Original article

Anxiety and depression in patients with knee osteoarthritis

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Background: Anxiety and depression is currently a leading health problem worldwide. The etiology of anxiety and depression involves multiple factors and the literature indicated that patients with osteoarthritis of the knee are likely to experience anxiety and depression.

Objective: To study the prevalence of anxiety and depression and associated factors in patients with knee osteoarthritis.

Methods: A total of 343 participants receiving treatment at the out-patient department (OPD) of Bang Bua Thong Hospital were recruited in line with the inclusion and exclusion criteria. The following four evaluation forms were used: 1) the demographic data questionnaire; 2) the Thai version of the Hospital Anxiety and Depression Scale (Thai HADS); 3) the Knee and Osteoarthritis Outcome Score (KOOS) Evaluation Form; and 4) the Thai version of the Exercise Addiction Inventory (Thai EAI).

Results: This study found that 8.5% had anxiety alone, 13.1% had depression alone and 26.8% had anxiety and depression. Factors related to anxiety or depression included age, education, severe symptoms, chronic hypertension, diabetes, active knee exercise, walking, aerobic, bicyclinge, and stretching, physical therapy treatment for knee osteoarthritis, Thai traditional massage, KOOS, score of EAI.

Conclusion: The study found that correlated factors included score of KOOS and score of the Thai version of the Exercise Addiction Inventory (Thai EAI) had correlations with anxiety or depression. The results of this study will be useful for patients with osteoarthritis to reduce the risk of anxiety and depression resulting in receiving treatment, care and choosing the right exercise methods.

Keywords: Anxiety, depression, osteoarthritis of the knee, behavior of exercise.

The Department of Mental Health reported in 2013 that over 1.4 hundred thousand Thai people suffered from anxiety, and the World Health Organization (WHO) has projected that depression will be the leading global public health problem by 2020. [1, 2] In Thailand, depression surveys in elderly patients have found that the prevalence of depression is 77.0% in elderly patients, and the rate increases with age. The impacts of depression on the quality of life of elderly patients can be very high. For example, patients might perceive a loss of self-control, lose the will to live and be in a constant state of stress. [3, 4] A study on the prevalence of psychiatric illnesses in Chinese people with knee osteoarthritis at a bone and joint surgery clinic reached 39.0% with psychiatric abnormalities, while 29.0% reported depression and 24.0% anxiety.[5] In addition, a study in the United States on the correlations among fear, anxiety and depression and correlations with work in patients with knee osteoarthritis found increasing anxiety to be correlated with lower knee joint function in patients. Additionally, daily activities and knee X-rays examined by the aforementioned study indicated that significant decreases in knee function in knee osteoarthritis patients was associated with anxiety, fear, and depression.[6]

One of the major symptoms that can cause mental health problems is physical problems. These problems include bone and joint problems, muscle weakness, nervous system problems, and others. The WHO estimates that the number of patients with bone and joint problems will increase from 400 million people in 2008 to 570 million people by 2020.[7] As for the

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situation in Thailand, a survey in the population of 2,463 people living in the countryside who were at least 15 years of age found that 12.5% of samples had knee pain, which was one of the top-ranking statistics for all pain.[8]

Knee osteoarthritis (OA) is an ailment caused by degeneration of cartilage and joints in a process which cannot be reversed back to normal. This disease is commonly encountered in patients aged 46 - 60 years.[9] Knee osteoarthritis is the most commonly encountered musculoskelital disease and is ranked fourth and eighth among all women's and men's health problems, respectively, worldwide. In addition, knee osteoarthritis is a cause for increasing disability in industrialized and developing countries. The risk factors associated with knee osteoarthritis include age, gender, birth defects and basic factors such as exercise, injury, and muscle and tendon strength around joints in the presence of damage or injury. [10] In addition, knee osteoarthritis can limit daily activities and locomotion, thereby negatively impacting quality of life, particularly among people aged 45 years and up.[11] Approximately, 4.3 million people in the United States are affected by knee osteoarthritis and knee dysfunction, which are primary causes of knee pain. In addition, a previous study found multiple factors correlated with knee joint function, and evidence indicates that psychological factors such as anxiety, fear and depression are correlated with physical function in patients with knee osteoarthritis. The previous research has found that increased anxiety is correlated with decreased function. [12]

