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Article:	**Effect of Depression on Sleep Quality and Pain among Patients with Arthritis Disease**
Author(s):	Dr. Nighat Shaheen Associate professor Jinnah College for women university of Peshawar
	Dr. Saima Arzeen Lecturer, Department of psychology, University of Peshawar.
	Sidra Batool Visiting Lecturer, Department of psychology, University of Peshawar
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Author(s) Note:	Dr. Nighat Shaheen is serving as an Associate professor at Jinnah College for women university of Peshawar Email: nighatshaheen96@uop.edu.pk
	Dr.Saima Arzeen is serving as a Lecturer at Department of psychology, University of Peshawar. Email: saimaarzeenmehar@uop.edu.pk
	Sidra Batool is serving as a Visiting Lecturer at Department of psychology, University of Peshawar Email: sidrabatool@uop.edu.pk

ABSTRACT

The major aim of the present study was to examine the effect of depression on sleep quality and pain among patients with arthritis. The sample included (N=30) arthritis female patients recruited from outpatients of three main hospitals of Peshawar using Convenient Sampling Technique. Age range of the sample was between 45 to 65 years (M=54.51 ± 5.24). The inclusion criteria consisted of patients having diagnosed with hip and/or knee arthritis since one year on the basis of X-rays reports and currently were under treatment. The control group consisted of (N=26) female outpatients in the same age range who visited the OPD of the same hospitals for their less severe diseases. The Siddiqui Shah Depression Scale (Siddiqui & Shah, 1997) was used to measure depression, the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) was used to assess quality of sleep and the Visual Analogue Scale (Gracely, McGrath, Dubner, 1978) was used to obtain data on the severity of pain in participants. Results showed that participants having higher baseline depression obtained significantly higher mean scores on the SSDS, the PSQI, and the VAS scales compared to the control group. The results support all hypotheses of the study. The findings have critical implications in clinical setting by suggesting an utmost need of treatment of the depression in arthritis patients in order to overcome their problem of sleep and reducing intensity of pain.

Key Words: Depression, Sleep Quality, Pain, Arthritis

Introduction:

Osteoarthritis a type of joint disease is one of the most common forms of arthritis globally affecting about 3.6 % of the population, nearly 250 million people. In men it is most common before 45 years of age while in women it is common after 45 years in the period of menopause (Report on Osteoarthritis National Institute of Arthritis and Musculoskeleta land Skin Diseases, April, 2015). In both sexes it is highly prevalent when people get older and causes about 2% of years lived with disability (March, et al., 2014). Globally it causes moderate to severe disability in 43.4 million populations (Estimated prevalence of moderate and severe disability (millions) for leading disability conditions by age, for high-income and middle income countries, 2004 (table 9). The rate of this disease vary in different countries, e-g., in India (5.78), in China, (7.50%, 10.9%, and 13.6%) in Bangladesh (10.2%) and in Pakistan (28.00 %) of the urban and (25.00%) of the rural population have been reported to have knee osteoarthritis (The Global Burden of Disease: 2004 Update Geneva: World Health Organization, 2008, Loeser, 2010., Haq, 2011). Risk factors include gender, age, sex hormones, bone density, obesity, ethnicity and nutritional status. The rate of the disease is increased by activity requiring prolong bending of the knee joint (Moskowitz & Swift, 2012). Osteoarthritis is a syndrome that results of biochemical, metabolic, and physiological changes occur simultaneously in articular cartilage, lining of freely moving joints, (causing gradual loss) subchondral bone, (sclerosis), synovial tissue (inflammation), joint capsules and muscles surrounding the affected joint and active tiny bones at the joint sites. These changes are the result of an imbalance in equilibrium between breakdown and repair of the joint tissue. The most common symptoms include joint pain and stiffness which at the initial stage of the disease occur following exercise but over time become constant. Other symptoms are swelling of joint, decrease in range of mobility and numbness and weakness of arms and legs in case when back is affected that usually appear over years. Previous joint history, abnormal joint or limb development and inherited risk factors are the common causes. People having one leg of different length, obese and have jobs that results high levels of mechanical stress on joints are at a high risk of developing this disease (Mounach., et al, 2008). Rheumatic disorders mainly characterized by chronic and disabling impairment resulting physical damage, limiting functional ability and interfering with daily routine activities of the patients. Osteoarthritis in this context as one of most common causes of incapacity of the labor, need critical examination.

