"A Comparative Study to Analyse the Functional Mobility, Muscle Strength, Dynamic Balance And Quality of Life in With And Without Diabetic Neuropathy Patient"

Dr. Manoj kumar[1], Dr. Chintan Vyas[2], Dr. Chaitany Patel [3], Afreen Vora [4],

1Principal, Shree B. G. Patel College of Physiotherapy
2 Saarthi Institute Of Diabetes Sciences Center, Anand
3Assistant Professor, Shree B. G. Patel College of Physiotherapy
4 Intern, Shree B. G. Patel College of Physiotherapy

Affiliated to Sardar Patel University, Anand-388001

Corresponding Author: Chaitany Patel, Department of Physiotherapy Shree B. G. Patel College, Sardar Patel University, Anand, Gujarat 388001, India, Tel: +919173127664; E-mail: chaitany.bpt@gmail.com

ABSTRACT

Purpose: To Compare the Functional Mobility, Muscle Strength, Dynamic Balance And Quality of Life With And Without Diabetic Neuropathy Patient. Methods: Cross Sectional Study design assigned by convenient sampling with 60 Subjects in each group.

Outcome measure: 5 time sit-to-stand test (FTSTS), Michigan Neuropathy Screening Instrument (for diabetic neuropathy patients), Functional reach test, Time up and go test and QOLID

Results: Study shows that mean of muscle strength of 60 patients with diabetic mellitus assessed by five time sit to stand was 14.48 and standard deviation was 6.556 .and 60 patients in diabetic neuropathy patient mean was 15.96 and standard deviation was 5.778. which shows that patients with neuropathy need more time to do 5 times sit to stand compared to diabetic mellitus. It concludes that the muscle strength in diabetic neuropathy patients is low compared to diabetic mellitus patients.

Conclusion: There is significant correlation between **muscle strength** with **functional mobility and dynamic balance** in with and without diabetic neuropathy. patient's quality of life gets affected with and without diabetic neuropathy but in neuropathy seen more affection, there is correlation between poor diabetic control and role limitation due to physical health.

Keywords: Diabetic, Diabetic Neuropathy Functional Mobility, 5 time sit-to-stand test, Functional reach test, Dynamic Balance , Quality of Life

INTRODUCTION

Diabetes mellitus is a metabolic disease that is characterized by elevated levels of blood glucose. Already 2000 years ago, the ancient Greek physician Arateus of Cappadocia gave the first complete description of diabetes and concluded that "life with diabetes is short, disgusting and painful".[1] India has earned the dubious distinction of being termed the "Diabetes capital of the world" with number of patients expected to cross 79.4 million by year 2030.[2] There are two distinct types of diabetes mellitus: type 1 (DM1) and type 2 diabetes mellitus (DM2).

Ten percent of all patients with diabetes have DM1, which in most (but not all) cases develops during childhood or adolescence. This type of diabetes is the result of an autoimmune destruction of the insulin producing beta cells in the pancreas. Most of the patients with diabetes mellitus suffer from DM2. This metabolic disorder is characterized by high blood glucose levels (hyperglycemia) due to insulin resistance and relative lack of insulin. There are several risk factors in the development of DM2, such as family history (genetic predisposition), intrauterine environment, obesity, diet, and physical inactivity. [17]

Edward Horton concluded in 1983 in his review that "Environmental factors such as excessive caloric intake altered dietary composition, physical inactivity, and the process of aging, may contribute to the development of noninsulin-dependent diabetes mellitus in the genetically predisposed subject".[3] Diabetic neuropathy (DN) is a nerve damaging disorder associated with diabetes. This condition is thought to be result from micro vascular injury involving small blood vessels that supply the nerve (vas nervorum) in addition to macro vascular condition that can culminate in diabetic neuropathy. Neuropathy frequently results in significant morbidities such as pain, loss of sensation, foot ulcers, gangrene and amputations which is much feared sequel that results in hospitalizations.[4] Postural instability in diabetic sensory neuropathy (DSN) patients is usually attributed to the lack of accurate proprioceptive feedback (sensory ataxia) from the lower limbs.[5]