Knee osteoarthritis could cause physical impacts ranging from mild impacts to disability and can also cause psychological impacts. As a result, the objectives of this study was to study anxiety and depression in patients with osteoarthritis of the knee in order to create benefits to treatment, care, rehabilitation and mental health care for patients with knee osteoarthritis and to prevent negative psychological impacts and impacts to activities of daily living.

Materials and methods

This study was cross-sectional descriptive research design. The sample population was patients with knee osteoarthritis seeking treatment at the out-patient department (OPD) of Bang Bua Thong Hospital in Nonthaburi from August to October 2019. The sample had to meet the inclusion criteria consisting of willingness and consent to participate, male or female, aged over 50 years, and diagnosed with ICD-10: M170-M179. On the contrary, the exclusion criteria were inability to read or write in Thai, requirement for emergency care, for example, the unconscious, high blood pressure of greater than 160/110 mmHg, fever, breathing difficulty. The total sample size according to the criteria was 343 participants.

The collection instruments were: 1) a demographic data questionnaire; 2) the Thai version of the Hospital Anxiety and Depression Scale (Thai HADS). The reliability test is equal to 0.86 for anxiety subscale and 0.83 for depression sub-scale (Thai HADS values at the point of cut > 11). For item 1, 3, 5, 6, 8, 10, 11, 13 is calculated as 3, 2, 1, 0 score, and item 2, 4, 7, 9, 12, 14 is calculated as 0, 1, 2, 3 score. The scores were summarized to calculate for the result; 3) the Knee and Osteoarthritis Outcome Score (KOOS) evaluation form and 4) the Thai version of the Exercise Addiction Inventory (EAI). It comprises question item, the reliability to 0.84, validity to 0.80, Cronbach's alpha coefficient 0.84. The score has 1 to 5 points and then the score was summarized to calculate for result.

This study has been approved by the Ethics Committee, the Institutional Review Board (IRB), Faculty of Medicine, Chulalongkorn University (no. IRB 276/62).

Statistical analysis

Data were analyzed by the SPSS version 22.0 software package. Each type of data was analyzed by different statistical methods as follows:

Descriptive statistics were used to describe the characteristics of the sample population. Deductive statistics were used to Chi-square and Fisher's exact test for correlations among the factors associated with anxiety and depression in patients with knee osteoarthritis. Odd ratio (OR) and 95% confidence interval (CI) was also reported. Pearson's product moment correlation coefficient was used to determine the correlations among disability and severity of osteoarthritis of the knee and anxiety and depression in patients with knee osteoarthritis. Logistic linear regression statistics were used to analyze the factors associated with anxiety and depression in patients with osteoarthritis of the knee by using the Forward Likelihood ratio with statistical significance set to $P < 0.05$.

Results

The prevalence of anxiety or depression in 343 patients with knee osteoarthritis, 177 participants had no anxiety or depression (51.6%), 45 participants had only anxiety (13.1%), 29 participants had only depression (8.5%), and 92 participants had anxiety and depression (26.8%). The mean score for anxity 6.4, ± 4.2 (total score 21) and for depression 5.6 ± 3.9 (total score 21) most patients were females (n = 262, 76.4%), and age range of 60 - 69 years (n = 142, 41.4%), married (n = 207, 60.3%). One hundred and seventy participants gained education on the junior high school level or below (49.6%) and 157 participants were unemployed (45.8%) (Table 1).