Numerous research studies have reported that osteoarthritis of one or more joints causing varying degree of unrelenting pain and disability is highly prevalent in older population. Further considerable research findings have demonstrated increasing need for operative and non- operative interventions to minimize disability experienced by arthritic patients (Current Rheumatology Reports, 2014., Jones,et al.,2015., Kwok, Vlieland, Rosendaal, Huizinga & Kloppenburg, 2011).

Commonly attributed to age, this debilitating disorder can be worsened by a variety of biological and co- morbid conditions others than aging. Depression commonly observed in older population and in people having chronic painful disease is one of the aggravating factor which increases osteoarthritis pain (Arola, Nicholls, Mallen, & Thomas, 2010., Rosemann, et al., 2007). Jinks (2007) studied self reported osteoarthritis knee pain, general health and physical functions in 3907 adults over 50 years of age who were registered with three general

practitioners using the Short Form 36. His results demonstrated a strong association between onset of osteoarthritis knee pain and considerable reduction in physical functions. Gandhi, Zywiel, Mahomed and Perruccio (2015) examined association between multiple painful joints and self reported depression in 475 patients with end stage. Results showed that participants who reported six or more symptomatic joints had higher level of depression than those whose symptoms were limited to only surgical joints. Although psychological factors certainly contribute to a heightened pain experience, it is also possible that pain itself can contribute to poor mood. Such relationship can only be studied by longitudinal studies of which there are few to date. One is by Hawker et al, (2011). These researchers in older adults of a community cohort having knee and hip osteoarthritis studied arthritis pain, fatigue and depressed mood and covariates certain demographics such as self-rated health, co-morbidity, pain coping, pain catastrophizing and social support at three times points over two years. Their results showed that current arthritis pain strongly predicted future fatigue and disability which in turn predicted depressed mood. The authors concluded that pain through its effect on fatigue and disability developed subsequent depression in these patients.

Carsten, Richard and Jutta (2002) in cross-sectional of 127 and longitudinal of 111 analyses examined association between depressive symptoms and health engagement control strategies, i-e, behavioral and cognitive investments for attainment of health goals and health stresses in elderly individuals. Results showed that elders who were engaged in health management control strategies scored significantly lower on the depression scale than those less likely to engage in control strategies, and invested less on health. The findings concluded that individuals characterized by low levels of health engagement control strategies and higher levels of depression are at increased risk of accelerating decline in mental health. Parmelee, Harralson, McPherron and Schumacher (2013) in a one year longitudinal study of older adults having chronic osteoarthritis examined the effect of knee arthritis on pain, functional disability and perceived health. Depression and anxiety of the patients were measured through DSM-IV checklist and perceived health, pain and disability were examined using self report. Results showed that depression in participants was associated with pain and disability and marginally with perceived health. In another study Parmelee, Tighe, Dautovich (2014) studied among 288 knee arthritis patients recruited from different settings, functional limitations, sleep disturbances, depressive symptoms and pain for one year. Results revealed that at baseline poor sleep was associated with pain and depression but not with disability. Participants having higher levels of pain experienced in combination with sleep disturbances.

Moving along these line Dexter and Brandt in a study examined the effect of age, education and self perceived impact of osteoarthritis problem in 108 patients of hip and knee arthritis of 50 years age and over. Their results revealed that less educated and young patients were more depressed. Further patients who were currently under treatment for their osteoarthritis showed significantly more depressive symptoms than those not under treatment Brandt, 1994). Keeping in view of its serious consequences in terms of limiting fictional ability and reducing quality of life in arthritis patients it seems imperative to examine the effect of depression on quality of sleep, and pain intensity in these patients.

Hypotheses

Following hypotheses were formulated and tested in the present study.

