Hand Dysfunction in Elderly Individuals with Diabetes Mellitus

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Abstract

Aim: To study the effect of diabetes on hand function in elderly individuals.
Background: Given the evidence of reduced hand function in elderly individuals we were interested in examining any additional effect of diabetes in this population. Many studies showed the effect of diabetes on nerves of lower extremity but very few studies dealt with hand function.
Study design: Comparative observational study with simple random sampling in an out patient department setting.
Material and Methods: The study involved 60 patients divide equally in two groups i.e. control group consisted of elderly non diabetic individuals and experimental group consisted of elderly diabetics. Both groups were assessed on the basis of hand function test named “Action Research Arm Test” in which maximum score was 57. The coefficient of reproducibility of the test was 0.99 and coefficient of scalability was 0.94. The data was analyzed using an unpaired t test.
Results: The age factor in two groups was comparable with standard error of difference between two means (p value 2.20). Mean hand function score in two groups was compared (45.77 and 41.63) which showed no statistically significant difference (t cal =1.375, p>0.05). On comparison of scores between males and females in both groups no statistical difference was found. (t cal=0.063, p > 0.05).
Conclusion: Thus from our study it can be concluded that diabetes with an average duration of 5 years do not have a statistically significant effect on the hand function in elderly individuals.

Key Words: Hand dysfunctions, diabetes, elderly individuals

Introduction

The hand is really an extension of the brain. It serves three main functions: expression, sensation, and prehension (combining precision, pinch and gross grasp). The hand is a compact complex structure consisting of five types of tissues: skeleton, muscle tendon units, nerves, vascular supply (blood and lymph), skin and soft tissues. The most important of this is nerves which undergo changes with the advancement of age. It has been observed that reduced manual dexterity occurs in many healthy elderly persons, often affecting their quality of life and capacity for independent living.

The overall results demonstrated that precision grip force control capacity declines with advancing age. It is suggested that this decline is due mainly to age-related changes in skin properties, cutaneous sensibility functions and in part to central nervous system function. A long period of time with elevated blood glucose can damage nerve fibers. Specific efforts to treat complications in the lower leg--"the diabetic foot"--have been emphasized. Various complications in diabetes occur also in the upper extremity and hand--"the diabetic hand"--and include not only more specific diabetic-related conditions like limited joint mobility but conditions related to the non-diabetic hand, such as trigger finger, Dupuytren's contracture and peripheral nerve compression lesions are also seen.

There are various scales for the assessment of hand function. One such test mainly used for patients with neurological dysfunction is Action Research Arm Test. This test evaluates all types of precision grips including the ability to manipulate large as well as small objects. Diabetic neuropathy which affects mainly the small muscles of hand interferes with the manipulation of the objects and thus has a negative impact on the quality of life. Hence the purpose of this study was to evaluate the...
effect of diabetes on hand functions in elderly individuals with the help of most appropriate tool i.e. Action Research Arm Test.

Material and Methods

The study was conducted in outpatient department. Sixty subjects were included in the study. They were divided equally in two groups. The subjects without diabetes served as control with age ranging from 59 to 70 years (mean 67.76±5.95). The experimental group consisted of subjects with diabetes mellitus with an average duration of 5.76±4.91 and age ranging from 57 to 65 years (mean 61.17±6.26). Exclusion criteria were patients having obvious complications of diabetes such as neurological deficit, with severe limited joint mobility, Dupuytren's contracture, carpal tunnel syndrome and flexor tenosynovitis. All participants were ambulatory, lived independently in the general community and claimed to perform activities of daily living with little or no difficulty. Informed consent was obtained from all subjects. All participants appeared to be alert and cognizant of their surroundings. All the participants were given the explanation about the test. This test consists of four subtests i.e. grasp, grip, pinch and gross movement. In each subtest, scores were given to the ability to lift a particular size object. The test was carried in the calm distraction free room. To avoid any ambiguity, the tests were administered by the clinical therapist who was blinded with the group of the patient. The subjects were allowed to perform the test item as and how they could do it. No particular instructions regarding the type of hold and manner of handling were given to the patient. They were just told that “you have to pick up the object, lift it up and keep it back in place”. The scores for each individual were obtained and recorded. The data collected was analyzed using the unpaired t test.

Results

The study was conducted for a period of 6 months between August 2007-January 2008. The total score of the Action Research Arm test is 57. In the control group this was observed to be 45.77 ± 13.25 which indicates a statistically significant decrease in the hand functions (tcal = 1.96, p<0.05). Considering the fine work usually done by females, the mean scores of males and females was compared and the mean score of males was 43.69±16.9 and that of females was 45.26±19.89. Though the scores of males appears to be low but there was no statistically significant difference between the two (tcal=0.063, p>0.05).

Discussion

According to the study conducted by Richardson, there is an age related decline in peripheral nerve functions among older persons. Desrosiers checked the hand sensibility in healthy older individuals in the form of touch pressure threshold, moving two point discrimination, tactile recognition (modified pick up test) and thumb kinesthesia. He found that all were reduced in the older individuals he checked i.e. in the range of 60 to 94 years. Mota et al have reported that various abnormalities of hand like Dupuytren's contracture, limited joint mobility, carpal tunnel syndrome, flexor tenosynovitis occur in 50% of the diabetic patients. A study conducted by Casanova et al on hand function in patients with diabetes mellitus suggested that the function was significantly reduced in the diabetic group. Centius et al checked hand grip strength in patients with type 2 diabetes mellitus with a Jamar Dynamometer and found that hand grip strength and key pinch power values to be lower in patients with type 2 DM than in age matched control subjects. The hand and wrist are the most active and intricate parts of the upper extremity. Due to this they are vulnerable to injury which can lead to large functional deficits and do not respond well to trauma. The assessment of hand and wrist should be done with two objectives in mind. First injury or lesion should be assessed as accurately as possible to ensure proper treatment. Second the examiner should evaluate the remaining function to determine whether the patient will have incapacity in everyday life. As per the available literature hand function reduces considerably with age and in our study we found the same result that hand function was significantly reduced in the elderly age group. This can be due to reduction in pressure pain threshold, grip and grasp strength, which occurs with advancing age. There was a significant difference in the age group of the two groups. The age range in control group was on a higher side as compared to the experimental group. Still the hand function scores in experimental group were lower as compared to the control group. This can explain the effect of diabetes on hand function in elderly individuals but cannot be proved
statistically. So a study can be taken up which will exclude this age bias by selecting the subjects from more or less the same age group.

According to American Diabetes Association people with diabetes can develop problems at any time but significant clinical neuropathy can develop within the first 10 years after the diagnosis of diabetes.¹² In our study the average duration of diabetes was 5.78 years which might have produced negative results. This is in contrast to the study done by Casanova et al. who found that hand function was significantly reduced in patients with diabetes of 5 years duration. One of the limitations of the study can be that we did not include any symptom questionnaire in our study.

Conclusion

Diabetes with an average duration of 5.75 years does not affect the hand functions significantly in the elderly individuals.

References

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