The mean knee pain duration was 40.8 months, pain and discomfort were moderate in 157 participants (45.8%). All participants received medication for treatment of knee osteoarthritis, followed by physical therapy (n =105, 30.6%), and Thai massage (n = 97, 28.3%). Most of the sample, or 276 participants, did not use walking aids (80.5%), while 32 participants used one-legged canes (9.3%), and 19 participants used three-legged or four-legged canes/walkers (5.5%), respectively. Most patients or 327 participants did not consume alcohol (95.3%), and 336 participants did not smoke (98.0%) (Table 1).

Concerning the exercise behavior of patients with knee osteoarthritis, most of the sample, or 249 participants, exercised in the past (72.6%), 190 participants exercised by walking (55.4%), 104 participants exercised the knee joints (30.3%), and 68 participants rode bicycles (19.8%), respectively. Most of the sample, or 115 participants, never warmed up before or cooled down after exercise (46.8%), and most of the sample, or 178 participants, preferred to walk rather than ridinge motorcycles on some occasions while doing errands somewhere nearby (51.9%). Of the 343, 207 participants (60.3%) had exercise addiction with risk presence, 30 participants (12.0%), exercise addiction and 12 participants (4.8%) non exercise addiction. From the total score of 30, the mean score was 14.6, ± 8.9.

According to information from KOOS of patients with knee osteoarthritis, total score 100 for each aspects, the mean score was 67.3 for symptom evaluation, 69.9 for pain, 71.06 for activity of daily living, 38.59 for movement in exercise and othr activity, and 51.4 for quality of life (Table 1).

Correlations among the factors and anxiety in 343 patients with knee osteoarthritis using chi-square and Fisher's exact probability test revealed that age and education were correlated with anxiety with statistical significance ($P < 0.001$). Furthermore, hypertension and diabetes mellitus were correlated with anxiety ($P = 0.003$, $P = 0.049$ respectively). In addition, pain was correlated with anxiety ($P = 0.002$), and physical therapy treatment of knee osteoarthritis was correlated with anxiety ($P < 0.001$). Additionally, exercise addiction were found to be correlated with anxiety ($P < 0.05$). Exercise addiction and the questionnaire evaluating knee joints on symptoms, pain, activities of daily living, movements during exercise and other activities, and quality of life found that these factors had negative correlations with anxiety ($P < 0.001$) (Table 2). The depression score evaluated by the Thai HADS questionnaire was correlated with anxiety *(*$P < 0.001$) (Pearson's correlation coefficient $r = 0.709$).

Age and education were correlated with depression ($P < 0.005$). Furthermore, hypertension and other chronic illnesses also had statistically-significant correlations with depression ($P = 0.0016$, $P = 0.007$). Knee joint treatment by Thai massage and physical therapy was correlated with anxiety ($P = 0.0014$, $P < 0.001$). Exercise behaviors, joint exercise, aerobic dancing, bicycling and warming up before and cooling down after exercising were correlated with depression ($P < 0.05$). Exercise addiction and the questionnaire evaluating knee joints on symptoms, pain, activities of daily living, movements during exercise and other activities, and quality of life found that these factors were negatively correlated with depression with ($P < 0.005$) (Table 2).

As shown in Table 3, when the related factors above were analyzed for predicting anxiety in patients with knee osteoarthritis using logistic regression analysis with controlled influence of other variables by the Forward Likelihood ratio, it was found that factors linked to anxiety in patients with knee osteoarthritis were age adjusted odd ratio = 0.343 time (95% CI 0.148 - 0.794), hypertension adjusted odd ratio = 2.551 time (95% CI 1.208 - 5.38), physical therapy treatment adjusted odd ratio = 0.417 time (95% CI 0.178 - 0.976), exercise by walking adjusted odd ratio = 0.320 time (95% CI 0.138 - 0.740), knee joint severity evaluation (on movement during exercise and other activities) adjusted odd ratio = 0.249 time (95% CI 0.093 - 0.667), knee joint severity evaluation (quality of life) adjusted odd ratio = 0.353 time (95% CI 0.156 – 0.802), and depression adjusted odd ratio = 9.412 time (95% CI 4.241 - 20.889) (Table 3).