1. Arthritis patients with higher baseline depression scores will be significantly more depressed as compared to the control group.
2. The scores of arthritis patients having higher baseline depression on Pittsburg Sleep Quality Index will be significantly higher than the control group.
3. Arthritis patients having higher baseline depression will obtain significantly higher scores on three measures of pain intensity (i-e, overall pain intensity, day time and night time pain intensity) as compared to control group.

Method

Sample

The sample of study included (N=30) arthritis female patients recruited from outpatients of three main hospitals of Peshawar namely, Hayatabad Medical Complex, Khyber Teaching Hospital, Lady Reading Hospital and orthopedic clinics from different areas of Peshawar. Age range of the sample was between 45 to 65 with mean age from 54.51 ± 5.24. The minimum education of the sample was five years schooling and maximum was eight years. The inclusion criteria consisted of patients having diagnosed with hip and/ or knee arthritis since one year, feeling pain in joints, having at least five to six visits to the physician, and currently were under treatment. The diagnoses were made on the basis of X-rays reports. All those diagnosed with grade 3 that included moderate multiple arthritis, definite narrowing of joint space and possible deformity of bone ends and grade 4 that comprised of definite deformity of bone and narrowing of joint space were included. Those diagnosed with grade 1 and 2, (less severe stages) were taking inflammatory drugs such as NSAID, or any hormone replacement therapy or having other disorders such as diabetes, asthma, higher blood pressure, or any respiratory diseases were excluded. Further those who had experienced stressful life events such as death of a close family member, or any serious injury due to road accident or exposed to a natural disaster or were taking anti- psychotic, anti-depressant, or anxiolytics were also excluded. The control group consisted of (N=26) female outpatients in the same age range who visited the OPDs of same hospitals for having less severe diseases.

Instruments

Personal Informational Sheet

It was designed to collect demographic information such as age, education, previous medical conditions, time since diagnosis, and number of visit to the physicians.

Siddique Shah Depression Scale (SSDS)

The SSDS was developed by Siddiqui and Shah in 1997 at the National Institute of Psychology Quaid-I-Azam University Islamabad. The scale measures level of depression in clinical and non-clinical population. It consists of 30 items, each having four possible alternatives, i-e, never, (0) sometime, (1) usually (3) and always (4).The reliability of the scale determined by split half method for the clinical group is 0.79 and for non clinical group is 0.80. The correlation of the scale with the Zung Depression Self Rating Scale is 0 .55 and with the psychiatric rating of the depression is 0 .04.

Pittsburgh Sleep Quality Index (PSQI)

Buysse et al., in 1989 developed the PSQI to measure quality and pattern of sleep during the earlier month. But it has been used for such a short period as two days (Backhaus, 2002) and one week (Lai, 2005).The scale includes 18 items. Four items are open ended while 14 are scored using frequency and semantic scales. The scale differentiate good sleep from poor. The

scale consists of seven components in which sleep disturbances can occur. Score on each item ranges from 0-3 with the following response categories: not during the past month (0) and three or more times a week (3). From 0 to 21 global score range and global score of five or greater indicates worse sleep quality. Reliability coefficient (Cronbach, Alpha) of the PSQI is 0.83 for its seven domains. As the PSQI is in English, it was deemed essential to translate it in Urdu, which is the national language of Pakistan. The scale was translated in Urdu with permission of the author using Back Translation Technique following the guidelines recommended by Brislin (1973).

Visual Analogue Scale (VAS)

The VAS is the most widely used scale for the measurement of pain intensity (Gracely, McGrath & Dubner, 1978). The scale comprised of a 100 millimeter horizontal line. The endpoints of the line are marked by the responses as no pain to unbearable pain. Participant responds to the VAS by placing 11 marks at the point along the scale that best describes the intensity of the pain he/she experiences. The VAS can also be converted into graphic rating scale. The intensity of pain is measured by distance from left endpoint to the mark made by respondent. The distance reveals measure of pain intensity of respondent in terms of quantity. The VAS has been used in numerous research to measure the outcomes of pharmacological and cognitive behavioral interventions (Parker, et al, 1988; Radley,Young, & Anderson,1987).

