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Original Research Paper

Neuropathy detection with quality-of-life questionnaire in obese inactive, prediabetes and type 2 diabetes individuals

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ABSTRACT:

Background: Different research populations, such as those who are overweight, obese, and inactive (OO), prediabetes and in addition to those who have T2DM, gave valuable insight into the optimal application of fundamental screening procedures for detecting early stages of diabetes peripheral neuropathy. **Aim**: The present study aim is to determine to what extent, the QOL–DN questionnaire detect early DPN in an OO and T2DM population? **Material & methods**: After talking about it, the Human Ethics Committee at the institution gave the study protocol its approval. This study uses quantitative, observational, and correlational methods. The people in this study were OO, which stands for overweight, obese, and inactive. People were put into different groups for further study based on their levels of glycated hemoglobin (HbA1C) and their previous diagnoses. The participants in the study were given the option to fill out questionnaires once they had been screened and granted permission to take part in the research. This was done before going on to other methods of data collection. **Results**: It was found that total QOL-DN scores had a negative correlation with both SNAPs [R, p =.045; L, p =.048], as did the Symptoms subscale (both SNAPs] [R, p =.036; L, p =.021]. The RSCV was found to have a correlation with the small fiber subscale of the QOL-DN (R, p =.047). The sensitivity of the QOL-DN components ranged anywhere from 0% to 65.4%, and their specificity could be anywhere from 12.5% to 87.50%. **Conclusion**: The present study conclude that future research should continue to focus on refining and developing screening procedures that can be performed at a reasonable cost to detect asymptomatic DPN as soon as possible. When administered to patients with OO, PD, and T2D, the QOL-DN can accurately predict the neuropathy criterion standard components.

INTRODUCTION:

Diabetes is a condition that affects anywhere between 382 and 387 million people all over the world, including 29.1 million people in the United States of America (which is 9.3 percent of the population) [1]. The International Diabetes Federation and other related studies project that by 2035, the global impact of diabetes will increase to an astounding 590-592 million, with an estimated 21 million diagnosed and another 8.1 million undiagnosed [2]. This is a significant increase from the current prevalence of 382 million people worldwide who have diabetes. The current prevalence of diabetes in the world, which is estimated to be 382 million people, represents a significant increase from this projection [3] Therapies that aim to interrupt the processes that lead to diabetes at earlier stages and in younger populations appear to be a good idea in light of the fact that the disease is increasing its grip on the population in the United States of America and around the world [2]. The number of people diagnosed with diabetes is climbing steadily across the entire globe. India is the nation that has experienced the most rapid economic expansion over the course of the past few years [4]. Most individuals who are diagnosed with diabetes have Type 2 Diabetes Mellitus (T2DM), which is the most typical form of the disease. T2DM has been found to have a prevalence of 2.4% in rural populations, whereas it has a prevalence of 11.6% in urban populations [5]. Different research populations, such as those who are overweight, obese, and inactive (OO), prediabetes and in addition to those who have T2DM, gave valuable insight into the optimal application of fundamental screening procedures for detecting early stages of diabetes peripheral neuropathy [6-10]. This

information was helpful in determining how to best detect early stages of diabetes peripheral neuropathy [11-15]. The present study aim is to determine to what extent, the QOL–DN questionnaire detect early DPN in an OO and T2DM population?

MATERIAL AND METHODS:

After talking about it, the Human Ethics Committee at the institution gave the study protocol its approval. This study uses quantitative, observational, and correlational methods. The people in this study were OO, which stands for overweight, obese, and inactive. People were put into different groups for further study based on their levels of glycated hemoglobin (HbA1C) and their previous diagnoses. After more testing, it was found that the people in this study had pre-diabetes and T2DM. The results of an investigation were made public. So, adults of both sexes were split into three groups: those who were overweight or obese and didn't exercise (OO), those who had prediabetes, and those who had T2DM.