As shown in Table 4, after all of the related factors shown above were analyzed for factors predicting to depression in patients with knee osteoarthritis using logistic regression analysis with control of influence from other variables by using the Forward Likelihood ratio, patients with knee osteoarthritis who received physical therapy treatment had depression adjusted odd ratio 0.210 time (95% CI 0.092 - 0.482) when compared to patients with knee osteoarthritis who do not received treatment by physical therapy with statistical significance. Knee severity evaluation scores on symptoms had score range 0 - 50 point had depression adjusted odd ratio 0.367 time (95% CI 0.147 - 0.914) when compared to knee severity evaluation scores on symptoms had score range 51-100 point with statistical significance. After all variables were controlled, anxiety influence on depression adjusted odd ratio 10.213 time (95% CI 5.092 - 20.485) with statistical significance (Table 4).

Table 1. The number and percentage of general information and Chi-Square test result of the correlation between related factor with anxiety and depression.

Characteristics	N (%)	Anxiety		*P*-value	Depression		*P*-value
		Non anxiety	Anxiety		Non depression	Depression	
		N (%)	N (%)		N (%)	N (%)	
Gender							
Man	81 (23.6)	48 (23.3)	33 (24.1)	0.867	54 (24.3)	27 (22.3)	0.675
Woman	262 (76.4)	158 (76.7)	104 (75.9)		168 (75.7)	94 (77.7)	
Age							
50 - 59 (years)	88 (25.7)	59 (28.6)	29 (21.2)	< 0.001**	58 (26.1)	30 (24.8)	0.013*
60 - 69 (years)	142 (41.4)	67 (32.5)	75 (54.7)		79 (35.6)	63 (52.1)	
70 - 79 (years)	90 (26.2)	63 (30.6)	27 (19.7)		67 (30.2)	23 (19.0)	
Marital Status							
Single	50 (14.6)	27 (13.1)	23 (16.8)	0.519	30 (13.5)	20 (16.5)	0.748
Married	207 (60.3)	124 (60.2)	83 (60.6)		136 (61.3)	71 (58.7)	
Widow/ Divorce	86 (25.1)	55 (26.7)	31 (22.6)		56 (25.2)	30 (24.8)	
Religion							
Buddhism	319 (93.0)	196 (95.1)	123 (89.8)	0.056	206 (92.8)	113 (93.4)	0.836
Christ/ Islamic	24 (7.0)	10 (4.9)	14 (10.2)		54 (24.3)	27 (22.3)	
Education level							
The junior high school level or below	170 (49.6)	10 (50.0)	67 (48.9)	< 0.001**	111 (50.0)	59 (48.8)	0.002*
High school or equivalent	92 (26.8)	43 (20.9)	49 (35.8)		48 (21.6)	44 (36.4)	
Bachelor degree/ Postgraduate	81 (23.4)	60 (29.1)	21 (15.3)		63 (28.4)	18 (14.9)	
Current occupation							
No occupation/Retired	190 (55.4)	118 (57.3)	72 (52.6)	0.344	127 (37.2)	63 (52.1)	0.542
Civil service/state enterprise/ Company employees/permanent employees/temporary employees	60 (17.5)	38 (18.4)	22 (16.1)		39 (17.6)	21 (17.4)	
Freelancer/Trading/Farmers/ Fisheries	93 (27.1)	50 (24.3)	43 (31.4)		56 (25.2)	37 (30.6)	
Medial disease							
Underlying disease	107 (31.2)	64 (31.1)	43 (31.4)	0.950	152 (68.5)	84 (69.4)	0.856
Hypertension disease	174 (50.7)	91 (44.2)	83 (60.6)	0.003*	102 (45.9)	72 (59.5)	0.016*
Diabetes disease	107 (31.2)	56 (27.2)	51 (37.2)	0.049*	66 (29.7)	41 (33.9)	0.427
Hyperlipidemia disease	126 (36.7)	71(34.5)	55 (40.1)	0.285	77 (34.7)	49 (40.5)	0.286
Myocardial infarction disease	16 (4.7)	13 (6.3)	3 (2.2)	0.076	14 (6.3)	2 (1.7)	0.051
Other (gout asthma thyroid etc.)	40 (11.7)	28 (13.6)	11 (8.8)	0.172	33 (14.9)	7 (5.8)	0.012*

*$P < 0.05$, ** $P < 0.001$, a = Fisher's exact probability test

Table 1. (Con) The number and percentage of general information and Chi-Square test result of the correlation between related factor with anxiety and depression.