Diabetes is highly prevalent in older people, and its prevalence is expected to increase substantially in the next decades.[6]
About 79% live in low- and middle-income countries. The number of people with diabetes increases to 451 million if the age is expanded to 18-99 years. If these trends continue, by 2045, 693 million people 18-99 years, or 629 million of people 20-79 years, will have diabetes.[7]

Recent studies have shown that more than half of community-dwelling elderly people over the age of 62 years report a fear of falling. Developing a fear of falling is more prevalent with increasing age and fall history but is not limited to individuals with a history of falls.

The impact of fear of falling is far-reaching because it can lead to activity restriction and diminished mobility, with as many as 56% of elderly people curtailing activities due to this fear.[7]
According to Stefano Volpato, MD, MPH et al. (2002), A total of 53% of the sample reported mobility disability, 31.6% had ADL disability, and 26.8% had severe walking limitations.[8]

According to DanikLafond et al. (2004) DSN showed larger sway area, larger speed of sway larger COP range, higher RMS values of the COP-COM variable, and an increase in the power of medium-high frequency band of a power spectral analysis.[2] According to Lindsey M Tilling et al. (2005), Falls occurred more frequently in patients with poor diabetic control [risk ratio (RR)=7.83 (2.948–20.799), χ^2 value=6.422]; patients requiring assistance with mobility: for those mobile with a stick [RR=1.839 (1.048–3.227), χ^2=4.619]. Poorly controlled diabetes and conditions associated with complications of diabetes are associated with an increased risk of falling in older people.[9]

Elderly people with chronic diseases are more prone to serious damage and complications after a fall. For example, diabetic patients with complications, such as peripheral neuropathy, visual defects, poor kidney function, and hypoglycemia, are likely to experience various physical and psychological limitations and difficulties.[15,23]

Interactions between the vestibular system and cerebellum, which regulate the musculoskeletal and sensorimotor systems, are responsible for balance. [24]

Peripheral neuropathy, a complication of diabetes, negatively affects proprioception and increases postural instability or body sway. [25]

Delayed reaction and recovery times from sudden postural changes on irregular surfaces comprise further risk factors for falls. [26]

Diabetic neuropathy (DN) severely decreases patients' quality of life [27] and the quality of diabetes self-management and, in consequence, is worsening the prognosis of other diabetes complications. Some patients cannot sense temperature and often burn themselves during daily activities.

Lack of sensitivity, or loss of nociception can lead to foot ulceration and to unintentional but serious injuries that can become infected and lead to amputation.[28] Recent research brought to attention that cardiac autonomic neuropathy is independently associated with chronic kidney disease in patients with type 2 diabetes [29] and that diabetic neuropathy and albuminuria are significantly associated.[30] In addition, cardiac autonomic neuropathy is associated with increased cardiovascular morbidity and mortality. [31]

DN may compromise balance during daily activities. Patients with DN have a fivefold increased risk of falling [32] and the consequences include decline in mobility, activity avoidance, institutionalization, and mortality.[33]

This balance impairment in patients with DN is predominantly in the medial-lateral plane and is the greatest during stair descent.[32] Both physiological (strength and proprioception) and cognitive–behavioral factors (fear of falls) should be considered when treating diabetic patients with gait alterations. [19,34]

So for this our aims of study To Compare The Functional Mobility, Muscle Strength, Dynamic Balance And Quality of Life With And Without Diabetic Neuropathy Patient.

MATERIALS & METHODS

STUDY DESIGN: Cross Sectional Study

STUDY SETTING:

Department of physiotherapy, SHREE B.G. PATEL COLLEGE OF PHYSIOTHERAPY,

ANAND, vSAARTHI INSTITUTE OF DIABETES SCIENCES CENTER, ANAND

SAMPLE SIZE: 60 subjects in each group

TYPE OF SAMPLE: Convenient Sample

SUBJECTS: Male and Female

INCLUSION CRITERIA:

1.With and without Diabetic Neuropathy Patient
2.Age group 45 to 70
3.Patients with no musculoskeletal or cardiac problems,
4. Patient who was able to stand up from the chair without any external support,
5. Patient diagnosed by Physician or Neurophysician .

EXCLUSION CRITERIA:

1. Who are unable to follow commands properly,
2. Suffering from other neurological or musculoskeletal diseases which could affect sit to stand performance.

MATERIALS USED IN STUDY:

1. Measure tape
2. Pencil
3. Papers

APPARATUS USED IN STUDY:

1. Height adjustable chair
2. Digital stopwatch

OUTCOME MEASURES:

1. 5 time sit-to-stand test (FTSTS) [10]
2. Michigan Neuropathy Screening Instrument (for diabetic neuropathy patients) [11]
3. Functional reach test [14]
4. Time up and go test. [14,18]
5. QOLID [20]

PROCEDURE:

Subjects will be selected based on inclusion and exclusion criteria. All subjects will be provided with written informed consent. In Data collection the demographic data, hbA1c [21,22], average blood sugar and all test and measures taken with standard Procedure and instruction to follow.

Statistical Analysis : Correlation and Unpaired t-test was used for analysis.
Null hypothesis will be rejected if $P< 0.05$. All the statistical analysis was conducted with the help of version 16.0 of the SPSS.

RESULT

DATA ANAYLSIS

Table :1 :- baseline characteristics of patient with diabetic and diabetic neuropathy patient included in the study (n=120, 60 each group)

Variables	**Diabetic**	**Diabetic neuropathy**
Age	57.87±8.098	58.02±8.384
GENDER (M:F)	31: 29	25: 35
MUSCLE STRENTH FTSTS (sec)	14.48±6.556	15.96±5.778
FUNCTIONAL MOBILITY FRT(cm)	28.99±5.383	26.72±5.924
DYNAMIC BALANCE TUGT (sec)	10.64±4.869	14.82±6.154
HbA1C (%)	8.828±2.109	9.453±2.253
AVERAGE BLOOD SUGAR (mg/dl)	202.6±67.05	221.1±67.29
MNSI SCORE	4.567±1.294	7.750±1.633
QOLID (%)	88.68±6.071	80.09±13.34

Table:2 : Correlation Between All Variables In Diabetic Mellites Patients

	MUSCLE STRENTH (sec)	FUNCTIONAL MOBILITY (cm)	DYNAMIC BALANCE (sec)	HbA1C	AVERAGE BLOOD SUGAR (mg/dl)	MNSI SCORE	QOLID
MUSCLE STRENTH (sec)		-0.2944808	0.6369522	0.01082952	-0.1180812	0.1178515	-0.1241582
FUNCTIONAL MOBILITY (cm)	-0.2944808		-0.4498819	- 0.04907566	0.01354697	- 0.08134838	0.02656791
DYNAMIC BALANCE (sec)	0.6369522	-0.4498819		0.07523669	0.01225988	0.2346001	-0.1260508
HbA1C	0.01082952	-0.04907566	0.07523669		0.9151055	0.3013175	-0.2116711
AVERAGE BLOOD SUGAR (mg/dl)	-0.1180812	0.01354697	0.01225988	0.9151055		0.337763	-0.2115054
MNSI SCORE	0.1178515	-0.08134838	0.2346001	0.3013175	0.337763		-0.3217514
QOLID	-0.1241582	0.02656791	-0.1260508	-0.2116711	-0.2115054	-0.3217514	

(r Value) Statistically Significant

(p Value Of All Variable)

