International Journal of Yoga, Physiotherapy and Physical Education
ISSN: 2456-5067; Impact Factor: RJIF 5.24
Received: 21-03-2020; Accepted: 22-04-2020; Published: 28-04-2020
www.sportsjournal.in
Volume 5; Issue 2; 2020; Page No. 12-15

Effect of diabetic neuropathic pain on quality of life with type II DM patients

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Abstract
Background: Diabetes mellitus (DM) is defined as heterogeneous metabolic disorder characterized by common feature of chronic hyperglycaemia with disturbance of carbohydrates, fats and proteins metabolism. The prevalence of Diabetes for all age groups worldwide was estimated to 2.8% in 2020 and 4.4% in 2030.
Material and Methodology: Both male and female (n =64) are from tertiary care hospital in Miraj taluka were taken with age group of 40 years and above was included in this study. Data collected is by using McGill pain questionnaire and SF 36 scale.
Results: A very strong negative relationship between McGill Score for pain and SF 36 Score for quality of life ($r=-0.88$, $p<0.001$) for subjects between 40-50 years of age.Strong negative relationship between McGill Score for pain and SF 36 Score for quality of life ($r=-0.75$, $p<0.01$) for subjects between 51-60 years of age.Strong negative relationship between McGill Score for pain and SF 36 Score for quality of life ($r=-0.79$, $p<0.001$) for subjects between 61-70 years of age.A very strong negative relationship between McGill Score for pain and SF 36 Score for quality of life ($r=-0.84$, $p<0.01$) for subjects >70 years of age.
Conclusion: It indicates that as pain increases, quality of life decreases.

Keywords: diabetes mellitus (dm), mcgill pain questionnaire, sf 36 score, quality of life

1. Introduction

Diabetes mellitus (DM) is defined as a heterogeneous metabolic disorder characterized by common features of chronic hyperglycaemia with disturbance of carbohydrates, fat and protein metabolism [1]. Diabetes mellitus is clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin [2]. The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030. The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030 [3]. In India alone, diabetes is expected to increase from 40.6 million in 2006 to 79.4 million by 2030. Studies have shown that the prevalence of diabetes in urban Indian adults is about 12.1% [4] Risk factors for diabetes mellitus includes obesity, habitual physical inactivity, race, hypertension, dyslipidaemia, vascular disease, genetic syndromes [1] Acute metabolic complications includes ketoacidosis, hyperosmolar nonketotic coma and hypoglycaemia and late metabolic complications includes atherosclerosis, diabetic microangiopathy, diabetic nephropathy, diabetic neuropathy, diabetic retinopathy and infections [1].

Neuropathy can be defined as any disease of the nerves can include peripheral nerves. Diabetic neuropathy is generic term for any DM related disorder of the peripheral and autonomic nervous system or cranial nerves. Neuropathy is divided into distal symmetric sensorimotor polyneuropathy, Asymmetric neuropathy and Autonomic neuropathy [5] the majority of the symptoms from diabetic neuropathy will be located in the lower extremity with foot insensitivity and ulceration being most common. It is estimated that 15% of individuals with diabetes will develop foot ulcer sometimes in their life, making them almost 40 times more likely to go for amputation due to non-healing wound [6].

It is expected that DM is major health problem and complications includes peripheral neuropathy, renal disease, IHD, gangrene of the lower limb. Also reports shows that after 5 years 26% of people devlope peripheral neuropathy and at around 10 years, 41% of people with DM devlope neuropathy and 50% to 66% of the patients devlope peripheral neuropathy at some point during life time. Chronic painful symptoms have considered impact on individuals life and is associated with anxiety, depression, loss of mobility and independence. Purpose of study will be to find effect of diabetic neuropathic pain on quality of life.

2. Materials and Methods

An approval for the study was obtained from the Institutional Ethical Committee. A cross sectional study was conducted in the subjects with Type II DM in tertiary care hospital of Miraj. Sample was achieved by Purposive Sampling method. A total of n= 64 were taken. All the subjects were screened for inclusion criteria. i.e. Both males and females with age is above 40 years, Diagnosed with Type II DM and with neuropathic symptoms such as tingling, burning and shooting pain often with nocturnal exacerbation. Subjects were excluded with musculoskeletal disorder, Neuropathic pain of non-diabetic origin and diagnosed with type I DM. The demographic data including age, gender were taken. Subjects were given written consent prior to the Study. The data was collected by using McGill pain questionnaire for neuropathic pain and quality of life by using SF 36 scale.

McGill pain questionnaire

The scale contains 4 subscales evaluating the sensory, affective and evaluative, and miscellaneous aspects of pain. The Pain Rating Index contains 78 pain descriptor items

categorized into 20 subclasses, each containing 2–6 words that fall into 4 major subscales: sensory (subclasses 1–10), affective (subclasses 11–15), evaluative (subclass 16), and miscellaneous (subclasses 17–20). Reliability = 0.81 [7].