Characteristics	N (%)	Anxiety		*P*-value	Depression		*P*-value
		Non anxiety	Anxiety		Non depression	Depression	
		N (%)	N (%)		N (%)	N (%)	
Level of pain							
No pain	24 (7.0)	19 (9.2)	5 (3.6)	0.002*	18 (8.1)	6 (5.0)	0.053
Little pain	108 (31.5)	77 (37.4)	31 (22.6)		79 (35.6)	29 (24.0)	
Middle pain	157 (45.8)	84 (40.8)	73 (53.3)		91 (41.0)	66 (54.5)	
Very pain	54 (15.7)	26 (12.6)	137 (20.4)		34 (15.3)	20 (16.5)	
Treatment for osteoarthritis							
Thai traditional massage	97 (28.3)	52 (25.2)	45 (32.8)	0.126	53 (23.9)	44 (36.4)	0.014*
Physical therapy	105 (30.6)	80 (38.8)	25 (18.2)	< 0.001**	91 (41.0)	14 (11.6)	< 0.001**
Other	4 (1.2)	1 (0.5)	3 (2.2)	0.306[a]	3 (1.4)	1 (0.8)	0.665
Assistive walking devices							
Did not use walking aids	276 (80.5)	160 (77.7)	116 (84.7)	0.100[a]	175 (78.8)	101 (83.5)	0.595
Walker	8 (2.3)	5 (2.4)	3 (2.2)		7 (3.2)	1 (0.8)	
Three-legged or four-legged	19 (5.5)	17 (8.3)	2 (1.5)		12 (5.4)	7 (5.8)	
Cane	32 (9.3)	20 (9.7)	12 (8.8)		23 (10.4)	9 (7.4)	
Wheel	8 (2.3)	4 (1.9)	4 (2.9)		5 (2.3)	3 (2.5)	
Behavior of exercise							
Non ever	94 (27.4)	32 (15.5)	62 (45.3)	< 0.001**	39 (17.6)	55 (45.5)	< 0.001**
ever	249 (72.6)	174 (84.5)	75 (54.7)		183 (82.4)	66 (54.5)	
Frequency of exercise in 6 months ago							
Non exercise	145 (42.3)	68 (33.0)	77 (56.2)	< 0.001**	77 (34.7)	68 (56.2)	< 0.001**
1 - 2 times/month)	44 (12.8)	26 (12.6)	18 (13.1)		27 (12.2)	17 (14.0)	
1 - 2 times/week)	67 (19.5)	43 (20.9)	24 (17.5)		48 (21.6)	19 (15.7)	
More than 3 times/week	87 (25.4)	69 (33.5)	18 (13.1)		70 (31.5)	17 (14.0)	
Types of exercise							
Exercise knee movement	104 (30.3)	65 (31.6)	39 (28.5)	0.542	78 (35.1)	26 (21.5)	0.009*
Walking	190 (55.4)	139 (67.5)	51 (37.2)	< 0.001**	138 (62.2)	52 (43.0)	< 0.001**
Jogging	16 (4.7)	9 (4.4)	7 (5.1)	0.750	11 (5.0)	5 (4.1)	0.730
Aerobic dance	32 (9.3)	28 (13.6)	4 (2.9)	< 0.001**	27 (12.2)	5 (4.1)	0.015*
Swimming	12 (3.5)	7 (3.4)	5 (3.6)	1.00[a]	8 (3.6)	4 (3.3)	1.000[a]
Cycling	68 (19.8)	51 (24.8)	17 (12.4)	0.005*	57 (25.7)	11(9.1)	< 0.001**
Exercise addiction							
Non exercise addiction	97 (28.3)	33 (16.0)	64 (46.7)	< 0.001**	43 (19.4)	54 (44.6)	< 0.001**
Exercise addiction but no risk	216 (63.0)	149 (72.3)	67 (48.9)		154 (69.4)	62 (51.2)	
Risk from exercise addiction	30 (8.7)	24 (11.7)	6 (8.7)		25 (11.3)	5 (4.1)	