	MUSCLE STRENTH (sec)	FUNCTIONAL MOBILITY (cm)	DYNAMIC BALANCE (sec)	HbA1C	AVERAGE BLOOD SUGAR (mg/dl)	MNSI SCORE	QOLID
MUSCLE STRENTH (sec)		0.02237409	4.468890e-008	0.934549	0.3688861	0.3698249	0.3445779
FUNCTIONAL MOBILITY (cm)	0.02237409		3.105471e-004	0.7096201	0.9181759	0.5366465	0.8403072
DYNAMIC BALANCE (sec)	4.468890e008	3.105471e-004		0.5677744	0.9259271	0.07119218	0.3372158
HbA1C	0.934549	0.7096201	0.5677744		1.501703e-024	0.01930658	0.1044693
AVERAGE BLOOD SUGAR (mg/dl)	0.3688861	0.9181759	0.9259271	1.501703e-024		0.008307208	0.1047474
MNSI SCORE	0.3698249	0.5366465	0.07119218	0.01930658	0.008307208		0.01217952
QOLID	0.3445779	0.8403072	0.3372158	0.1044693	0.1047474	0.01217952	

Table :3 : Correlation Between All Variable In Diabetic Neuropathy Patients

	MUSCLE STRENTH (sec)	FUNCTIONAL MOBILITY (cm)	DYNAMIC BALANCE (sec)	HbA1C	AVERAGE BLOOD SUGAR (mg/dl)	MNSI SCORE	QOLID
MUSCLE STRENTH (sec)		-0.3663773	0.4652094	0.3475443	0.3124633	0.3431	-0.4272497
FUNCTIONAL MOBILITY (cm)	-0.3663773		-0.4885031	-0.04195054	-0.1095457	-0.2535027	0.4284163
DYNAMIC BALANCE (sec)	0.4652094	-0.4885031		0.2137042	0.2297418	0.382793	-0.3684761
HbA1C	0.3475443	-0.04195054	0.2137042		0.9093744	0.2055427	-0.3822006
AVERAGE BLOOD SUGAR (mg/dl)	0.3124633	-0.1095457	0.2297418	0.9093744		0.1305089	-0.2797025
MNSI SCORE	0.3431	-0.2535027	0.382793	0.2055427	0.1305089		-0.3921993
QOLID	-0.4272497	0.4284163	-0.3684761	-0.3822006	-0.2797025	-0.3921993	

(r Value) Statistically Significant

(p Value Of All Variable)

	MUSCLE STRENTH (sec)	FUNCTIONAL MOBILITY (cm)	DYNAMIC BALANCE (sec)	HbA1C	AVERAGE BLOOD SUGAR (mg/dl)	MNSI SCORE	QOLID
MUSCLE STRENTH (sec)		0.003988256	1.802799e-004	0.006512115	0.01507325	0.007280595	0.000662502
FUNCTIONAL MOBILITY (cm)	0.003988256		7.498754e-005	0.7502938	0.4047322	0.05065745	0.0006379366
DYNAMIC BALANCE (sec)	1.802799e-004	7.498754e-005		0.1011039	0.07742263	0.002539376	0.003769382
HbA1C	0.006512115	0.7502938	0.1011039		9.209374e-024	0.115139	0.002582124
AVERAGE BLOOD SUGAR (mg/dl)	0.01507325	0.4047322	0.07742263	9.209374e-024		0.3202663	0.03043426
MNSI SCORE	0.007280595	0.05065745	0.002539376	0.115139	0.3202663		0.001940083
QOLID	0.000662502	0.0006379366	0.003769382	0.002582124	0.03043426	0.001940083	

Table :4 : Correlation Between All Variable In Diabetic Neuropathy Patients

OUTCOME		MEAN± SD	DF	**P Value**	**T Value**
Muscle strength (5 time sit to stand sec)	Diabetes Mellites	14.48±6.556	118	**0.1924**	**1.311**
	Diabetic Neuropathy	15.96±5.778			
Functioal mobility(functional reach test cm)	Diabetes Mellites	28.99±5.383	118	**0.0298**	**2.199**
	Diabetic Neuropathy	26.72±5.924			
Dynamic balance (TUG test sec)	Diabetes Mellites	10.64±4.869	118	< **0.0001**	**4.131**
	Diabetic Neuropathy	14.82±6.154			
HbA1C (%)	Diabetes Mellites	8.828±2.109	118	**0.1194**	**1.569**
	Diabetic Neuropathy	9.453±2.253			
Average blood sugar (Mg/dl)	Diabetes Mellites	202.6±67.05	118	**0.1337**	**1.510**
	Diabetic Neuropathy	221.1±67.29			
MNSI Score	Diabetes Mellites	4.567±1.294	118	< **0.0001**	**11.84**
	Diabetic Neuropathy	7.750±1.633			
QOD (%)	Diabetes Mellites	88.68±6.071	118	< **0.0001**	**4.536**
	Diabetic Neuropathy	**80.09±13.34**			

