severity, having family history of mental illness, having lower extremity injury, developing complication and presence of amputation were found to be candidate variables for multivariate analysis at p-value <0.2.

Table 1. Distribution of orthopedic trauma patients visiting orthopedic unit of Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia (n=407)

Variable		frequency	Percent (%)
Sex	Male	243	59.7
	Female	164	40.3
Age	16-25	103	25.3
	26-35	109	26.8
	36-45	82	20.1
	46-55	69	17.0
	56-65	44	10.8
Religion	Orthodox	266	65.4
	Muslim	72	17.7
	Protestant	55	13.5
	Other*	14	3.4
Marital status	Married	227	55.8
	Single	121	29.7
	Divorced	31	7.6
	widowed/widower	28	6.9
have children	Yes	257	63.1
	No	150	36.9
No. of children	1-3 children	159	61.9
	>=4 children	98	38.1
Ethnicity	Amhara	162	39.8
	Oromo	133	32.7
	Tigre	46	11.3
	Gurage	41	10.1
	Welayita	14	3.4
	Other**	11	2.7
Residence	Rural	82	20.1
	Urban	325	79.9
Educational level	Can't read & write	53	13.0
	elementary school	111	27.3
	high school	109	26.8
	preparatory school	39	9.6
	college and above	95	23.3
Job	Employed	122	30
	Unemployed	285	70
Monthly income	Below poverty bench mark	189	46.4
	Above poverty bench mark	218	53.6

*= Catholic, Adventist **=Kefa, Siltie, Sidamo

Table 2. Description of trauma-related factors among orthopedic trauma patients visiting the orthopedic unit of Tikur Anbessa specialized hospitals, Addis Ababa, Ethiopia (n=407)

Variables		Frequency (N)	Percent (%)
Upper extremity injury	Yes	133	32.7
	No	274	67.3
lower extremity	Yes	294	72.2
	No	113	27.8
Multiple limb injury	Yes	16	3.9
	No	391	96.1
Cause for injury	Road traffic accident	174	42.8
	Fall	110	27.0
	Assault/blow	55	13.5
	Machine	5	1.2
	Crash	30	7.4
	Bullet/blast	16	3.9
	Other*	17	4.2
Type of injury	Fracture (yes)	290	71.3
	Closed	143	49.3
	Open	92	31.0
	Fracture & dislocation	57	19.7
	Dislocation and sprain (yes)	47	11.5
	Ligament injury	37	9.1
Complication	Other**	40	9.8
	Yes	67	16.5
Type of complication	No	340	83.5
	infection	60	89.6
	gangrene	5	7.4
Duration since injured	Other***	2	3.0
	<=3 month	141	34.6
	4-6 month	97	23.8
	>6 month	169	41.5
Pain	Yes	257	63.1
	No	150	36.9
Pain intensity	mild	110	42.8
	moderate	83	32.3
	severe	64	24.9

*=medical illness (DM, cancer, muscle TB), chill, unknown cause

**=nerve injury, medical amputation

***=sepsis, fibrosis

These factors were entered into multivariate logistic regression for further analysis in order to control confounding effects. As a result being female, poor social support, presence of amputation and having severe pain are found to be statistically significant with psychological distress at the p-value of less than 0.05. Females were 1.65 times more likely to develop psychological distress than males (AOR=1.65,95% CI:1.89,3.04), those who had poor social support were 3.51 times more likely to develop psychological distress as compared to those who had good social support (AOR=3.51,95% CI: 1.39,8.88), the odds of developing psychological distress among those with moderate social support 2.75 times higher as compared to those with strong social support (AOR=2.75, 95% CI: 1.13, 6.72), the odds of developing psychological distress among those who undergo amputation were 2.90 times higher as compared to those who didn't undergo amputation (AOR=2.90, 95% CI: 1.97,8.73), those who had chronic medical illness were 2.24 times more likely to develop psychological distress as compared to those who didn't have chronic medical illness (AOR=2.24,95% CI:1.16,4.32) and Participants who had severe pain within 24 hours were 2.50 times more likely to develop depression than participants who didn't have pain (AOR= 2.50, 95% CI: 1.20, 5.18) (Table 3).

Table 3. Bivariate and multivariable analysis of factors associated with psychological distress among orthopedic trauma patients visiting the orthopedic unit of Tikur Anbessa specialized hospitals, Addis Ababa, Ethiopia (n=407)

Variables		Psychological distress		COR (95% CI)	AOR (95 CI %)
		YES	No		
Sex	Male	67	176	1	1
	Female	77	87	2.33 (1.53,3.53)	1.65 (1.89,3.04)*
Marital status	Married	75	152	1	1
	single	43	78	1.12 (0.7, 1.8)	1.59 (.81, 3.13)
	Divorced/widowed	26	33	1.60 (0.9, 2.9)	1.24 (.53, 2.92)
Educational status	Can't read & write	23	30	1.84 (0.91,3.69)	1.76 (.59,5.22)
	Elementary	38	73	1.25 (.69,2.25)	1.35 (.57,3.20)
	high school	41	68	1.44 (.80,2.60)	1.45 (.63,3.32)
	preparatory school	14	25	1.34 (.61,2.95)	1.70 (.56,5.18)
	College & above	28	67	1	1
Monthly income	Below poverty bench mark	73	116	1.30 (.87, 1.96)	1.21 (.64, 2.28)
	Above poverty bench mark	71	147	1	1
Social support	Poor	70	97	2.17 (1.18,3.96)	3.51 (1.39, 8.88)**
	Moderate	55	109	1.51 (.82,2.79)	2.75 (1.13, 6.72)*
	Good	19	57	1	1
Chronic medical illness	Yes	47	52	1.97 (1.24,3.12)	2.24 (1.16, 4.32)*
	No	97	211	1	1
Family history of mental illness	yes	28	31	1.81 (1.03,3.16)	1.43 (.63, 3.24)
	no	116	232	1	1
Lower extremity injury	yes	112	182	1.56 (.97,2.50)	0.65 (0.31,1.37)
	no	32	81	1	1
Complication	yes	38	29	2.89 (1.69,4.94)	1.98 (.96,4.12)
	no	106	234	1	1
Amputation	yes	23	13	3.66 (1.79,7.46)	2.90 (1.97,8.73)*
	no	121	250	1	1
pain intensity	Mild	34	79	1	1
	Moderate	55	109	1.40 (.77, 2.54)	1.06 (.54,2.08)
	Severe	19	57	2.95 (1.5,5.6)	2.50 (1.20,5.18)*

