Kinesthetic and Proprioceptive Impairments in Diabetic Patients

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ABSTRACT

Background: Diabetes Mellitus is a group of metabolic disorder having high glucose level. The aim of the study was to find out the prevalence of Proprioceptive and kinesthetic sensory impairments in diabetic patient.

Objective: The objectives of the study were to find out the prevalence of proprioceptive and kinesthetic sensory impairments in diabetic patient.

Methodology: A Descriptive cross sectional study was conducted and 100 patients were selected from 01st June 2012 to 30th November 2012. The patients were recruited from the hospitals of Rawalpindi and Islamabad. The data was collected through a semi-structured questionnaire.

Results: The total 100 patients were recruited 67 were female and 33 were male. The result shows the kinesthetic sensation loss was found in 39% patients while 61% have intact sensation. The proprioception loss was only 7% and remaining 93have intact proprioceptive sensation.

Conclusion: It is concluded that majority of diabetic patients were diagnosed as type 2, more females were noted in sample. It was observed that majority of the diabetic patients have intact proprioception while majority have lost kinesthetic sensation. The females were more prone to loss Proprioception as compare to male diabetic population. It is recommended to advise proper sensory training, awareness and education to diabetic population for fall prevention.

Keywords: Diabetes, kinesthetic sensation, proprioception (JRCRS 2014; 2(1): 12-16)

INTRODUCTION:

Diabetes is a disease of metabolic disorder1 in which an individual has elevated blood sugar, either because the body does not make enough insulin, or because cells do not react to the insulin that is produced.2 the prevalence of diabetes for all age-groups worldwide was expected to be 2.8% in 2000 and 4.4% in 2030. These result indicates that the "diabetes epidemic" will persist even if levels of obesity remain constant.(3) Diabetes mellitus is the most prevalent condition in geriatric population with higher incidence of functional disability and falls.4 The incidence of diabetes is gradually increasing due to the prevalence of sedentary life style, lack of exercise and obesity 5, 6 There are two different types of DM the type I DM results from body failure to produce insulin while type II DM from insulin resistance.7 The classic symptoms of natural diabetes are loss of weight, frequent urination, increased thirst and increased hunger. The most common of these is diabetes insipidus in which large which large amounts of urine are produced[8]. It is recommended for diabetic population to familiar with their roles including proper education, dietetic support and sensible exercise, with the goal of keeping both short-term and long-term blood glucose levels within acceptable levels.[9]

There are certain risks which are associated with diabetes , one of them is diabetic neuropathy, the impact of diabetes on the nervous system, most commonly causing numbness, tingling and pain in the feet, and also increasing the risk of skin damage due to altered sensation.10 For managing the problem of sensation some specialized footwear is widely used to reduce the risk of ulceration in diabetic feet.11, 12 There is some sensation of pain or tingling due to loss of some neuropathic factor in the skin, this leads to the poor sensory impairments. It was observed that the sensory loss included the kinesthetic and Proprioception sometimes interfere the perception.[13] Diabetic neuropathy includes the loss of proprioception and kinesthetic sensation which play an important role in the perception and stability. It is crucial to discuss the different complication related to the diabetes and also the impact of these complications on quality of life. The consequences of such neuropathies leads to the variation and impairments in locomotion in future.[14] So keeping in mind the different aspects of complications and

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their outcome, this study was planned to find out the frequency of different sensory impairments include kinesthetic and proprioception.

MATERIALS ANDMETHODS:

The descriptive cross sectional was conducted in Rawalpindi and Islamabad form 01st June 2012 to 30th November 2012.It included a100 patients having diabetes of longer than one year through purposive non probability sampling regardless of age and gender. A semi structured questionnaire was prepared for the recording of details of patients. The questionnaires have some items include the different sensory examination, proprioception, kinesthetic evaluation points. The data was collected through face to face patient's interviews and physical assessment of sensory integration. The data was analyzed through SPSS and a descriptive analysis was presented.

RESULTS:

The total 100 patients were recruited 67 were female and 33 were male. The 93% patients have intact proprioception while 7& have impaired proprioception sensation. The 61% of total patients have intact kinesthetic sensation while 39% have impaired kinesthetic sensation. It was analyzed 31 out 33 male have intact Proprioception while remaining 2 have not intact and 62 out of 67 females have intact and rest of 5 have not intact.