Procedure

Permission from the hospital authority and verbal consent from each patient was obtained. Participants were informed about purpose of the study and each was interviewed individually. Convenience Sampling Technique was used to select the sample from three hospital of Peshawar namely, Lady Reading, Naseerullah Babar, and Hayatabad Medical Complex. To measure depression at baseline the Siddiqui Shah Depression Scale (Siddiqui & Shah,1997) was administered on the entire sample both arthritis patients and participants consisting of control group. The Pittsburgh Sleep Quality Index (Buysse, et al., 1989) was used to assess quality of sleep and the Visual Analogue Scale (Gracely, McGrath, Dubner, 1978) was used to obtain data on the severity of pain of participants with high baseline depression included arthritis patients and control group.

RESULTS

Table 1

Mean Baseline Difference between Participants Having High Baseline Depression and Control Group on Siddiqui Shah Depression Scale

Groups of Patients	N	M	SD	t-Value	p	LL	UL	Cohen's d
PHHBLD	30	45.80	16.14	4.84	.00	05.88	09.45	1.06
Control Group	26	33.69	03.66					

Note: PHHBLDS=Participants having high baseline depression score, LL=Lower Limits, UL=Upper Limits

Results in above table show significant difference in terms of depression between arthritis patients having high baseline depression and control group. The mean score of the participants with high baseline depression on SSDS is higher than the control group. These results support first hypothesis of the study which assumed that participants with high level of depression at baseline will be significantly more depressed as compared to the control group.

Table 2

Mean Difference between Participants Having High Baseline Depression and Control Group on Pittsburgh Sleep Quality Index

Groups of Patients	**N**	**M**	**SD**	**t-Value**	**p**	**LL**	**UL**	**Cohen's d**
PHHBLDS	30	54.19	21.80	5.75	.00	7.98	14.16	1.31
Control Group	26	33.61	03.40					

Note: PHHBLDS=Participants having high baseline depression score, LL=Lower Limits, UL=Upper Limits

Results in table 2 reveal that compared to control group the arthritis patients with higher level of depression at baseline obtained significantly higher mean score on the Pittsburg Sleep Quality Index. These findings support second research hypothesis which stated that scores of arthritis patients having higher level of baseline depression on the PSQI will be significantly higher than the control group.

Table 3

Mean Difference between Participants Having High Baseline Depression Scores and Control Group on Visual Analogue Scale

	PHHBLDS (n=30)		**Control Group(n=26)**				
	M	**S D**	**M**	**S D**	**t-Values**	**P**	**Cohen's d**
Overall Pain Intensity	15.19	4.75	8.2	4.14	4.12	0.00	.78
Day Time Pain Intensity	11.90	2.17	4.61	5.39	4.13	0.00	.90
Night Time Pain Intensity	11.42	2.89	3.61	4.66	4.87	0.00	.60

Note: PHHBLDS= Participants having high baseline depression score

Data in table 3 demonstrate that obtained mean score of the participants with higher baseline depression is higher than the control group on all three measures i-e, overall pain intensity, day time pain intensity, and night time pain intensity. These results support third

hypothesis of the study which postulated that arthritis patients having higher baseline depression will obtain significantly higher scores on three measures of pain intensity as compared to control group.

Discussion

The findings of present research suggest that higher baseline depression have significant effect on quality of sleep and intensity of pain among arthritis patients. It is due to this baseline depression, a potential risk factor, in patients diagnosed with arthritis which contributes to enhance intensity of pain which in turn, leads to poor sleep that most of the arthritis patients experience and which limit their physical functions. Arthritis is a syndrome that results of biochemical, metabolic, and physiological changes occur simultaneously because of imbalance in equilibrium between breakdown and repair of the joint tissue (Mounach, 2008). It is usually attributed to age, but different biological and co- morbid conditions others than age can worsen disease and resulting pain in patients (Adams, 2014., Jones,2015). In present study an effort was made o find out the effect of baseline depression on sleep quality and intensity of pain in arthritis patients.

