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From Pain to Daily Function: A Narrative Review on Quality of Life in Diabetic

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Abstract

Background: Diabetic neuropathy (DN) is among the most common and disabling complications of diabetes mellitus, associated with chronic pain, sensory loss, and functional decline. Beyond physical impairment, DN substantially reduces quality of life (QoL) through emotional distress, sleep disturbances, and social limitations.

Methods: A narrative synthesis was conducted based on literature published between January 2000 and March 2025. Databases searched included PubMed, Cochrane Library, Scopus, and CINAHL. Eligible studies comprised randomized controlled trials, observational studies, systematic reviews, and meta-analyses that evaluated QoL in DN using validated instruments such as SF-36, EQ-5D, WHOQOL-BREF, Norfolk QOL-DN, and NeuroQoL. Studies focusing on diabetes complications without specific reference to neuropathy, or reporting solely pharmacological efficacy without QoL outcomes, were excluded.

Results: The global prevalence of DN ranges from 20% to 46%, varying by diagnostic method, region, and population characteristics. Painful DN significantly reduces QoL by limiting mobility, impairing sleep, and causing fatigue. Emotional distress including anxiety and depression further exacerbates symptom burden and negatively impacts adherence to treatment. Social participation and occupational functioning are also compromised. Disease-specific QoL tools, particularly the Norfolk QOL-DN, demonstrate greater sensitivity in detecting neuropathy-related impairments compared to generic measures. Evidence indicates that pharmacological treatments (pregabalin, duloxetine), exercise therapy, and cognitive-behavioral interventions improve symptom control and overall QoL. Multidisciplinary approaches combining medical, physical, and psychological care yield the most comprehensive benefits.

Conclusion: DN profoundly affects multiple dimensions of QoL. Holistic, patient-centered care strategies that integrate symptom management, psychosocial support, and functional rehabilitation are essential to improving outcomes and guiding future research.

Keywords: Diabetic Neuropathy, Quality of Life, Neuropathic Pain, Functional Disability, Psychological Distress, Multidisciplinary Care

Introduction

Diabetes mellitus is a prevalent long-term metabolic disease that results in elevated blood sugar levels due to issues with either insulin action or secretion, or both. High blood sugar levels over time can lead to issues with both large and tiny blood vessels. Diabetic neuropathy (DN) is among the most common and debilitating of these. A variety of neuropathic symptoms, including peripheral, autonomic, proximal, and localised neuropathies, are included in diabetic neuropathy (DN). The most prevalent kind is distal symmetric polyneuropathy, which typically begins in the feet and progresses up the body to bring symptoms like tingling, burning, numbness, and pain. These symptoms significantly impair quality of life by making it more difficult to walk about, sleep, and perform daily duties. They also increase the risk of foot ulcers and amputations. (QoL).

The global prevalence of diabetes has risen steeply in recent decades. According to estimates by the International Diabetes Federation, hundreds of millions of adults presently have diabetes, and this number is expected to rise significantly by 2030 and 2045. Estimates of the prevalence of diabetic peripheral neuropathy (DPN) among individuals with diabetes vary significantly according on diagnostic criteria, demographic factors (age, type of diabetes), duration, glycaemic management, and study setting.

The INTERPRET DD study, which included 2,733 people with type 2 diabetes from 14 countries, found that DPN was present in 26.71% of the sample, with a lot of variation between countries. Risk factors included having diabetes for a long time, not controlling blood sugar well, high blood pressure, heart disease, and depressive symptoms [1]. A meta-analysis and systematic review of 29 observational studies in Latin America and the Caribbean found that the incidence rate for those studies that reported incidence was approximately 13.7% (95% CI: 10.6 17.2%), but the prevalence of DPN was 46.5% (95% CI: 38.0 55.0%) [2]. In a major meta-analysis covering over 50,000 participants globally, the pooled prevalence of DPN was roughly 30% (95% CI 25 34%), although this varied by diagnostic method employed [3]. An overall DPN prevalence of 28.5% (95% CI 27.4 29.6%) was found in a multicenter study of 6,487 diabetics who attended diabetes clinics in the UK. Type 2 diabetes was more common than type 1 diabetes, and the prevalence increased with age and the length of the condition [4].