Significant different (P < 0.05)

RESULT

Correlation of muscle strength with functional mobility and dynamic balance was statistically significant, which was tested with spearman correlation test. The spearman r values were -0.29448089 (weak negative), 0.6369522 (strong) respectively. P valuesof correlation with muscle strength were 0.02237409 for functional mobility 4.468890e-008 for dynamic balance diabetic mellitus

Correlation of functional mobility with muscle strength and dynamic balance was statistically significant, which was tested with spearman correlation test. The spearman r values were -0.2944808(weak negative), -0.4498819 (strong) respectively. P values of correlation with functional mobility were 0.02237409 for muscle strength 3.105471e-004 for dynamic balance diabetic mellitus

Correlation of dynamic balance with muscle strength and functional mobility was statistically significant, which was tested with spearman correlation test. The spearman r values were 0.6369522(strong), -0.4498819 (strong negative) respectively. P values of correlation with dynamic balance were 4.468890e-008 for muscle strength 3.105471e-004 for functional mobility diabetic mellitus

Correlation of HbA1C with ABS, MNSI was statistically significant, which was tested with spearman correlation test. The spearman r values were 0.9151055(very strong), 0.3013175(moderate) respectively. P values of correlation with HbA1C were 1.501703e-024 for ABS 0.01930658 for MNSI in diabetic mellitus

Correlation of ABS with HbA1C, MNSI was statistically significant, which was tested with spearman correlation test. The spearman r values were 0.9151055(very strong), 0.008307208(no/negligible) respectively. P values of correlation with ABS were 1.501703e-024for HbA1C 0.008307208 for MNSI in diabetic mellitus

Correlation of MNSI with HbA1C, ABS, QOLID was statistically significant, which was tested with spearman correlation test. The spearman r values were0.3013175(moderate), 0.337763(modrate) ,0.01217952(no/negligible) respectively. P values of correlation with MNSI were 0.01930658for HBA1C 0.008307208for ABS ,0.01217952 for QOLID in diabetic mellitus

Correlation of QOLID with MNSI was statistically significant, which was tested with spearman correlation test. The spearman r values were -0.3217514(moderate negative) respectively. P values of correlation with QOLID were 0.01217952 for MNSI in diabetic mellitus.

Correlation of muscle strength with functional mobility, dynamic balance, HbA1C, ABS MNSI and QOLID was statistically significant, which was tested with spearman correlation test. The spearman r values were -0.36637773(moderate negative), 0.4652094(strong), 0.3475443(moderate), 0.3124633(moderate), 0.3431(moderate), 0.4272497(strong) respectively. P values of correlation with muscle strength were 0.003988256 for functional mobility, 1.802799e-004 for dynamic balance, 0.006512115 for HbA1C, 0.0107325 for ABS ,0.007280595 for MNSI 0.000662502 for QOLID in diabetic neuropathy

Correlation of functional mobility with muscle strength, dynamic balance and QOLID was statistically significant, which was tested with spearman correlation test. The spearman r values were -0.3663773(moderate negative), 0.4885031(strong), 0.4284163(strong) respectively. P values of correlation with functional mobility were 0.003988256 for muscle strength 7.498754e-005 for dynamic balance 0.0006379366 for QOLID in diabetic neuropathy.

Correlation of dynamic balance with muscle strength, functional mobility, MNSI and QOLID was statistically significant, which was tested with spearman correlation test. The spearman r values were 0.4652094(strong), -0.4885031(strong negative), 0.382793(moderate), -0.3684761(moderate negative) respectively. P values of correlation with dynamic balance were 1.802799e-004 for muscle strength, 7.498754e-005 for functional mobility, 0.002539376 for MNSI, 0.003767382 for QOLID in diabetic neuropathy

Correlation of HbA1Cwith muscle strength, ABS and QOLID was statistically significant, which was tested with spearman correlation test. The spearman r values were 0.3475443(strong), 0.9093744(very strong), -0.3822006(moderate negative) respectively. P values of correlation with HbA1C were0.006512115 for muscle strength, 9.209374e-024 for ABS, 0.002582124 for QOLID in diabetic neuropathy

Correlation of ABS with muscle strength, HbA1C and QOLID was statistically significant, which was tested with spearman correlation test. The spearman r values were 0.3124633(moderate), 0.9093744(very strong), -0.2797025(weak negative) respectively. P values of correlation with ABS 0.01507325 for muscle strength,9.209374e-024 for dynamic balance, 0.001940083 for QOLID in diabetic neuropathy

Correlation of MNSI with muscle strength, dynamic balance and QOLID was statistically significant, which was tested with spearman correlation test. The spearman r values were

0.3431(moderate), 0.382793(moderate), 0.392199399 (moderate) respectively. P values of correlation with MNSI were 0.00728059for muscle strength, 0.002539376 for dynamic balance, and 0.001940083 for QOLID in diabetic neuropathy

Correlation of QOLID with muscle strength functional mobility, dynamic balance, HbA1C, ABS and MNSI was statistically significant, which was tested with spearman correlation test.
The spearman r values were -0.44272497(strong negative), 0.4284163(strong), -0.3684761(moderate negative), -0.3822006(moderate negative), -0.2797025(weak negative), 0.3921993(moderate) respectively. P values of correlation with QOLID were 0.000662502 for muscle strength 0.0006379366 for functional mobility, 0.003769382 for dynamic balance,
0.002582124 for HbA1C, 0.03043426 for ABS, 0.001940083 for MNSI in diabetic neuropathy

The mean and standard deviation of muscle strength in diabetic mellitus is 14.48 and 6.556 respectively. And in diabetic neuropathy is 15.96 and 5.778 respectively. And p value we found is 0.1924 that is statistically not statistically significant.

The mean and standard deviation of functional mobility in diabetic mellites is 28.99 and 5.383 respectively. And in diabetic neuropathy is 26.72 and 5.924 respectively. And p value we found is 0.00298 that is statistically significant.

The mean and standard deviation of dynamic balance in diabetic mellites is 10.64 and 4.869 respectively. And in diabetic neuropathy is 14.82 and 6.154 respectively. And p value we found is 0.0001 that is statistically significant.

The mean and standard deviation of HbA1C in diabetic mellitesis 8.828 and 2.109 respectively. And in diabetic neuropathy is 9.453 and 2.253 respectively. And p value we found is 0.1194 that is statistically not statistically significant.

The mean and standard deviation of ABS in diabetic mellites is 202.6 and 67.05 respectively. And in diabetic neuropathy is 221.1 and 67.29 respectively. And p value we found is 0.1337 that is statistically significant.

The mean and standard deviation of MNSI in diabetic mellites is 4.567 and 1.294 respectively. And in diabetic neuropathy is 7.750 and 1.633 respectively. And p value we found is 0.0001 that is statistically significant.

The mean and standard deviation of QOLID in diabetic mellites is 88.680 and 6.071 respectively. And in diabetic neuropathy is 80.09 and 13.34 respectively. And the p value we found is 0.0001 that is statistically significant.

DISCUSSION

This comparative study provides information about the analysis of the functional mobility, muscle strength, dynamic balance, and QOLID with and without diabetic neuropathy patients.

During the study, data was collected from 120 people with diabetic mellitus (Saarthi Institute of Diabetic Science and Shree B. G. Patel College of Physiotherapy)). Out of 120 people taken, 60 were with diabetes mellitus and 60 were with diabetic neuropathy.

Outcome measures used were muscle strength, functional mobility, dynamic balance, HbA1C, ABS, MNSI, QOLID.

Study shows that mean of muscle strength of 60 patients with diabetic mellitus assessed by five time sit to stand was 14.48 and standard deviation was 6.556 .and 60 patients in diabetic neuropathy patient mean was 15.96 and standard deviation was 5.778. which shows that patients with neuropathy need more time to do 5 times sit to stand compared to diabetic mellitus. It concludes that the muscle strength in diabetic neuropathy patients is low compared to diabetic mellitus patients.

The task of FTSTS involves changing the base of support between the buttocks and feet repeatedly and places high demands on vision, proprioception, coordination, and especially lower limb strength. A longer FTSTS time has been observed in people with balance.
problems, both young and older, and found to predict falls and disability in older adults.[24]

As per our study time taken by diabetic mellitus patients is 14.48 seconds. as similar research by Bohannon, Richard W.et al (2006), they have categories the individuals according to their age.
The average time taken was 60 to 69 years -11.4 seconds, 70 to 79 years -12.6 seconds and 80 to89 years -14.8 seconds.[12] According to Bohannon, Richard W.et al (2007), they got mean 7.6seconds. There are various factors which affect the studies.[13] Factors like age group, gender, lifestyle, etc.

As per our study time taken by diabetic neuropathy patient is 15.96 seconds. According to K. Lee et al. (2013), the mean baseline was 17 seconds.[25] According to Vaz M.M et al. (2013), DN performed the test in 15.1±2.7 seconds.[26] The values obtain from the present is higher than those of K. Lee et al. and Vaz M.M et al. respectively. The difference in time variation taken can be due to following factors age group, gender, community, vision, sensory and motor affection, and reduced muscle strength.

The results show that the diabetic neuropathy patients took more time as compared to diabetic mellitus. The diabetic neuropathy patient took 15.96 seconds to complete FTSTS, and diabetic mellitus took 14.48 sec.

Study shows that the mean of functional mobility of 60 patient with diabetic mellitus assessed by functional reach test was 28.99 cm and standard deviation was 5.383 cm. and 60 patients in diabetic neuropathy patients mean was 26.72 cm and standard deviation was 5.924cm. which shows that the patient with diabetic neuropathy has less functional mobility compared to diabetic mellitus.

Study shows that the mean of dynamic balance of 60 patient with diabetic mellitus assessed by time up and go test (TUGT) was 10.64 seconds and standard deviation was 4.864 seconds. And 60 patients in diabetic neuropathy patients mean was 14.82 seconds and standard deviation was
6.154 seconds. Which shows that the patient with diabetic neuropathy need more time to do TUGT compared to diabetic mellitus. It concludes that, the dynamic balance in diabetic neuropathy patients is low compared to diabetic mellitus patients.

As similar research by Goldberg A (2012) The main objective of this study was to evaluate the (Dynamic Balance) validity of the FTSST as a measure of dynamic balance in older adults. Twenty-nine females (mean age, 73.6 years) performed two trials of the FTSST, timed up and go (TUG), and functional reach (FR) tests. Validity of the FTSST as a measure of dynamic balance was evaluated by quantifying strength of relationships between the FTSST and two measures of dynamic balance, TUG and FR, using Pearson's correlation coefficient. Measures of relative [intraclass correlation coefficient (ICC)] and absolute [standard error of measurement (SEM)] reliability, as well as the MDC at the 95% confidence level (MDC 95) were computed for the FTSST. The FTSST is a valid measure of dynamic balance and functional mobility in older adults. The high ICC and low SEM and SEM% suggest excellent relative and absolute reliability and reproducibility of the FTSST in older adults. Change in FTSST performance should exceed 2.5 seconds to be considered real change beyond measurement error.[13]

Study shows that the mean of HbA1C of 60 patients with diabetic mellitus 8.825%and standard deviation 2.109%. And 60 patients in diabetic polyneuropathy 9.453% and standard deviations 2.253%. which shows that the patient with diabetic neuropathy has more Hba1c value than diabetic mellitus.