SF 36 scale

The SF-36 BPS assesses bodily pain intensity and interference of pain with normal activities. The SF-36 BPS is 1 of 8 subscales of the Medical Outcomes Study SF-36 questionnaires a generic measure of health status designed for use in population surveys. SF 36 BPS scores range from 0–100. A higher score indicates lack of bodily pain where 50 is the "average" for the population. Therefore, scores above or below 50 can be considered above or below, respectively. Reliability= 0.78 [7].

3. Results

Table 1: Age group wise distribution of subjects with type 2 DM

Age groups	Frequency	Percentage
40-50 years	17	26.6
51-60 years	16	25
61-70 years	21	32.8
> 70 years	10	15.6
Total	64	100

Table 1 Shows that shows that, there were 17(26.6%) subjects between 40-50 years, 16(25%) subjects between 51-60 years and 21(32.8%) subjects between 61-70 years and 10(15.6%) subjects >70 years of age with type 2 DM

Table 2: Gender distribution of subjects with type 2 DM

Gender	Frequency	Percentage
Females	24	37.5
Males	40	62.5
Total	64	100

Table 2 shows that, there were 24(37.5%) female subjects and 40(62.5%) male subjects with type 2 DM.

Table 3: Correlation between McGill Score for pain and SF 36 Score for quality of life of subjects with type 2 DM

McGill Score	SF 36 Score
Pearson Correlation	p value
-0.82	<0.01

Correlation analyses revealed a very strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.82, p<0.01).
So, it indicates that as pain increases, quality of life decreases.

Table 4: Descriptive statistics of subjects with type 2 DM according to their gender as per McGill Score for pain and SF 36 Score for quality of life and its comparison using unpaired t test

Group Statistics	Gender	N	Mean	Std. Deviation	Unpaired t statistic	p value
McGill Score	Males	40	35.93	9.56	0.60	0.55
	Females	24	34.38	10.27		
SF 36 Score	Males	40	41.16	24.75	0.97	0.34
	Females	24	47.65	26.47		

Unpaired t test was done to compare between gender of subjects having type 2 DM according to McGill Score for pain and SF 36 Score for quality of life.

It was found that:

- Mean McGill score for pain of female subjects (34.38) was lower than mean score for quality of life of male subjects (35.93).Mean SF 36 score for quality of life of female subjects (47.65) was higher than mean score for quality of life of male subjects (41.16).Hence, we can conclude that female subjects are stronger for bearing pain than male subjects, so their quality of life is better than male subjects.

Table 5: Correlation between McGill Score for pain and SF 36 Score for quality of life of subjects with type 2 DM according to their gender

Gender	McGill Score	SF 36 Score
	Pearson Correlation	*p* value
Males	-0.76	<0.01
Females	-0.89	<0.01

Correlation analyses revealed a strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.76, p<0.01) for male subjects and very strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.89, p<0.01) for female subjects.
So, it indicates that as pain increases, quality of life decreases.

Table 6: Descriptive statistics of subjects with type 2 DM according to their age groups as per McGill Score for pain and SF 36 Score for quality of life and its comparison using unpaired t test

Group Statistics	Age groups	N	Mean	Std. Dev.	F statistic	*p* value
McGill Score	40-50 years	17	34.52	9.51	2.45	0.07
	51-60 years	16	34.46	9.38		
	61-70 years	21	35.40	9.85		
	> 70 years	10	33.72	9.01		
SF 36 Score	40-50 years	17	45.82	25.54	3.89	0.01
	51-60 years	16	45.46	25.31		
	61-70 years	21	43.21	25.41		
	> 70 years	10	46.56	25.23		

F test was done to compare between age groups of subjects having type 2 DM according to McGill Score for pain and SF 36 Score for quality of life.

It was found that:

- Mean McGill score for pain was higher for subjects between 61-70 years of age (35.40) followed by subjects of 40-50 years (34.52) then subjects of 51-60 years (34.46) and mean McGill score for pain was lower for subjects >70 years of age (33.72).Mean SF 36 score for quality of life was significantly lower for subjects between 61-70 years of age (43.21) followed by subjects of 51-60 years (45.46) then subjects of 40-50 years (45.82) and mean SF 36 score for quality of life was higher for subjects >70 years of age (46.56).Hence, we can conclude that >70 years of age subjects are stronger for bearing pain than young subjects as compared to them, so their quality of life is better than other age group subjects.

Table 7: Correlation between McGill Score for pain and SF 36 Score for quality of life of subjects with type 2 DM according to their age groups

Age groups	McGill Score	SF 36 Score
	Pearson Correlation	*p* value
40-50 years	-0.88	<0.001
51-60 years	-0.75	<0.01
61-70 years	-0.79	<0.001
> 70 years	-0.84	<0.01

Correlation analyses revealed

A very strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.88, p<0.001) for subjects between 40-50 years of age. Strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.75, p<0.01) for subjects between 51-60 years of age. Strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.79, p<0.001) for subjects between 61-70 years of age. A very strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.84, p<0.01) for subjects >70 years of age. So, it indicates that as pain increases, quality of life decreases.

4. Discussion

The purpose of the study was to find the effect of diabetic neuropathic pain on quality of life with type ii dm patients. In this study, 64 participants with age more than 40 years were taken.