These high prevalence rates imply a large burden, but prevalence alone doesn't capture the full impact of diabetic neuropathy. Beyond sensory or motor impairment, DN often leads to chronic pain (including painful diabetic peripheral neuropathy, PDPN), sleep disturbances, reduced mobility, increased risk of foot complications, psychological distress (including depression and anxiety), and limitations in social and occupational activities. According to a cross-sectional study, 26.4% of patients with type 2 diabetes had PDPN, and their quality of life (QoL) levels were noticeably lower than those of individuals without pain [5]. Thus, pain severity and neuropathy severity show strong correlations with QoL impairments.

Quality of life or more specifically health-related quality of life (HRQoL) comprises multiple domains including physical functioning, emotional state, social participation, role limitations, and general well-being. Tools such as SF-36, EQ-5D, WHOQOL-BREF, Michigan Neuropathy Screening Instrument (MNSI), Toronto Clinical Scoring System (TCSS), and questionnaires like NeuroQoL are commonly used both to assess neuropathy severity and to link these with QoL outcomes. However, the literature reveals substantial heterogeneity: in diagnostic definitions of neuropathy, in measurement tools for QoL, in cross-cultural contexts, and in the degree to which psychological, social, and economic factors are considered.

Given the progressive nature of diabetic neuropathy, its prevalence rising with age, duration of disease, and decreasing glycemic control, and the multitude of ways that it disrupts life beyond simply physical symptoms, a thorough narrative synthesis is needed. Understanding the nuances of how diabetic neuropathy impacts all domains of life is crucial for informing patient-centred care, designing holistic interventions, and guiding policy and research priorities.

Hence, this narrative review is intended to synthesize existing evidence on quality of life in individuals with diabetic neuropathy examining its prevalence, contributing factors, domains of life affected, and gaps in current literature to provide guidance for clinicians, researchers, and health policy makers.

Objective

To evaluate and synthesize existing literature on the impact of diabetic neuropathy on quality of life, highlighting physical, psychological, and social dimensions, and to identify key factors influencing patient well-being for improved clinical and supportive care strategies.

Literature Review

1. Epidemiology and Prevalence of Diabetic Neuropathy

Diabetic neuropathy (DN) is a common and progressive side effect of diabetes mellitus, affecting both type 1 and type 2 individuals. It is characterized by nerve damage arising from persistent hyperglycemia and metabolic dysregulation, with diabetic peripheral neuropathy (DPN) being the most often diagnosed form. DPN contributes greatly to patient morbidity, increased healthcare burden, and diminished quality of life internationally.

The estimated frequency of DPN ranges between 10% and 90% worldwide, primarily according to healthcare systems, diagnostic standards, and population characteristics. According to a meta-analysis that included more than 50,000 patients, the global pooled prevalence of DPN was 30% (95% CI: 25–34%) [3]. Prevalence rates are often much higher in low- and middle-income nations. African studies reported an average prevalence of 46.0% [6], whereas the pooled frequency in Latin America and the Caribbean was 46.5% [2]. According to the INTERPRET-DD study, which was carried out in 14 different countries, the prevalence of type 2 diabetes was 26.7% [1]. Outpatient investigations in Bangladesh revealed a 19.7% frequency, which rose significantly with age and length of illness [7].

In Ethiopia, a systematic evaluation revealed the national pooled prevalence of DPN to be roughly 22% [8]. These numbers demonstrate that although prevalence varies, DPN is a substantial public health risk in both industrialised and developing countries.

Diabetic peripheral neuropathy (DPN) has been repeatedly linked to a number of risk variables, with the length of diabetes being one of the most important. Research indicates that after five years of having diabetes, the risk of developing neuropathy rises noticeably, and the incidence keeps rising as the condition worsens. In a research carried out in Bangladesh, for instance, the prevalence of DPN increased from around 14% in people with a five-year history of the condition to about 30% after ten years [1, 7].

Another significant element promoting the development of DPN is inadequate glycemic control. Elevated HbA1c levels have been frequently linked to an increased risk of neuropathy. The INTERPRET-DD study indicated that for every 1% increase in HbA1c, there was a proportional and statistically significant increase in the probability of developing DPN, underlining the necessity of maintaining normal blood glucose levels [1].

Age also plays a key effect in the frequency of DPN. Older adults are generally more vulnerable to developing neuropathy, likely due to prolonged exposure to hyperglycemia and cumulative metabolic stress over time. A study conducted in Qatar indicated that those aged over 60 had almost three times the chance of having DPN compared to those in lower age groups [9].

In addition to these primary risk factors, several comorbid conditions have shown strong associations with DPN in multiple studies. These include hypertension, dyslipidemia, obesity, renal dysfunction, and depression. Their presence can exacerbate metabolic dysregulation and vascular complications, further increasing the likelihood of

neuropathic changes [2, 1, 9].

Together, these findings emphasize the multifactorial nature of diabetic neuropathy and highlight the importance of comprehensive risk management strategies that address not only blood glucose levels but also broader metabolic and cardiovascular health.

Although DPN can occur in both type 1 and type 2 diabetes, prevalence is often higher in type 2 due to factors such as older age at onset, longer undiagnosed periods, and accompanying metabolic syndrome. According to a meta-analysis, type 2 diabetes had a DPN prevalence of 31.5%, while type 1 diabetes had a prevalence of 17.5% [3]. In a different study, 37.5% of people with type 2 diabetes had symptomatic polyneuropathy, but only 16% of those with type 1 diabetes had this condition [10]. People with type 1 diabetes are not excluded, though. After 10 to 15 years of disease, especially with poor glycaemic control, the incidence of neuropathy in type 1 patients rises sharply [3, 7]. Long-term type 1 diabetics are therefore similarly at high risk, even if patients with type 2 diabetes may exhibit DPN earlier.

Age distribution shows a clear upward trend in DPN prevalence. Individuals above the age of 60 consistently exhibit the highest prevalence, with rates up to three times higher than those under 40 [7, 9]. The TODAY study also showed that young people with type 2 diabetes, especially those with high BMI and poor glycaemic control, are developing neuropathy earlier [2].

Over time, the overall prevalence of DPN has increased due to rising diabetes rates and increased life expectancy among diabetic patients. Some regional studies also report a trend toward earlier onset of neuropathy, especially in populations with a high prevalence of obesity and metabolic syndrome [1, 2].

2. Clinical Manifestations and Diagnosis of Diabetic Neuropathy

Diabetic neuropathy describes a broad set of nerve illnesses induced by diabetes, which affects many areas of the peripheral and autonomic nervous systems. Diabetic peripheral neuropathy (DPN), the most prevalent and well-known kind, mostly affects the distal sensory and motor nerves in a distinctive "stocking-glove" pattern. Because of this distribution, nerve injury usually starts in the feet and toes, moves proximally upward, and may eventually affect the hands. Along with DPN, diabetic patients may also have autonomic neuropathy, which affects the autonomic nervous system, which controls involuntary body functions, and focal or multifocal neuropathies, which manifest as isolated damage to single nerves or nerve groups leading to acute or subacute presentations like cranial nerve palsies or mononeuropathies [11, 12].

The clinical presentation of diabetic neuropathy varies depends on the nerves implicated and the stage of the disease. Patients with DPN frequently experience sensory problems such as pain, numbness, tingling, burning, or stabbing sensations. These symptoms often begin insidiously and are more pronounced at night, causing significant discomfort and sleep disturbances. Painful neuropathy in particular has been identified as a major cause of reduced quality of life, affecting physical function and mental health [13]. As the neuropathy progresses, sensory loss becomes predominant, resulting in diminished protective sensation in the feet. This sensory loss predisposes patients to injuries and ulcerations, which are the leading causes of diabetic foot complications and subsequent lower-limb amputations. Meanwhile, autonomic neuropathy presents with a distinct constellation of symptoms depending on the affected organ system. Cardiovascular autonomic neuropathy may lead to orthostatic hypotension and exercise intolerance; gastrointestinal involvement can cause gastroparesis, constipation, or diarrhea; and genitourinary autonomic dysfunction can result in bladder dysfunction and sexual impotence [14].