Procedure for Questionnaire:

The participants in the study were given the option to fill out questionnaires once they had been screened and granted permission to take part in the research. This was done before going on to other methods of data collection. A close watch was kept, and careful notes were taken, on the length of time necessary to complete each individual instrument. This was done so that a time comparison could be drawn between the many potential solutions. They were timed in terms of the amount of minutes and seconds it took them to complete each instrument, and the volunteer research assistant was stationed in a quiet room within the Wellness Institute with the individuals. Volunteer research assistants and investigators checked the questionnaires to make sure they were comprehensive before moving on to the HbA1C testing. Before moving further with the study, we completed filling out the questionnaires that had been started but not finished earlier. In the course of our email communication with the authors (QOL–DN), we were able to obtain digital copies of all of the questionnaires, including the scoring rubrics. Each participant received a printed copy, and those copies have been transcribed and added as appendices to this document. The Norfolk Quality-of-Life Diabetic Neuropathy measure, commonly known as QOL-DN, has been found to be reliable across a broad spectrum of populations, sensitive to both minor and significant fiber impairments, and responsive to improvements in neuropathy. This has been demonstrated using research.

Statistical analysis:

For the statistical analysis, the most recent version of SPSS will be utilized (SPSS, Chicago, IL). The relationships between the results of the QL-DN were studied, and age, Hba1c, and waist circumference will be considered (in cm). To determine whether there are differences between the three groups, Kruskal-Wallis H tests will be applied to pairwise comparisons. In every study, alpha was confirmed to be 0.05.

RESULTS:

Table 1: Anthropological characteristics of the present study subjects

		N	Min	Max	Mean	Std. Dev
Age	**Male**	20	38	80	61.8	13.62
	Female	48	36	75	58.1	11.91
Height	**Male**	20	1.6	1.9	1.81	0.09
	Female	48	1.5	1.8	1.69	0.07
Weight (Wt)	**Male**	20	84	134	6.60	20.71
	Female	48	66	123	3.21	15.23
Wt by group	**OO**	20	77	107	3.51	11.21
	PD	26	66	134	7.41	23.42
	T2DM	22	79	128	5.67	17.88
BMI	**Male**	20	28	42	1.63	4.71
	Female	48	25	44	1.21	5.81
BMI by group	**OO**	20	27	36	1.10	3.28
	PD	26	25	44	1.91	6.89
	T2DM	22	28	42	1.62	5.08

In our sample, there were a total of 20 males and 48 females, and the HbA1C ranged anywhere from 4.4 to 14.0% for all of the subjects (Table1). Thirty out of 68 people reported having no prior diagnosis or knowledge of type 2 diabetes or Prediabetes (PD). 10 out of 30 people had values for PD HbA1C, and they were divided into appropriate groups as a result. Sixty-six out of 68 people weighed in at a weight that classified them as overweight or obese. 56 people said they had never been diagnosed with neuropathy or had any prior knowledge about the condition. There was a wide range of medication use, with 20 of the 68 participants reporting that they were using T2DM-specific medication as part of their individual medical plan. Four people who have type 2 diabetes reported taking medication for neuropathy in addition to their diabetes.

Table 2: Spearman correlations

		SNAP-R (n=68)	**SNAP-L (n=68)**	**SNCV-R (n=68)**	**SNCV-L (n=68)**
QOL-DN	**Total**	**-0.329**	**-0.312**	-0.160	-0.171
	Sig.	**0.034**	**0.041**	0.198	0.3279
	Symptoms	**-0.421**	**-0.298**	0.027	0.088
	Sig.	**0.024**	**0.032**	0.443	0.356
	Large fiber	0.398	0.401	-0.242	-0.324
	Sig.	0.015	0.041	0.166	0.048
	Small fiber	0.099	0.161	**-0.434**	-0.088
	Sig.	0.309	0.299	**0.032**	0.365

It was found that total QOL-DN scores had a negative correlation with both SNAPs [R, p =.045; L, p =.048], as did the Symptoms subscale (both SNAPs) [R, p =.036; L, p =.021]. The RSCV was found to have a correlation with the small fiber subscale of the QOL-DN (R, p =.047). The sensitivity of the QOL-DN components ranged anywhere from 0% to 65.4%, and their specificity could be anywhere from 12.5% to 87.50%.