Evidenced show that, Chris Florkowski studied on"HbA1c as a Diagnostic test for Diabetes Mellitus-reviewing article the evidence", evidence base in support of HbA1c as a diagnostic test for diabetes mellitus is focused on predicting a clinical outcome. Normal value HbA1C <5.7% , elevated 5.7-6.4% , high >6.4 .

Study shows that the mean of ABS (average blood sugar) of 60 patients with diabetic mellitus 202.6Mg/dl and standard deviation was 67.05Mg/dl. and 60 patients in diabetic neuropathy 221.3Mg/dl and standard deviation was 67.29Mg/dl. Which shows that the patient with diabetic neuropathy has more ABS value that diabetic mellitus. it is concluded that higher the ABS value more physical problem.

In my study in assessed MNSI (Michigan neuropathy screening instrument) That is used for to categorized patient in only diabetic and diabetic neuropathy interpretation that the <7 score suggestive of patient has only diabetes mellitus (without diabetic neuropathy) and >7 or 7 score suggestive that patient has diabetic neuropathy.

Evidence shows that,W. H Herman et al. (2012) The Michigan Neuropathy Screening Instrument (MNSI) is used to assess distal symmetrical peripheral neuropathy in diabetes.
Conclusions Altering the cut point to define an abnormal test from = 7 abnormal to = 4 abnormal items improve the performance of the MNSI questionnaire. The MNSI is a simple, noninvasive, and valid measure of distal symmetrical peripheral neuropathy in Type 1 diabetes.[16]

Study shows that mean of QOLID in 60 patient who has only diabetic mellitus 88.68% and standard deviation was 6.071%. and 60 patients has diabetic neuropathy 80.09% and standard deviation was 13.34 %. which shows that diabetic patient had higher percentage (more score) QOL compared to diabetic neuropathy patients.it conclude that diabetic patient has better QOL compared to diabetic neuropathy patients.

In general, patients with DM2 had inadequate HRQoL, of which the most affected scales were Role limitation due to physical health, Energy/Fatigue, and pain.

The findings in the literature regarding the QoL of patients with DM2 and its association with sociodemographic factors have been variable. Previous reports found that lower educational level, lower income and belonging to the female sex were associated with poor QoL in people with diabetes.[35]

Another important factor is that patients with DM2 often feel challenged by their illness and the related demands on a daily basis, which also impacts their perception of QoL. [36]

Several studies have shown that the presence of comorbidities decreases the QoL of patients with diabetes; for example, Wermeling et al. evaluated 2086 patients with DM2 in the Netherlands and found that those with comorbidities had a significantly lower health status than those without comorbidities. [37]

Depression has an important impact on HRQoL in patients with DM2, and thus, strategies should be developed to prevent depression. It has been shown that exercise on a regular basis, of any type of intensity, prevents depression. [38-39] Because of this, some of the strategies should be to promote routine exercise for older adults.

CONCLUSION

There is significant correlation between **muscle strength** with **functional mobility and dynamic balance** in with and without diabetic neuropathy. patient’s quality of life gets affected with and without diabetic neuropathy but in neuropathy seen more affection, there is correlation between poor diabetic control and role limitation due to physical health.

Limitation Of The Study: The size of the sample was relatively small. It was within sphere of one district. So it doesn’t represent the large population and Factor evolution not done like age, gender, and duration of diabetes.

Clinical Implication : As per our study results shows the muscle strength, dynamic balance, functional mobility and quality of life is affected with and without diabetic neuropathy patients so its suggest to take a outcome for screening and prognosis within clinical and physiotherapy practice.

future scope about a study should be in large population as well as Experimental study between case group and control group can be done for improvement in glycaemic control and improvement in overall health.

Conclude your research paper here.

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