The diagnosis of diabetic neuropathy involves a careful clinical assessment supported by validated screening tools and confirmatory diagnostic tests. Given the subtlety of early symptoms and the high prevalence of asymptomatic neuropathy, screening is essential for timely detection. The Michigan Neuropathy Screening Instrument (MNSI) and the Toronto Clinical Scoring System (TCSS) are commonly used clinical tools that combine symptom questionnaires with physical examination components such as assessment of vibration sense, ankle reflexes, and pinprick sensation. These instruments are appropriate for use in both clinical and research contexts and have demonstrated high sensitivity and specificity for diagnosing DPN [15, 16].

Nerve conduction tests (NCS) are still the gold standard for verifying the diagnosis, especially for large fibre neuropathy, even though clinical examination and symptom-based rating systems are helpful for initial screening. By capturing electrical conduction velocities and amplitudes, NCS provide an objective assessment of motor and sensory nerve function, allowing for the identification of axonal loss or demyelination [17]. However, NCS primarily assess large myelinated fibers and may miss early involvement of small fibers, which are responsible for pain and temperature sensations. Other diagnostic modalities, such as skin biopsy to measure intraepidermal nerve fibre density, a sensitive indicator of small fibre neuropathy, and quantitative sensory testing (QST), which assesses small fibre function through psychophysical testing of thermal and pain thresholds, have become more popular as a result of this limitation [18, 19].

Early and accurate diagnosis of diabetic neuropathy is critical for preventing progression and managing symptoms effectively. Integration of clinical evaluation with appropriate diagnostic tools allows for a comprehensive assessment of neuropathic involvement and guides targeted interventions, including glycemic control, symptom management, and complication prevention. Continued advancements in diagnostic modalities promise to improve detection of neuropathy at its earliest stages, potentially altering the course of this debilitating complication.

3. Impact on Quality of Life: Physical, Emotional, and Social Dimensions

Diabetic neuropathy (DN), particularly its peripheral form, substantially impacts the quality of life (QoL) of persons across numerous dimensions, including physical, emotional, and social elements. Chronic neuropathic pain, the hallmark symptom of DN, is often characterised as electric-like, burning, or shooting pain and is a primary cause of physical impairment. Persistent pain leads to diminished mobility and functional impairment, restricting patients' ability to do daily chores such as walking or standing for longer periods. These physical restrictions increase the risk of secondary complications like foot ulcers, further exacerbating

disability [20, 21].

Beyond pain, DN frequently causes sleep disturbances and fatigue, which significantly worsen the overall burden of the disease. Nocturnal pain and discomfort interrupt sleep patterns, leading to poor sleep quality and non-restorative sleep. As a result, patients often experience daytime fatigue, which reduces their energy levels and ability to engage in both personal and occupational activities [22]. These disruptions lead to a vicious cycle in which pain impacts sleep, which in turn increases pain sensitivity, hence intensifying the patient's physical limitations and suffering [23].

Diabetic neuropathy has a very negative emotional impact. Research has repeatedly demonstrated that individuals with DN have greater rates of anxiety and depression than both healthy controls and diabetic patients without neuropathy. The chronic nature of neuropathic pain, coupled with its unpredictability and interference with daily life, contributes to psychological distress. Depression in this population not only worsens pain perception but also negatively impacts adherence to diabetes management and treatment regimens, creating a detrimental feedback loop that compromises both physical and mental health outcomes [24, 25].

Social and occupational functioning are also considerably affected by diabetic neuropathy. The limitations imposed by pain, sensory loss, and fatigue reduce patients' ability to participate fully in daily activities, social engagements, and work responsibilities. Many individuals report withdrawing from social interactions due to physical incapacity or emotional distress, leading to feelings of isolation and decreased social support, which further aggravates psychological morbidity [26]. Employment status is often compromised, with many patients experiencing reduced productivity, absenteeism, or even job loss because of neuropathy-related disability [27].

Furthermore, diabetic neuropathy's impact on QoL extends beyond individual health to affect family dynamics and caregiver burden. When helping patients with everyday living activities, carers may experience heightened physical and emotional stress, which exacerbates the disease's social impact [28]. Together, these results demonstrate that diabetic neuropathy has wide-ranging and complex effects, requiring a thorough, interdisciplinary approach to patient care that takes into account social reintegration, psychological support, and symptom control.