Table 1

There is age wise group distribution of subjects with type II DM patients. All the subjects were divided into 4 groups according to age; 40-50, 51-60, 61-70 and more than 70 years. There were total 17 subjects in the age group of 41-50 years with 26.6%, in 51-60 age there were 16 subjects with 25%, in 61-70 years of age there were 21 subjects with 32.8% and with age group more than 70 years of age 10 subjects were there with 15.6%.

This finding is similar to a previous study conducted in 2012 in United States by M. Sue Kirkman, Vanessa Jones Briscoe *et al*. The result shows that prevalence of diabetes among U.S. adults aged ≥65 years varies from 22 to 33%, depending on the diagnostic criteria used [8].

Table 2

Table 2 shows that gender wise group distribution of subjects with Type II DM. There were total 64 subjects out of which 24 are females with 37.5% 40 are males with 62.5%.

Table 3

Table 3 shows that there were Correlation between McGill Score for pain and SF 36 for quality of life of subjects with type II DM. Correlation analyses revealed a very strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.82, p<0.01) So, it indicates that as pain increases, quality of life decreases.

This result is similar to study done previously in UK in 1996 by SJ Benbow, M E Wallymahmed, I A MacFarlene. The study was shown that chronic neuropathic pain impaires quality of life [9].

This result is similar to the study done by Mark P jensen, Marci J Chodroff, Robert H. Dworkin *et al*. in 2007. This study was shown that presence and severity of neuropathic pain are associated with greater impairments in number of important HRQoL domains [10].

Table 4

Table 4 shows there were comparison of McGill pain questionnaire and SF 36 by using unpaired t test. It was found that Mean McGill score for pain of female subjects (34.38) was lower than mean score for quality of life of male subjects (35.93).Mean SF 36 score for quality of life of female subjects (47.65) was higher than mean score for quality of life of male subjects (41.16) Hence, we can conclude that female subjects are stronger for bearing pain than male subjects, so their quality of life is better than male subjects.

This result is similar to study done previously in USA in 1998 by Joseph Riley III, Roger B Filingim *et al*. In this study we found that sex differences in response to noxious stimuli, females displaying greater sensitivity to pain than male [11].

Table 5

Table 5 shows that there were correlation between McGill questionnaire for pain and SF 36 score for quality of life of subjects with type II DM according to their gender. Correlation analyses revealed a strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.76, p<0.01) for male subjects and very strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.89, p<0.01) for female subjects.

So, it indicates that as pain increases, quality of life decreases.

This result is similar to the study done by M. P. Wrobel, A. Szymborska *et al* in 2008. This study was shown that reducing pain intensity, improving quality of life and increasing in the pain intensity reducing quality of life [12].

This result is similar to the study done by Mark P jensen, Marci J Chodroff, Robert H. Dworkin *et al*. in 2007. This study was shown that presence and severity of neuropathic pain are associated with greater impairments in number of important HRQoL domains [10].

Table 6

Table 6 shows that statistics of subjects with Type II DM according to their age groups as per McGill pain questionnaire for pain and SF 36 for quality of life and its comparison by using unpaired t test.

F test was done to compare between age groups of subjects having type 2 DM according to McGill Score for pain and SF 36 Score for quality of life. It was found that;

Mean McGill score for pain was higher for subjects between 61-70 years of age (35.40) followed by subjects of 40-50 years (34.52) then subjects of 51-60 years (34.46) and mean McGill score for pain was lower for subjects >70 years of age (33.72).Mean SF 36 score for quality of life was significantly lower for subjects between 61-70 years of age (43.21) followed by subjects of 51-60 years (45.46) then subjects of 40-50 years (45.82) and mean SF 36 score for quality of life was higher for subjects >70 years of age (46.56).Hence, we can conclude that >70 years of age subjects are stronger for bearing pain than young subjects as compared to them, so their quality of life is better than other age group subjects.

Table 7

Table 7 shows that there were correlation between McGill score for pain and SF36 for quality of life of subjects with Type II DM according to their age groups. Correlation analyses revealed that a very strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.88, p<0.001) for subjects between 40-50 years of age.

Strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.75, p<0.01) for subjects between 51-60 years of age. Strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.79, p<0.001) for subjects between 61-70 years of age. A very strong negative relationship between McGill Score for pain and SF 36 Score for quality of life (r=-0.84, p<0.01) for subjects >70 years of age. So, it indicates that as pain increases, quality of life decreases.

Previous study was done in 2019 by Ayesha Girach, Thimas henry julian *et al*. In this study we found that patients with higher pain intensity experienced the worse quality of life [13].

Previous study was done in 2009 by Moreira RO, Amancio AP *et al*. In this study we found that Diabetic patients with diabetic distal polyneuropathy (DDP) presented a worse QL in the physical and environmental domains of the WHOQOL-bref, probably due to more depressive symptoms and the severity of pain [14].

Previous study was done in 2016 by Radka vymetalova, Renata zelenikova *et al*. In this study we found that quality of life in patients with permanent pain was lower in all domains of questionaarrie in comparison with patients who reported no pain [15].

5. Conclusion

The study shows that as diabetic neuropathic pain increases in Type ll DM patients quality of life decreases.

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