DEPRESSION, ANXIETY, SLEEP IMPAIRMENTS AND QUALITY OF LIFE: A COMPARISON BETWEEN PATIENTS WITH PAINFUL DIABETIC PERIPHERAL NEUROPATHY (PDPN) AND NON-PAINFUL NEUROPATHY (NPDPN), KHYBER PAKHTUNKHWA, PAKISTAN

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ABSTRACT

Objectives: This study aimed to evaluate the quality of life, anxiety, depression, and sleep disturbance between patients diagnosed with PDPN (painful diabetic peripheral neuropathy) and NPDPN (non-painful diabetic peripheral neuropathy), Khyber Pakhtunkhwa, Pakistan.

Methods: A cross-sectional study, which included 400 persons aged 30-65 diagnosed with type 1 or type 2 diabetes, was conducted at Khyber Pakhtunkhwa's tertiary care facilities. The purposive sampling techniques were used. The patients were divided into two groups: 200 with painful diabetic peripheral neuropathy (PDPN) and 200 with non-painful diabetic peripheral neuropathy (NPDPN). The Demographic Information Sheet, Hospital Anxiety and Depression Scale (HADS), Douleur Neuropathique 4 (DN4), WHOQOL-BREF, and Sleep Disturbance Adult Measure were the questionnaires used to collect the data.

Results: In comparison to the NPDPN group, the PDPN patients reported significantly higher levels of anxiety (10.8 ± 3.2, $p < 0.001$) and depression (Mean ± SD: 11.2 ± 3.4, $p < 0.001$). The PDPN group experienced more severe sleep deficits (15.4 ± 4.1, $p < 0.001$). In terms of quality of life, PDPN patients had significantly lower scores in physical health (48.6 ± 12.4p < 0.001), psychological well-being (42.8 ± 11.9, $p < 0.001$), social relationships (51.3 ± 10.5, $p < 0.001$), and environment (49.2 ± 12.1, $p < 0.001$). Inadequate sleep, anxiety, and depression were all significant predictors of quality of life in both groups, with the PDPN group experiencing stronger consequences. These results indicate the patients' worse quality of life and increased psychological burden.

Conclusion: PDPN is linked to psychological distress, sleep problems, and decreased quality of life. Effective management should target both physical and psychological aspects.

Keywords: Depression, Anxiety, Sleep Impairment, Diabetic, Neuropathy

INTRODUCTION

Diabetes is a condition where the body cannot control blood sugar levels. It can be caused by consuming processed carbohydrates, red meat, and sugary drinks. Insulin is a hormone that regulates blood sugar, but in diabetes, the body either doesn't produce enough insulin or doesn't use it effectively.

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There are different types of diabetes, including Type I, Type II, and Gestational diabetes. [1] Some women develop Gestational diabetes during pregnancy. Typically, after the baby is born, this diabetes goes away. During this diabetes, in later life, there is a more significant probability of emerging type 2 diabetes. Diabetes that is identified in the period of pregnancy is sometimes, in reality, type II diabetes.[2] According to a study, Common Comorbidities of diabetes include hypertension, hyperlipidemia, kidney infections (renal disease), cardiovascular problems, obstructive sleep apnea, obesity and non-alcoholic fatty liver illness. Diabetic neuropathy is a type of neuropathy that occurs in people with diabetes.[3] It can affect nearly every nerve in the body, leading to many symptoms. Some types of neuropathies affect the nerves supplying internal organs, such as the bladder, heart, and gut.[4]

Diabetic neuropathies are nerve disorders caused by diabetes, affecting around 45% of diabetes patients. The most common type is PDPN, which damages nerves due to high blood sugar levels, often affecting the feet and hands. Symptoms include tingling, burning, numbness, muscle weakness, and reduced sensitivity to heat, cold, and injury.[5] A research was conducted to find out the influence of painless and painful PDPN on depression. For this purpose, 181 subjects were evaluated using different measures, including questionnaires for measuring neuropathy and comorbidity index. Research found that symptoms of depression are more common in PDPN patients than other comorbidities and problems.[6] Another study was conducted in Japan on diabetes patients with painful neuropathy in which a total of 298 patients were studied, and their quality of life, depressive symptoms and anxiety were assessed and found that Japanese diabetic patients had painful diabetic neuropathy. Additionally, patients with PDN had more indicators of depression and deprived quality of life than patients without PDN.[7] A study of 255 individuals with painful diabetic peripheral neuropathy found that most patients had type II diabetes. The study revealed that these patients experienced poor quality of life, depressive and anxiety symptoms, sleep disturbance, and interference with daily activities due to pain.[8] A study assessed sleep disturbance in diabetes patients with painful peripheral neuropathy using the medical outcomes sleep measure (MOS-Sleep). It was found that patients with painful PDPN exhibited sleep impairment in comparison to the general population.[9]

The relationship between chronic pain and psychological distress is reported in patients with conditions like PDPN, who are at a higher risk of developing mental health disorders such as depression and anxiety.[10] Chronic pain can disrupt sleep, leading to psychological distress and impacting quality of life.[11] Quality of life is a multi-dimensional concept encompassing physical health, psychological well-being, social relationships, and environmental factors.[12] Patients with diabetes, especially those with complications like PDPN, often experience compromised quality of life due to physical limitations and psychological burdens.[13] Previous research has shown that individuals with PDPN report lower QoL than those with NPDPN.[14] There was no research data on the Khyber Pakhtunkhwa population. Our study will provide the statistical figures and the relationship between anxiety, depression, quality of life, and sleep impairment in patients with painful diabetic peripheral neuropathy among the population of Khyber Pakhtunkhwa, Pakistan. This study addressed a gap in the existing literature concerning this population and provided insight for the professionals to improve these patients' psychological health and quality of life.