4. Assessment Tools for Quality of Life in Diabetic Neuropathy

Assessing quality of life (QoL) in patients with diabetic neuropathy is critical for understanding the entire burden of the condition and directing optimal management methods. Various techniques have been developed to evaluate QoL, roughly divided into generic and disease-specific instruments.

Generic QoL tools such as the Short Form-36 (SF-36), EuroQol-5 Dimension (EQ-5D), and World Health Organization Quality of Life-BREF (WHOQOL-BREF) are extensively employed due to their broad applicability across diverse diseases and demographics. These tools measure various areas, including physical functioning, mental health, social functioning, and general well-being. The SF-36, for example, has been extensively validated and allows comparison between diabetic neuropathy patients and the general population or those with other chronic conditions [29, 30]. However, generic tools may lack sensitivity to detect specific symptoms or challenges unique to neuropathy.

To address this, disease-specific QoL instruments have been developed, focusing on neuropathy-related symptoms and their impact. Notable examples include the NeuroQoL and the Norfolk Quality of Life-Diabetic Neuropathy (Norfolk QOL-DN) questionnaires. These tools are designed to capture the nuanced physical symptoms such as pain, numbness, and sensory deficits, as well as emotional and social consequences directly related to diabetic neuropathy. The Norfolk QOL-DN, in particular, has demonstrated strong psychometric properties and correlates well with clinical severity markers, making it highly valuable for both clinical practice and research [31, 32].

When comparing generic and disease-specific tools, studies indicate that disease-specific instruments provide superior sensitivity and relevance for neuropathy populations, capturing subtle changes in symptom burden and QoL that generic tools may overlook [33]. However, combining both types of assessments often yields the most comprehensive understanding, offering a balance between broad health status evaluation and targeted neuropathy impact. Selecting the appropriate tool depends on the study objectives, clinical context, and the need for sensitivity to neuropathy-specific issues.

5. Interventions and Their Influence on Quality of Life

Diabetic neuropathy (DN) considerably reduces quality of life (QoL), and appropriate therapies are necessary to alleviate symptoms and improve overall well-being. Pharmacological treatments such as pregabalin and duloxetine are frequently used to manage neuropathic pain, a key factor contributing to reduced QoL. Pregabalin acts on calcium channels to reduce pain intensity and improve sleep quality, indirectly enhancing physical and emotional health. Duloxetine, a serotonin-norepinephrine reuptake inhibitor, provides similar pain relief while also addressing comorbid anxiety and depression common in DN patients [34, 35]. Despite their benefits, side effects like dizziness and fatigue may limit adherence.

Non-pharmacological strategies are important complementary approaches. Physical therapy and exercise programs have shown effectiveness in improving muscle strength, balance, and mobility, thereby reducing fall risk and physical disability. Additionally, regular aerobic and resistance exercise supports better glycemic control, which may slow neuropathy progression and improve QoL [36, 37]. Lifestyle changes such as smoking cessation and nutritional optimization further support nerve health.

Psychological interventions and multidisciplinary care are increasingly recognized for their positive impact on QoL. Cognitive-behavioral therapy (CBT) and mindfulness approaches help reduce pain-related distress, despair, and anxiety, strengthening patients' coping mechanisms [38]. Multidisciplinary clinics integrating medical, physical, and psychological care provide holistic management, addressing the multifaceted nature of DN and leading to better patient outcomes [39].

Evidence consistently shows that combining pharmacological treatments with physical rehabilitation and psychological support yields significant improvements in both neuropathic symptoms and QoL measures. Such multimodal approaches are essential for optimizing

treatment effectiveness and improving the daily lives of individuals living with diabetic neuropathy.