α = 0.05
 * =P-value<0.05
 ** =P-value< 0.01
 *** =P-value<0.001

Discussion

Discussion on the prevalence of psychological distress

The study revealed that the prevalence of psychological distress was 35.4%. The current study finding for psychological distress was higher than the studies conducted in India 22% [12] and a study in the USA 19% [20]. The reason for the above difference might be due to the difference in sample size and study population who were only sport-related injuries while receiving physical therapy in the USA.

On the contrary finding of this study on the prevalence of psychological distress was lower than a study conducted at USA 42% [10] and another study in USA 45% [21] and in the Philippines 43.9% [15]. This difference might be attributed to measurement tool which was beck depression inventory (BDI) used in US [21], time onset of the study since injury and study participants who were only on patients with severe lower limb injury and study type which was prospective cohort at USA a follow up study and [10] and sample size which was a large scale study among general medical inpatients in Philippines [15].

Discussion on Factors associated with psychological distress

This study revealed that variables like being female, having poor and moderate social support, those who have chronic medical illness, amputation and having severe pain were found to be statistically significant for depression. Females were 1.65 times more likely to

develop psychological distress than males. This study was in line with a study conducted in China (AOR=2.62) [22]. This study was supported by studies conducted in the US, United Kingdom, Korea, Jordan, Hong Kong Pakistan and India [23-29].

The odds of developing psychological distress among those who have poor social support were 3.51 times higher when compared to those who have strong social support. This may be due to the reason that good social support is known in buffering the negative consequence of traumatic events [30,31]. Our study result has been found to be consistent with other studies in the US and Pakistan [25,32].

Those who had chronic medical illnesses were 2.24 times more likely to develop psychological distress than those who haven't chronic medical illnesses. This may be due to a reduction in functional independence and long term survival time with being a comorbid victim of physical injury and additional systemic illness [33] which appears to undermine the victim's mental wellness and increases patients' susceptibility for mental health problems. This may also be due to immune suppression and neurotransmitter disturbances which are the major causes of morbidity including mental health problems [34,35].

The odds of developing psychological distress among those who undergo amputation were 2.90 times higher as compared to those who didn't undergo amputation. This may be attributed to adjustment reactions to the new event and loss of sense of independence and

having to rely on others for some of the most common everyday needs after loss of one or more limbs [36], because victims may come up with difficulties in carrying out daily activities as well as other tasks and it affects their recovery after orthopedic injury. This may result in an increased chance of physical and psychological disabilities which are major causes of emotional distress [4,36,37]. This may also be due to the fact that distortion of the patients' body image and decreased self-esteem after amputation which sets a series of emotional, perceptual and psychological reactions [38]. This was supported by a study conducted at Jordan [24].

Those who had severe pain within the last 24 hours were 2.50 times more likely to develop psychological distress than those who didn't have pain within the last 24 hours. This may be due to increased discomfort on patients which leads to increased emotional distress. It may also be due to the fact that pain is shown to cause altered synaptic connectivity at the prefrontal cortex and hippocampus [39], as well as altered dopamine signaling from the ventral tegmental area [40], these changes have been known to trigger negative symptoms of depression [41]. This was supported by studies conducted in the UK and Korea [23,28,29].

Conclusion and recommendation

Our study found a high prevalence of psychological distress when compared to the general population. Factors like being female, having poor social support, having a chronic medical illness, the presence of amputation and having severe pain were significantly associated with psychological distress. It is good if clinicians working at orthopedic clinics give emphasis on patients' psychological state during evaluating especially for females, those having a comorbid medical illness, those with poor social support, patients who undergo amputation and those with severe pain. It is also good if other researchers conduct a prospective cohort study to investigate the temporal relationship between factors such as comorbid medical illness and amputation, and psychological distress.

Declarations

Ethical approval and consent to participate

Ethical clearance was obtained from both the University of Gondar and Amanuel mental specialized hospital Ethical Review committee. Written Informed consent was obtained from participants aged 18 years and above. Written assent was also obtained for those who aged below 18 years from patients' caregivers coming with them. Each respondent was informed about the objective of the study that it will contribute necessary information for policymaker and other concerned bodies. Anyone who was not willing to participate in the study was not forced to participate. They were also informed that all data obtained from them would be kept confidentially by using code instead of any personal identifier and is meant only for the purpose of study. For the participants who were found to be positive for psychological distress during the study, linkage to nearby psychiatric clinic were done in order to have further assessment on their condition and it was done for a total of 18 patients.

Consent for publication

Not applicable

Availability of data and materials

The original data set analyzed in this study is not attached to this manuscript for a matter of privacy of study participants. But it is

possible to send the data set as per the reviewers' reasonable request by the corresponding author.

Competing interests

The authors declare that they have no competing interest.

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Authors' contributions

MS participated in the conception and design of the study, wrote the proposal, participated in data collection, analysis and write up of this manuscript. TF and ET participated in the design of the study, commented on the proposal, analysis and write up and edition of this manuscript. All authors read and approved the final manuscript.

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