Table 1 shows the frequency of proprioception loss

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Intact	93	93%	93%	93%
		7	7%	7%	100%
	Total	100	100%	100%	

Table 2 shows the frequency of kinesthetic loss

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Intact	61	61%	61%	61%
		39	39%	39%	39%
	Total	100	100%	100%	

Figure 1 shows the frequency of proprioception loss

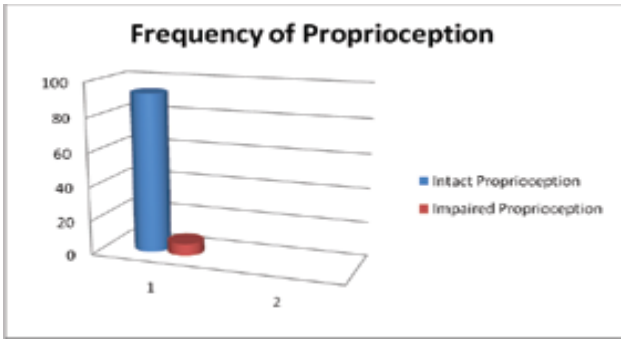
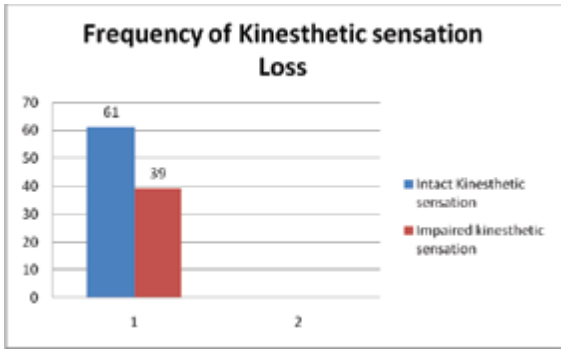


Figure 2 shows the frequency of kinesthetic sensation loss



DISCUSSION:

Diabetic neuropathy includes the loss of proprioception which plays an important role in the stability of diabetic patients. This study reveals the frequency of sensory impairment in diabetic population. Cavanagh et al. discussed that there is significant increase in postural sway due to loss of sensory component in diabetic population. They determined that there is lack of kinematic control during gait and also found the different biomechanical changes which leads to the sensory impairments.[15] Shun et al. described the details of sensory changes at cellular level with clinical and laboratory findings. The sensory impairments are correlated with duration of diabetes and lead to the sensory deficits and impair balance. Sensory neuropathy is a prominent component of diabetic neuropathy. It is not entirely clear how diabetes influences skin innervations.[16] Chochinov et al pointed out the abnormality of two point discrimination and other sensory characteristics. They found that it is more prevalent in the toes and fingers of feet, the tactile sensation are preserved in the diabetic population.[17]Dargent-Molina et al. clearly explained that the sensory impairments in diabetes are strongly related to the physical dependence and especially in female population. This type of sensory impairments leads to the lack of proper and concise activities of daily life. Such problems can lead to the lack of proper sensory integration so it's very difficult to perform the daily activities. [18] Guy et al suspected the involvement of thermal sensory impairments, frequent involvement of hands confirms the stocking and gloves distribution of diabetic neuropathy.

They concluded that thermal impairments is asymptomatic and proper assessment on different assessment scale is further needed to evaluate.[19] Schmader focused the research work on the effect of sensory impairments on quality of life in diabetic population. There are certain psychological factor include depression, fatigue, insomnia and anxiety interfere with social life and impaired the basic and necessary activities of life. The sensory impairments include the lack of kinesthetic and proprioception leads to the increase incidence of fall so people try to be stay inside and avoid this social life.[20] Van Deursen and simoneau briefly discussed the lower limb sensory impairments. They also described the balance deficiencies due to lack of proper proprioception and kinesthetic sensation.

They also pointed out different management plan for these impairments.[21] Lord et al found the evidence that older people have more problems with sensation, stability and sensory related motor function. They also raised the point of incidence of fall in diabetic neuropathy population due to impaired sensory sensation.[22] Morrison et al presented the research work on older population and shoes that there is impaired balance, slow reaction and consequently the higher chance of fall. There is lack of proper sensory integration and motor response adjunct to the feedback of receptors. [23] The literature have little evidence on proprioception and kinesthetic separately.

CONCLUSION:

It is concluded that majority of the diabetic patients were diagnosed as type 2, more female were noted in sample. It was observed that majority of the diabetic patients have intact Proprioception while majority have loss kinesthetic sensation. The females were more prone to loss Proprioception as compare to male

diabetic population. It is recommended to advise proper sensory training, awareness and education to diabetic population for fall prevention.

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