6. Gap in Literature and Need for Study

Despite the increasing frequency of diabetic neuropathy (DN) worldwide and its profound impact on patients' lives, considerable gaps exist in understanding the full extent of its affect on quality of life (QoL). Much of the previous research has focused exclusively on the clinical and physiological components of neuropathy, such as nerve conduction problems and pain treatment, while the broader implications for patients' physical, emotional, and social well-being are less fully addressed. Furthermore, there is variability in the assessment tools used to measure QoL, with some studies relying on generic instruments that may not capture the nuanced challenges faced by individuals with DN. This inconsistency hampers the ability to compare findings across studies and limits the development of targeted interventions. Additionally, many research focus on either type 1 or type 2 diabetes separately, with insufficient study of how neuropathy-related QoL outcomes change between these categories. These gaps highlight the need for a more integrated and holistic approach to evaluating and managing DN's impact on patients' lives.

The need for this research stems from the growing burden of diabetes globally, with diabetic neuropathy emerging as one of its most debilitating complications. As the number of individuals living with diabetes rises, so too does the prevalence of DN, which not only diminishes physical functioning but also affects emotional health, social participation, and overall life satisfaction. Understanding how DN affects QoL in its multifaceted dimensions is essential for developing effective clinical guidelines and patient-centered care strategies. This research is particularly important given the complex interplay between physical symptoms like pain and numbness, psychological distress including depression and anxiety, and social consequences such as reduced work capacity and social isolation. Addressing these interconnected factors can improve treatment adherence, reduce healthcare costs, and enhance the quality of diabetes care.

Materials & Methods

This narrative review was based on a comprehensive literature search conducted from January 2000 to March 2025 across multiple databases, including PubMed, Cochrane Library, Scopus, and CINAHL. The search strategy involved keywords such as "diabetic neuropathy," "quality of life," "neuropathic pain," "psychosocial impact," "functional disability," and "chronic complications of diabetes."

Inclusion criteria comprised of randomized controlled trials (RCTs), observational studies, meta-analyses, and systematic reviews that examined quality of life in persons diagnosed with diabetic neuropathy. Studies were considered if they evaluated physical, emotional, or social dimensions of quality of life using validated assessment instruments (e.g., SF-36, EQ-5D, WHOQOL-BREF, DN4, or similar). Only peer-reviewed works published in English were examined.

Studies focusing exclusively on other diabetes complications without specific reference to neuropathy were excluded, as were those that primarily investigated pharmacological efficacy without reporting on quality of life outcomes. Key outcomes of interest included pain severity, physical function, emotional well-being, sleep disturbances, and social participation.

Data extraction was conducted independently, and relevant findings were organized thematically into defined domains of quality of life. The synthesis focused on identifying common trends, gaps in the literature, and potential implications for clinical practice and future research.

Conclusion

Key findings from the literature reveal that diabetic neuropathy severely compromises multiple domains of QoL. Patients commonly experience chronic pain that disrupts sleep and leads to fatigue, further limiting daily activities. Emotional distress is highly prevalent, with elevated rates of depression and anxiety that exacerbate symptom perception and reduce coping ability. Social isolation and diminished participation in work and leisure activities further compound the disease burden. Importantly, the choice of assessment tools influences the extent to which these impacts are captured. Disease-specific QoL instruments, such as the Norfolk QOL-DN and NeuroQoL, demonstrate greater sensitivity to neuropathy-related impairments compared to generic questionnaires, underscoring the importance of tailored evaluations. Interventional studies show that a multimodal approach including pharmacological treatments like pregabalin and duloxetine, physical rehabilitation, lifestyle modifications, and psychological support can significantly improve both symptoms and QoL. However, individualized treatment plans and multidisciplinary care models are critical for addressing the diverse needs of patients effectively.

In conclusion, diabetic neuropathy poses a substantial challenge to quality of life, affecting physical, emotional, and social dimensions in a complex and interrelated manner. Despite advances in understanding its clinical features and treatment options, there remains a pressing need for comprehensive research that fully integrates QoL outcomes into the assessment and management of DN. Employing validated, disease-specific QoL instruments alongside generic measures can provide a more complete picture of patient well-being and treatment efficacy. Multidisciplinary approaches that combine symptom management with psychological and social support hold promise for improving patient-centered outcomes. With the ultimate goal of improving the lives of those impacted by this severe condition, this narrative review emphasises the necessity of giving quality of life top priority as a basic element of diabetic neuropathy care and research.

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