The results of the present study are in line with earlier research findings which revealed that patients with higher baseline depression experienced higher intensity of pain than those having low baseline depression (Kwok, Vlieland, Rosendaal, Huizinga & Kloppenburg, 2011., Arola, Nicholls, Mallen & Thomas,2010., Rosemann, et al., 2007). For example, Riddle Kong and Fitzgerald (2011) examined effect of baseline depression, self-efficacy and social support on severity of pain, and physical function in osteoarthritis patients. Results demonstrated that baseline depression consistently worsened pain and physical functions in participants. However, those with low baseline depression score and higher self-efficacy reported less severe pain and change in physical functions. Further, patients having low social support available reported poor physical functions. Kim in the same year (2011) examined arthritis knee pain and depression in 660 osteoarthritis patients both men and women 65 years and older. Severity of arthritis knee pain of these patients was assessed using X-rays and depression was measured through interview and standardized questionnaires. Results showed higher levels of arthritis pain in those whose X-rays indicated greater joint damage as expected. Interestingly patients who scored higher on the depression scale reported higher levels of arthritis knee pain even when there was no significant joint damage revealed through X-rays. Lobenanz et al., (2004) in multiple sclerosis patients examined disability, quality of life, sleep quality, fatigue and depression and compared with healthy individuals. Their results revealed that compared to healthy people, patients having multiple sclerosis scored significantly lower on the Quality Of Life Scale. The results further showed that scores on the depression scale were predictive for all items of quality of life scale (psychological domain) while on the sleep and fatigue severity scales scores predicted only physical domains.

Globally arthritis is one of the most prevalent chronic medical condition and a major cause of disability and utilization of health care. The chronic pain experience by patients in the disorder is an important factor for seeking medical care and surgical intervention in this population (Egede, 2007). Numerous studies have reported the occurrence of depressed mood among arthritis patients (Arola, Nicholls, Mallen & Thomas, 2010, Rosemann, 2007., Gandhi,2015., Hawker.,et al, 2011., Carsten, 2002, Kim, 2011). In one such study the

researchers found 20% rate of prevalence of depressive symptoms following knee and hip replacement surgery in arthritis patients (Perruccio, Davis, Hogg-Johnson & Badley, 2011).
A number of other research examining association between pain and depression in primary care population of arthritis have found similar findings and same rates have been reported by patients who were under treatment of specialists (Ohayon & Schatzberg, 2003). Further, in observational and longitudinal research on arthritis, depressive symptoms were reported to worse pain, poor physical functions and lower satisfaction with life (Sharma, et al., 2003). Findings of the present study are consistent with previous research reported depression and associated body pain in multiple sites among general medical and surgical populations (Perruccio, Davis, Hogg-Johnson & Badley, 2011). Similarly a number of mediating links have been suggested between depression and pain intensity such as alteration in activity of neurotransmission within central nervous system, psychological problems of anxiety, depression, anger, and poor sleep which in turn adversely affect social relationship with family and friends (Ohayon, 2010). In the current study similar findings were found. Arthritis patients who obtained significantly higher baseline depression scores reported higher intensity of pain and poor sleep than control group.

Conclusion

In the light of findings of current research, it is concluded that higher baseline depression is a potential risk factor contributing to enhance the intensity of pain experience by arthritis patients which in turn leads to poor sleep in them. In order to get maximum benefits from physical treatment, reduces pain intensity and modify sleep in arthritis patients, It is thus, suggested to introduce effective psychological programs to overcome baseline depression in arthritis patients.

Implications

The current research has important implications in the clinical settings. Keeping in view the rate of arthritis disease among females in Pakistan, especially in KPK it is very important to take into account the possible psychological risk factors. One of the most important among them is depression which increases intensify of pain in arthritis patients resulting poor sleep and functional limitations. It is thus, important to subject patients to effective psychological treatment to enable both patients and physicians to manage with the disease effectively.

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NS conceived the idea, supervised and planned the research and drafted the manuscript. collected the data, run statistics and analyzes results. All authors contributed significantly to the submitted manuscript.