MATERIALS AND METHODS

A cross-sectional study was conducted in the tertiary care hospitals of Khyber Pakhtunkhwa, i.e., Khyber Teaching Hospital, Lady Reading Hospital, Mardan Medical Complex, and Khalifa Gul Nawaz Teaching Hospital, from April 2023 to February 2024. The Purposive sampling technique was used. The sample was divided into two groups: 200 individuals with PDPN and 200 with NPDPN. Those patients who were diagnosed by the endocrinologists with DPN on the basis of their medical history, symptoms, and laboratory tests were enrolled. Participants aged 30-65 with type 1 or type 2 diabetes and PDPN or NPDPN were recruited from endocrinology clinics based on inclusion criteria. Pain lasting for at least six months was required for the PDPN group. Exclusions included individuals with gangrene, arthritis-related diagnoses, cardiovascular diseases, hypertension, kidney problems, or severe psychiatric disorders to minimize confounding factors. The Questionnaires were used to collect the data, i.e., Demographic Information Sheet, Douleur Neuropathique 4 (DN4), Hospital Anxiety and Depression Scale (HADS), WHOQOL-BREF, and Sleep Disturbance Adult Measure. Informed consent was obtained from the patients, who were debriefed after the study. The ethical approval was obtained from Gandhara University, Peshawar. Data were analyzed using SPSS version 25.0. A p-value of <0.05 was considered statistically significant.

RESULTS

The mean age of participants in the PDPN group was 52.4 ± 8.1 years, while in the NPDPN group, it was 51.8 ± 7.9 years. The gender distribution was similar across both groups, with males slightly outnumbering females in the PDPN (110 males, 90 females) and NPDPN (105 males, 95 females) groups. The average duration of diabetes was 12.5 ± 5.6 years in the PDPN group and 11.8 ± 5.4 years in the NPDPN group. The study found

that patients with painful diabetic peripheral neuropathy (PDPN) experience significantly higher levels of depression (11.2 ± 3.4 vs. 8.6 ± 2.9) and anxiety (10.8 ± 3.2 vs. 7.9 ± 3.0) compared to those without PDPN (NPDPN), as shown in Table 2. They also reported more significant sleep impairments (15.4 ± 4.1 vs. 10.2 ± 3.8) and lower quality of life (QoL) across all domains, including physical health (48.6 ± 12.4 vs. 61.2 ± 11.8) and psychological well-being (42.8 ± 11.9 vs. 55.7 ± 10.7), p-values < 0.001.

Regression analyses (Tables 3 and 4) revealed that depression and sleep impairments were significant predictors of QoL in both groups, with depression having a more substantial impact in the PDPN group (β = -0.32, p < 0.001) than in the NPDPN group (β = -0.21, p = 0.009). Anxiety was a significant predictor in the PDPN group (β = -0.24, p = 0.018) but not in the NPDPN group

Table 1: Demographic Characteristics of the Sample

Variable	PDPN (n=200)	NPDPN (n=200)	p-value
Age (Mean ± SD)	52.4 ± 8.1	51.8 ± 7.9	0.423
Gender (Male/Female)	110/90	105/95	0.645
Duration of Diabetes (Years)	12.5 ± 5.6	11.8 ± 5.4	0.312
Type 1/Type 2 Diabetes	80/120	75/125	0.576

Table 2: Comparison of Depression, Anxiety, Sleep Impairments, and Quality of Life between PDPN and NPDPN Groups

Variable	PDPN (Mean ± SD)	NPDPN (Mean ± SD)	t-value	p-value
Depression	11.2 ± 3.4	8.6 ± 2.9	7.35	<0.001
Anxiety	10.8 ± 3.2	7.9 ± 3.0	8.20	<0.001
Sleep Impairments	15.4 ± 4.1	10.2 ± 3.8	12.75	<0.001
Physical Health	48.6 ± 12.4	61.2 ± 11.8	-10.40	<0.001
Psychological Well-being	42.8 ± 11.9	55.7 ± 10.7	-11.22	<0.001
Social Relationships	51.3 ± 10.5	61.8 ± 9.7	-9.18	<0.001
Environment	49.2 ± 12.1	58.4 ± 10.8	-8.55	<0.001

Table 3: Regression Analysis Predicting Quality of Life in PDPN Group

Predictor	B	SE	β	p-value
Depression	-0.48	0.12	-0.32	<0.001
Anxiety	-0.36	0.15	-0.24	0.018
Sleep Impairments	-0.52	0.13	-0.35	<0.001

*__B__= unstandardized regression coefficient (shows change in the dependent variable, i.e., quality of life), **SE**=standard error of B (measures the accuracy of the coefficient estimate), and **β** (beta)= standardized regression coefficient (shows the strength and direction of the relationship between the predictor and the dependent variable).

Table 4: Regression Analysis Predicting Quality of Life in NPDPN Group

Predictor	B	SE	β	p-value
Depression	-0.29	0.11	-0.21	0.009
Anxiety	-0.18	0.14	-0.12	0.199
Sleep Impairments	-0.33	0.12	-0.25	0.007

DISCUSSION

This study aimed to compare the psychological distress, sleep impairments, and quality of life in patients with PDPN and NPDPN. The results of this study demonstrate the significant impact of PDPN on mental health and quality of life, especially when compared to NPDPN. The findings show that patients with PDPN experience significantly higher levels of depression and anxiety compared to those with NPDPN. This is consistent with previous research showing a high correlation between psychological illnesses and chronic pain syndromes. Since pain can lead to emotions of helplessness and hopelessness, the chronic pain experienced by patients with painful diabetic peripheral neuropathy (PDPN) contributes to the establishment of depressive

symptoms. Furthermore, PDPN patients have higher anxiety levels because they are more uncertain and believe that their pain will worsen, which raises physiological arousal.[15] The results of other research, which demonstrated the impact that neuropathic pain takes on its sufferers, reinforce the notion that PDPN-P patients experience high levels of psychological discomfort, specifically anxiety and depression. Impact of painful diabetic peripheral neuropathy on quality of life. Patient-Related Outcome Measure[16]

The PDPN group was shown to have a higher prevalence of sleep impairments than the NPDPN group. According to previous research, those with PDPN were more likely than people with NPDPN to have severe sleeping problems.[17] Inadequate sleep has the potential to intensify the experience of pain and aggravate psychological problems. [18] Furthermore, the reciprocal association between pain and sleep implies that insufficient sleep could worsen pain, creating a vicious cycle. [19] This underlines how crucial it is to treat sleep issues to manage PDPN and improve overall results.

Overall, the PDPN group's quality of life was significantly lower. This is consistent with other research that found patients with chronic pain issues had a lower quality of life than people without pain.[20] The area of physical health suffered the most, probably due to physical constraints imposed by pain. The psychological well-being category, however, was also noticeably poorer, indicating the substantial impact of anxiety and depression on the quality of life among PDPN patients.[21] Similar effects were seen in the social relationships and environment domains, suggesting pain affects a person's happiness and physical and mental health. [22]

The study's findings showed that depression, anxiety, and sleep issues were all significant indicators of quality of life for both the PDPN and NPDPN groups. Interestingly, the impact of these psychological factors on quality of life was even more notable in the PDPN group, suggesting that the presence of pain intensifies the adverse effects of depression, anxiety, and sleep disturbances on overall quality of life. These results indicate the critical importance of addressing psychological factors, especially in individuals experiencing pain, to enhance their quality of life. [3,23] The management of PDPN necessitates a comprehensive approach involving psychological interventions, effective pain management strategies, and sleep therapies, which is crucial for addressing the various factors impacting the lives of these patients.[24] Compared to the PDPN group, the NPDPN group had more favourable outcomes but still had a lower quality of life than the general population. This implies that, although these problems are still partially present, the lack of pain enables more successful management of the psychological and sleep-related issues related to PDPN. [25]

The study findings provide compelling evidence of the psychological and quality of life effects of PDPN, highlighting the importance of implementing appropriate management strategies for anxiety, depression, and sleep disturbances. This emphasizes the pressing need for comprehensive care approaches that address mental and physical symptoms. One limitation of the study was the narrow scope of data collection from only a few hospitals in Khyber Pakhtunkhwa. Future studies should aim to include a more extensive range of hospitals to gain a more representative sample. Additionally, it is crucial for future research to explore other factors that may impact quality of life and contribute to the exacerbation of anxiety, depression, and sleep-related issues.

CONCLUSION

The research findings indicate that patients with painful diabetic peripheral neuropathy (PDPN) experience significantly higher levels of depression, anxiety, and sleep impairments, along with a lower quality of life, compared to those without PDPN. The results highlight the significance of adopting comprehensive care strategies encompassing the physiological manifestations of PDPN and the psychological and sleep-related intricacies. This study suggests that future research endeavours should prioritize developing and assessing therapies to address these specific areas to improve the overall welfare of those impacted by PDPN.

DECLARATIONS

None

AUTHORS CONTRIBUTIONS: All authors contributed equally to the original manuscript

i.e., conception of the idea, data acquisition and analysis, draft of manuscript, and final approval.

CONFLICTS OF INTERESTS: None

FUNDING: None

ACKNOWLEDGEMENTS: None

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