BALANCE IMPAIRMENTS AMONG TYPE II DIABETICS

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ABSTRACT:
Chronic hyperglycemia is linked with long-term damage, dysfunction, and failure of different organs including the eyes, kidneys, nerves, heart, and blood vessel leading to Diabetic neuropathy, Diabetic retinopathy, diabetic foot ulcer causing fall and balance problems. Neuropathy is commonly seen condition in diabetics. Study was needed to assess weather diabetic nephropathy has affected patients’ dynamic stability or static stability more. So, in this study we evaluated that patient with type II diabetes have more affected dynamic balance or static balance.

Methodology:
Data was collected from sample size of 200 was calculated using software open Epi. Purposive sampling technique was used to collect data from patients of both gender and those age above 45, Diagnosed type II diabetics for more than 2 years and diagnosed diabetic neuropathy. All patients with amputation were excluded from study. All included patients were asked for demographics after which static balance was assessed using static balance test and dynamic balance test was assessed using TUG.
All gathered data was entered into SPSS and analyzed. P value of less than 0.05 was considered to be significant.

Results: Out of total 200 patients of diabetic neuropathy (113)56.5 % were females and (87) 43.5% were males. Mean age of patients was found to be 64.5 years. Out of total individual (128) 64% were having impaired static balance on static balance test and (130) 65% were having impaired dynamic balance using TUG. Among (80)40% people with hyperglycemic levels 170-250mg/dl out of which (50)62.5% had static balance impairment, (120)60% people with hyperglycemic level above 250 mg/dl out of which (78)65% had impaired static balance, showed significant result with p value of 0.04. Among (80)40% patients who had hyperglycemic level between 170-250 out of which (50)62.5% had dynamic balance impairment on TUG, (120)60% patients who had hyperglycemic levels 250-400mg/dl or above (80)66.6% had dynamic balance impairment on TUG, showed significant result with p value of 0.03.

Conclusion: Study concluded that static and dynamic balance impairment is associated with higher levels of type II diabetes. However, dynamic balance is affected more as compared to static balance in patients having diabetic neuropathy.

Key words: Balance Impairment, Diabetes Mellitus, Dynamic Balance, Static Balance
Introduction:
Balance Disorder is a disturbance that causes an individual to feel unsteady, when standing or walking.¹ It may be accompanied by feelings of spinning, or floating or having a sensation of movement.² Balance disorder can develop as a result of damage or deficit in visual, vestibular or proprioceptive system.³ Degeneration or loss of function in any of these systems can lead to balance deficits.⁴ Which could be possible outcome from long standing uncontrolled hyperglycemic levels.⁵ As chronic hyperglycemia is linked with long-term damage, dysfunction, and failure of different organs including the eyes, kidneys, nerves, heart, and blood vessel leading to Diabetic neuropathy, Diabetic retinopathy, diabetic foot ulcer causing fall and balance problems.⁶

Balance is body’s ability to maintain the line of gravity of a body within the base of support. Maintenance of line of gravity within base of support while body is in still position is static balance while maintaining this line of gravity within base of support in response of postural changes or sway is known to be dynamic balance.⁷ Different methods and scales are used for assessment of dynamic and static balance. Static balance can be measured using static balance test while dynamic balance can be measured using time up and go test (TUG).⁸