*$P < 0.05$, ** $P < 0.001$, a = Fisher's exact probability test

Table 2. Correlations among anxiety, depression, exercise addiction, and knee joint symptoms reported with Pearson's correlation coefficient.

Factors studied	Anxiety score		Depression score	
	r	*P*-value	*r*	*P*-value
Exercise Addiction	-0.345	-0.370	-0.370	<0.001*
Knee Joint Severity Evaluation (Symptoms)	-0.366	-0.428	-0.428	<0.001*
Knee Joint Severity Evaluation (Pain)	-0.376	-0.373	-0.373	<0.001*
Knee Joint Severity Evaluation (Activities of daily living)	-0.376	-0.373	-0.373	<0.001*
Knee Joint Severity Evaluation (Movements during Exercise and Other Activities)	-0.351	-0.318	-0.318	<0.001*
Knee Joint Severity Evaluation (Quality of life)	-0.396	-0.412	-0.412	<0.001*

* = Correlation is significant at the 0.01 level (2-tailed)

Table 3. Analysis results for factors predict anxiety in patients with knee osteoarthritis by linear regression (n = 343).

Variables	B	SE (B)	*P*-value	Adjusted OR	95% CI	
					lower	Upper
Age	-1.070	0.428	0.012*	0.343	0.148	0.794
Hypertension	0.937	0.381	0.014*	2.551	1.208	5.388
Treatment by physical therapy	-0.874	0.434	0.044*	0.417	0.178	0.976
Exercise by walking	-1.140	0.428	0.008*	0.320	0.138	0.740
Knee joint severity evaluation (Movement during exercise and performance of other activities)	-1.391	0.503	0.006*	0.249	0.093	0.667
Knee joint severity evaluation (Quality of life)	-1.041	0.418	0.13*	0.353	0.156	0.802
Depression	2.242	0.407	<0.001*	9.412	4.241	20.889
Constant	1.493	1.152	0.195	4.452		

*$P < 0.05$

Table 4. Analysis results for factors predict depression in patients with osteoarthritis of the knee by linear regression statistics (n = 343).

Variable	B	SE (B)	*P*-value	Adjusted OR	95% CI	
					lower	Upper
Physical therapy treatment	-1.559	0.424	<0.001*	0.210	0.092	0.482
Knee joint severity evaluation (on symptoms)	-1.003	0.465	0.031*	0.367	0.147	0.914
Anxiety	2.324	0.355	<0.001*	10.213	5.092	20.485
Constant	1.046	3.620	0.57	0.137		

*$P < 0.05$

Discussion

This study found that the prevalence of anxiety in patients with knee osteoarthritis was 8.5% and that the prevalence of depression 13.1%. The findings were consistent with a study by Wong L, *et al*., who studied the prevalence of psychiatric illnesses in Chinese patients with osteoarthritis of the knee and found that 24.0% and 29.0% of patients with knee osteoarthritis had anxiety and depression, respectively, as psychiatric illness.[5]

As for general data, this study found that more participants were females. This finding was consistent with a study by Wong L, *et al*., who studied the prevalence of psychiatric illnesses in Chinese people with knee osteoarthritis. [5] The finding was also consistent with the situation in Thailand in that medical diagnoses of knee pain occurred more frequently in females than males.[18] Additionally, this study found that age of patients with knee osteoarthritis had a correlation with depression with statistical significance. This finding is consistent with a study by Viriyawong P.[13] on selected factors with correlations with depression in patients with knee osteoarthritis, which found that depressed patients with knee osteoarthritis were in the age range of 60 - 69 years (44.4%) and 80 and up (7.4%). The aforementioned study also found that pain was significantly postively correlated with depression in elderly patients with knee osteoarthritis the coefficient was 0.205. Additionally, the aforementioned study found that stress was significantly positively correlated with depression in elderly patients with knee osteoarthritis. The correlation was moderate, correlation coefficient 0.569. Income, function and social support were found to have low significant negative correlations with depression in elderly patients with knee ostoarthritis. However, age, gender, and illness duration had no correlations with depression in elderly patients with knee osteoarthritis.[13] In addition, education, chronic diseases such as hypertension and other chronic diseases (gout, asthma, thyroid disease, allergies, spondylosis, enlarged prostate, kidney disease and rheumatism), Thai massage, physical therapy, symptoms impacts, pain, activities of daily living, movement during exercise and other activities, and quality of life were found to have significant correlations with depression. In addition, age was found to have significant correlations with anxiety. In patients with knee osteoarthritis, education, chronic diseases such as hypertension and diabetes, pain and discomfort severity, physical therapy, symptom impacts, pain, activities of daily living, movement during exercise and other activities and quality of life were found to have statistically-significant correlations. The findings were consistent with a study by Scopaz KA, *et al*.[6] in elderly patients in the United States who were impacted by knee osteoarthritis; the study found the clinical factors, biomechanical factors correlated with work, anxiety, fear, and depression. That was correlated with bodily function and led to worsening bodily function in terms of pain, pain severity, activities of daily living and quality of life. [6, 7, 13]

Exercise behaviors of patients with knee osteoarthritis found that exercise behaviors, exercise by walking, aerobic dancing, bicycling, warming up before and cooling down after exercise and choosing to walk instead of riding motorcycles to complete errands somewhere nearby had significant correlations with anxiety with statistical significance, and exercise behaviors, knee joint exercises, walking, aerobic dancing, bicycling, warming up before and cooling down after exercising had significant correlations with depression. The findings were consistent with a study by Poonsawad W, *et al*. on the exercise attitudes and behaviors of patients with knee osteoarthritis; that study found that most patients exercised fairly regularly and chose appropriate exercises for their disease by mostly choosing exercises that were appropriate for knee osteoarthritis such as knee joint exercises, walking and exercising in water [14], which minimized knee joint impact. and exercise or working of knee muscles in patients with osteoarthritis of the knee is aimed at increasing strength and boosting knee muscle resistance as well as to preserve flexiblity, to prevent locked joints and to train muscle coordination. Resistance exercise is used as it involves muscle exertions with and without joint movements in order to produce resistance to applied force.[15]

Exercise helps to control emotions, anxiety, depression, resulting in happiness, resisting stress, depression, and sadness, reducing stress sensitivity. Anxiety also has to aid effectiveness. The function of the adrenal glands, which secrete hormones that affect the work of the central brain. There will be increase in norepinephrine, which noradrenergic effect promotes resist stress, In addition, exercise increases the secretion of endorphin, an opioid substance, which helps to promote good mood and relieve pain. [16]

Conclusions

Based on the findings of this study, 13.1% of the participants had only anxiety, 8.5% had only depression, and 26.8% had both anxiety and depression. The correlating factors were physical therapy treatment, exercise by walking, knee symptom severity evaluation (on movement during exercise and other activities and symptoms) and had correlations with anxiety or depression with statistical significance. Based on the findings of this study, if responsible agencies could assess or screen patients

with knee osteoarthritis at risk of developing anxiety or depression, patients would be beneficial for appropriate care and treatment. Moreover, patients with knee osteoarthritis would be promoted with appropriate care and exercises in maintaining near-normal living with improved quality of living.

Conflict of interest

The authors, hereby, declare no conflict of interest.

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