DISCUSSION:

The integration of these testing methods provided an excellent framework to develop a better understanding of the onset of dysfunctional physiological processes within PD and OO individuals during the beginning of disease onset and examination of relationships between symptoms and disease. This study determines the effectiveness of QOL-DN as screening measures for early DPN detection to be established. This study offers a nonclinical analysis based off the criteria required by a study [16] aiming to achieve minimal definition requirements for confirmed and subclinical DSPN classification, with the intent of developing early screening measures for DPN prone populations [16]. In support of our findings, the individuals with abnormal findings self-reported symptoms via QOL-DN and had documented distal sensation loss. It is, however, possible that our readings are altered in some way that we are unaware of at present. In an attempt to offer specific recommendations of normal or abnormal findings based on applied individual characteristics, our assessment differed from previous research by evaluating each individual participant according to age, height and weight and determining appropriate cutoffs for normal and abnormal findings, thereby individualizing results to each participant. This would prove to an interesting point to consider, if the same type of error were true, as it would likely boost the number of individuals who had abnormalities even higher. The QOL-DN would provide the best mechanisms for detection; however, our results only indicated partial support for this theory. However, the QOL-DN, on several measures, did. This finding is different than some prior research, as the QOL-DN has not always been found to correlate with electrophysiological measures [17,18].

The QOL-DN ranged in sensitivity (0–65.4%) and specificity (12.5–87.5%), differing from previous research that resulting in high specificity and sensitivity. While there is no definitive answer for this, plausible considerations for this finding include the unusual distribution of our population, and our small pilot size across three groups in our attempts to discover DPN at its earliest point possible. Previous research expressed concern relating to the QOL-DN: A study [30] reported the QOL-DN as a means to aid in diagnosis and monitoring but expressed a lack of specificity for Peripheral Neuropathy (PN), stating that it may be

limited its use to health impacts of a diabetes foot disease related nature [19]. We did not find thisto be true in our study as QOL-DN measures not only correlated, but also provided vital standardized data relating to self-reported symptoms, ultimately contributing to our goal of the early identification of DPN. Detecting such diabetes complications is an unfolding evolution that involves multiple dynamics. DPN may present in a completely silent manner, without pain, burning or symptoms of annoyance. In such cases, individuals will not disclose physical symptoms that they aren't currently experiencing. Individuals with early DPN may experience the disease in a varied manner, with some individuals experiencing asymptomatic disease patterns, ultimately requiring hands on screening to identify the silent progression of the disease. Future research should likely continue to examine the QOL-DN for early DPN detection, as several subscales indicate correlations. We had hypothesized that the QOL-DN would be the most sensitive measure to detect undisclosed DPN in our population, and sensitivity results did not support this. Despite low sensitivity and specificity, the Total QOL-DN, Symptoms and Small Fiber component aspects of the QOL-DN measure, should be considered, as this questionnaire proved to be invaluable to the study. The QOL-DN and its subscales are likely to be more successful in a more balanced study that is seeking both small and large fiber deficits related to early DPN detection, as this measure has been previously validated to detect both. Our criterion measure was targeted towards screening for large fiber, and thus may not correlate as well with a well-roundedscreening measure that targets multiple areas of neuropathy, such as the QOL-DN. The QOL-DN has been previously validated for individuals with diabetes and neuropathy, yet its specific validation to effectively target OOI individuals has not been performed and, therefore, this should be taken this into account when interpreting our findings.

CONCLUSION:

The QOL-DN correlates positively with both overall QOL and several subscales, allowing it to provide valuable, standardized data on symptoms that can be incorporated into community screening models. Since the QOL-DN has a positive correlation with both Overall QOL and several subscales, it may provide useful information on symptoms. Since the QOL-DN has a positive relationship with both. It can provide the aforementioned information regarding QOL and a number of subscales. Future research should continue to focus on refining and developing screening procedures that can be performed at a reasonable cost to detect asymptomatic DPN as soon as possible. When administered to patients with OO, PD, and T2D, the QOL-DN can accurately predict the neuropathy criterion standard components.

Conflict of interest: The authors of the present study do not possess any conflict of interest among themselves,

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