Balance impairment is a situation which can lead to fall and cause many other complications.⁹ Poor balance also leads to low self esteem and low confidence levels. Balance impairment is a common problem among diabetics which could be possibly because of diabetic neuropathy or retinopathy.¹⁰ However, neuropathy is commonly seen condition in diabetics. Study was needed to assess weather diabetic nephropathy has affected patients’ dynamic stability or static stability more. So, in this study we evaluated that patient with type II diabetes have more effected dynamic balance or static balance.
Methodology:
Prospective study was conducted at Women Institute of Rehabilitation Sciences Clinic and Jinnah International Hospital for duration of 8 months, from August 2017 to April 2018. Ethical approval was taken from Research ethical committee of Women Medical College Abbottabad. Sample size of 200 was calculated using software Open Epi. Purposive sampling technique was used to collect data from patients of both gender and those age above 45, diagnosed type II diabetics for more than 2 years and diagnosed diabetic neuropathy. All patients with amputation were excluded from study. All included patients were asked for demographics after which static balance was assessed using static balance test and dynamic balance test was assessed using TUG. TUG which is used to assess a person's mobility and requires both good static and dynamic balance. The timed “Up and Go” test measures the time taken by an individual to stand up from a standard armchair, walk a distance of 3 meters (118 inches, approximately 10 feet), turn, walk back to the chair and sit down. The subject wore their regular footwear and used their customary walking aid (cane or walker) and no physical assistance was given. Participants were instructed that, on the word “go”; to get up and walk at a comfortable and safe pace to a line on the floor 3 meters away, turn, return to the chair and sit down again. A stopwatch was used to record the trial time. The Static Balance Test took three to five minutes. Patients were asked to stand with feet side-by-side and placing the instep of one foot so it is touching the big toe of the other foot. Finally Tandem stance was asked to perform which included placing one foot in front of the other, heel touching toes followed by standing on one foot. Patient who was unable to perform tandem walk accurately was considered to have poor static balance.
All gathered data was entered into SPSS and analyzed. P value of less than 0.05 was considered to be significant.
**Results:** Out of total 200 patients of diabetic neuropathy (113) 56.5% were females and (87) 43.5% were males. Mean age of patients was found to be 64.5 years. Out of all 200, (73) 36.5% were using assistive devices. Out of total individual (128) 64% were having impaired static balance on static balance test and (130) 65% were having impaired dynamic balance using TUG. Out of total 200 patients in this study among which (80) 40% had hyperglycaemic level between 170-250mg/dl among and (120) 60% patients who had hyperglycaemic level more than 250. Among (80) 40% people with hyperglycemic levels 170-250mg/dl out of which (50) 62.5% had static balance impairment, (120) 60% people with hyperglycemic level above 250 mg/dl out of which (78) 65% had impaired static balance, showed significant result with p value of 0.04. Among (80) 40% patients who had hyperglycemic level between 170-250 out of which (50) 62.5% had dynamic balance impairment on TUG, (120) 60% patients who had hyperglycemic levels 250-400mg/dl or above (80) 66.6% had dynamic balance impairment on TUG, showed significant result with p value of 0.03.

![Hyperglycaemic levels among type II diabetics](image1)

![Impaired static balance on static balance test](image2)

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Figure 3 Impaired dynamic balance test
Discussion:
Significant result is seen by this study between hyperglycaemic levels and impaired static and dynamic balance which supported by previous studies. According to previous study in which evaluation procedure ran through Balance Error Scoring System (BESS), Timed Up and Go (TUG), Postural Stability Test and Limit of stability Test (LOS) on Biodex stability system results revealed highly statistical significant difference in the mean values of the BESS test, the LOS test and overall stability indexes on Biodex stability system. Study concluded that diabetes affects postural stability during normal functional activity.\textsuperscript{11}

In another study balance training with Biodex Balance System can significantly improve balance function in Diabetes Mellitus Type-II patients with diabetic neuropathy. Diabetic peripheral neuropathy is associated with peripheral sensory and motor nerve damage that affects up to half of diabetes patients and is an independent risk factor for falls.\textsuperscript{12}

In another study conducted results showed mean age of the patients was 57.43±7.28 years. In a sample size of 59, 17(28.8\%) patients were at high risk of falling, whereas 33 (55.9\%) patients were at medium and 9 (15.3\%) patients were at low risk of fall respectively on berg balance scale. Results showed that dynamic balance was affected. Patients with diabetic neuropathy were at greater risk of falling and impaired dynamic balance.\textsuperscript{13}

In another study showed that higher hyperglycaemic levels caused more impaired balance while walking and standing use of insulin was also found to be significantly associated with balance impairment along with use of assistive devices. Study showed that more impaired balance while walking and standing causes more balance problems and impairments among type II diabetics.\textsuperscript{14}
Conclusion: Study concluded that static and dynamic balance impairment is associated with higher levels of type II diabetes. However, dynamic balance is affected more as compared to static balance in patients having diabetic neuropathy.
References:


