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ASSESSMENT OF NERVE CONDUCTION VELOCITY IN MALE AND FEMALE OFFSPRING OF DIABETIC PARENTSIN EASTERN UTTAR PRADESH

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ABSTRACT:

INTRODUCTION:

Diabetes mellitus is one of the most common health problems facing health care professionals. Chronic hyperglycemia is commonly associated with long term dysfunction of various organs including the nervous system. As the duration of diabetes increase, diabetic patients develops various microvascular (like neuropathy, nephropathy and retinopathy)complications.Therefore this study was intended to determine the nerve conduction velocity (NCV) of male diabetic offspring in Eastern Uttar Pradesh.

MATERIAL AND METHODS: This study was conducted in the Department of Physiology, MahamayaRajkiya Allopathic Medical College AmbedkarNagar,Uttar Pradesh. Median nerve is one of the major peripheral nerve was selected for NCV. NCV of all the subjects were done by NeuropackX1(Nihon Kohden).

RESULT: The median motor nerve conduction velocity (59.52 ± 2.98) and sensory nerve conduction velocity (56.58 ± 2.73) of diabetic offspring was insignificantly ($p>0.05$) decreased as compared to the median motor nerve conduction velocity (59.66 ± 3.24) and sensory nerve conduction velocity (56. 84 ± 2.79) of non-diabetic offspring.Inaddition,The median motor nerve conduction velocity (62.31 ± 2.23) and

sensory nerve conduction velocity (54.77 ± 2.70) of diabetic male offspring was insignificantly ($p>0.05$) decreased as compared to the median motor nerve conduction velocity (63.72 ± 1.24) and sensory nerve conduction velocity (54. 81± 2.65) of non-diabetic male offspring.Furthermore,The median motor nerve conduction velocity (62.01 ± 2.23) and sensory nerve conduction velocity (55.19 ± 2.70) of diabetic female offspring was insignificant ($p>0.05$) decreased as compared to the median motor nerve conduction velocity (63.3 ± 1.24) and sensory nerve conduction velocity (54. 4± 2.60) of non-diabetic female offspring.

CONCLUSION:In our study there is no significant difference in median motor and sensory nerve conduction velocity in diabetic offspring**.**Unlike observation of altered metabolic factor and high blood sugar in similar population by other study.

KEYWORDS: Median sensoryNerve, conduction velocity, Median motor nerve,diabetic offspring.

Introduction:

Indians are disproportionately affected by diabetes, one of the most common causes of death worldwide [1]. The systemic sequelae of Type 2 Diabetes, including blindness, kidney failure, heart attack, stroke, and lower limb amputation, are caused by its microvascular and macrovascular manifestations of impaired glycemic control. Type 2 Diabetes is an inherited metabolic condition characterised by the dysregulation of glucose homeostasis.In 2015, 1.6 million fatalities were attributed to diabetes-related causes, and by 2030, diabetes is predicted to rank as the sixth greatest cause of death [2].Researchers have found that people with a favourable parental history are more likely to develop the condition, implying that type 2 diabetes, like inherited conditions, is passed down through generations as a genetic endowment, becoming more pronounced with each generation.The combination of genes, environment, and other risk factors lead to type 2 diabetes, which is a polygenic disorder. Controversial findings from recent medical studies on the pathophysiology of the diabetic condition in the genetically vulnerable population show that non-diabetic children of diabetic parents may have altered systemic functioning even in their euglycemicstate.In this vulnerable population, neurophysiological testing has found altered autonomic functioning and longer latencies in the visual evoked potential (VEP), which suggests the autonomic nervous system is involved and that visual processing is compromised even in those who are not diabetic [3].The non-diabetic offspring of diabetic parents have microalbuminuria, higher expression of the oxidative stress marker 8-hydroxydeoxy-guanosine (8-OHdG), and impaired endothelium dependent vasodilation, according to biochemical and molecular investigations in similar populations [4].All of these findings imply that these alterations in children of diabetic parents are not always the results of impaired glycemic control, which is characterised by high blood glucose levels that cause micro and macro vascular problems. This study has been designed to assess any change in the nerve conduction parameters as neuropathy is one of the significant complications of the microvasculopathies of diabetes. Autonomic dysfunction, retinopathic, and nephropathic features are observable in the non-diabetic state of the euglycemic offspring of diabetic parents.Studies show that the motor nerve conduction velocity slowing is the same in both the upper and lower limbs, and that the sensory action potential is only altered after the involvement of large myelinatedfibres [5]. Therefore, the purpose of

this study is to evaluate any changes in the motor nerve conduction of the median nerve in children of diabetic parents who do not have diabetes.

Material and methods:

This study will be conducted in the Department of Physiology, MahamayaRajkiya Allopathic Medical College Ambedkar Nagar, Uttar Pradesh. Median nerve is one of the major peripheral nerve will be selected for NCV. NCV of all the subjects were done by NeuropackX1(Nihon Kohden).A total of 86 volunteers were found, and 60 of them agreed to participate in the study. There were 30 volunteers in the study group and 30 volunteers in the control group, all of whom were right-handed young adults. In each group, the gender distribution was equal. Since ovarian hormones affect brain functions during the follicular and luteal phases, all female participants were asked to report on the assessment during the menstrual period.Non-diabetic individuals with a family history of type 2 DM were matched by age and BMI (30 people - 15 males and 15 females).Non-diabetic participants with matching age and BMI but no known history of type 2 DM (30 people - 15 males and 15 females) were as control group. Healthy, non-obese participants between the ages of 18 and 23 with a BMI of 18.5-24.9 kg/m were inclusion included while Participants with complaints of discomfort, tingling, numbness, or weakness in the upper limb, as well as those who were alcoholics, smokers, athletes, or who had a family history of hypertension, were all disqualified from participating in this study.

Results

The above table (Table 1) depicts the gender distribution, mean and standard deviation of age and BMI of the participants in the study and control groups.

Table 1: Comparison of Anthropometric measurements between study and control groups

Parameters	Study group	Control group	P value
No of participants	30	30	–
Male/Female	15/15	15/15	–
Age (in years)	28.5± 1.15	28.29 ± 0.8	p>0.05
Height (cm)	170.46±6	172.98±5.12	p>0.05
Weight (kg)	60.7±.46	65.9±6.73	p>0.05
BMI (Kg/m2)	20.15 ± 1.4	21.37 ± 1.23	P>0.05

p>0.05 considered as not significant p<0.05 is taken as significant.

There is no difference as to the age and BMI between the groups and there was equal gender distribution in each group.

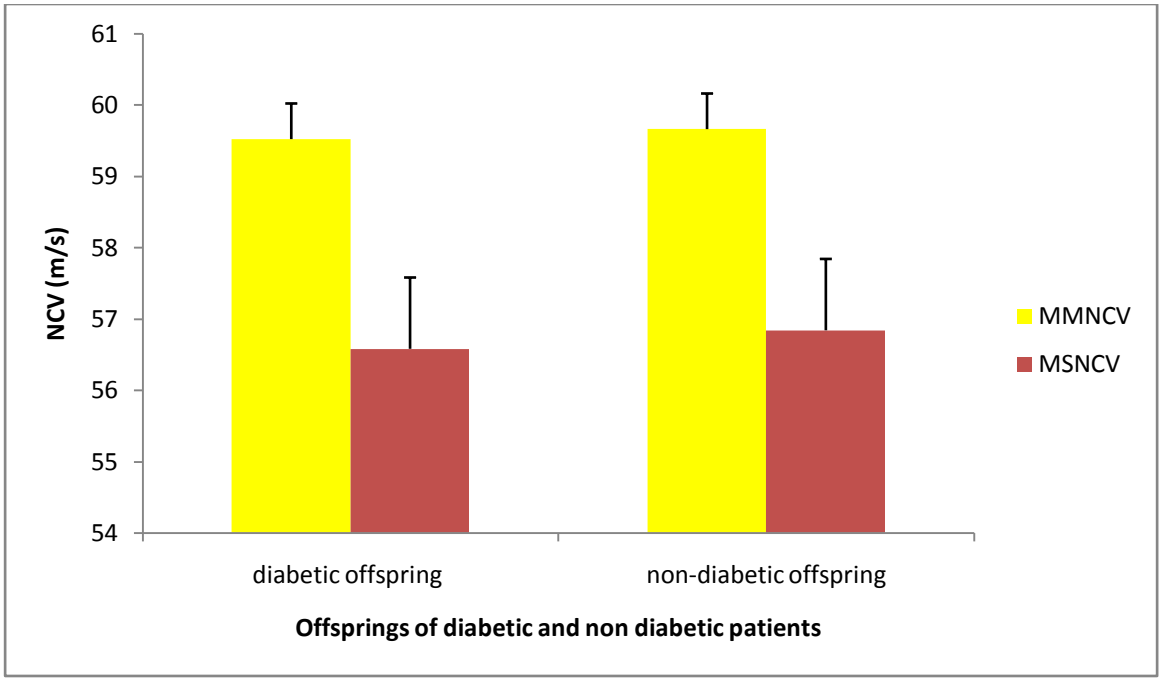

Figure 1:The median motor nerve conduction velocity (59.52 ± 2.98) and sensory nerve conduction velocity (56.58 ± 2.73) of diabetic offspring was insignificantly ($p>0.05$) decreased as compared to the median motor nerve conduction velocity (59.66 ± 3.24) and sensory nerve conduction velocity (56. 84 ± 2.79) of non-diabetic offspring.

Figure 2: The median motor nerve conduction velocity (62.31 ± 2.23) and sensory nerve conduction velocity (54.77 ± 2.70) of diabetic male offspring was insignificantly (p>0.05) decreased as compared to the median motor nerve conduction velocity (63.72 ± 1.24) and sensory nerve conduction velocity (54. 81± 2.65) of non-diabetic male offspring.

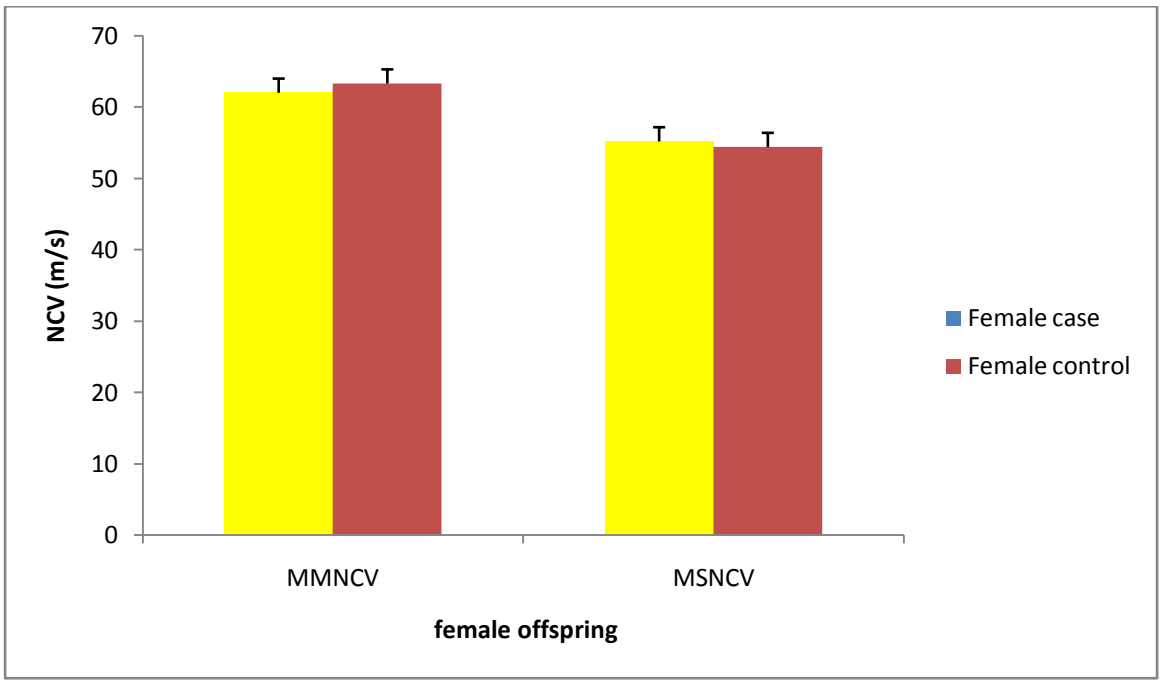

Figure 3: The median motor nerve conduction velocity (62.01 ± 2.23) and sensory nerve conduction velocity (55.19 ± 2.70) of diabetic female offspring was insignificant (p>0.05) decreased as compared to the median motor nerve conduction velocity (63.3 ± 1.24) and sensory nerve conduction velocity (54. 4± 2.60) of non-diabetic female offspring.

Discussion

Type 2 Diabetes mellitus is a group of metabolic diseases characterized by dysregulated glucose homeostasis by defects in insulin secretion, insulin action or both leading to hyperglycemia which in its chronicity can lead to long-term damage, dysfunction and failure of various organs, especially the eyes, kidneys, nerves, heart and blood vessels [1]. The specific susceptibility of these structures to diabetic complication lies in the fact that the capillary endothelial cells in the retina, mesangial cells in the renal glomerulus and neurons and Schwann cells in peripheral nerves are vulnerable to hyperglycaemia as they do not possess efficient mechanisms of down regulating glucose entry in the hyperglycemic environment to maintain a constant intracellular glucose concentration unlike the other tissues of the body [3].

In this study, the median motor nerve conduction velocity (62.31 ± 2.23) and sensory nerve conduction velocity (54.77 ± 2.70) of diabetic male offspring was insignificant (p>0.05) decreased as compared to the median motor nerve conduction velocity (63.72 ± 1.24) and sensory nerve conduction velocity (54. 81± 2.65) of non-diabetic male offspring.The median motor nerve conduction velocity (62.01 ± 2.23) and sensory

nerve conduction velocity (55.19 ± 2.70) of diabetic female offspring was insignificant ($p>0.05$) decreased as compared to the median motor nerve conduction velocity (63.3 ± 1.24) and sensory nerve conduction velocity (54. 4± 2.60) of non-diabetic female offspring. Overall, the median motor nerve conduction velocity (59.52 ± 2.98) and sensory nerve conduction velocity (56.58 ± 2.73) of diabetic offspring was insignificant ($p>0.05$) decreased as compared to the median motor nerve conduction velocity (59.66 ± 3.24) and sensory nerve conduction velocity (56. 84 ± 2.79) of non-diabetic offspring.Probably, the reason behind this finding may be the greater height /weight of the volunteers of control group. [7-10].

Hennessey et al [12] and Fujimaki et al [13] in their study found that women had greater sensory nerve action potential (SNAP) amplitude than men which is in accordance with our study. Whereas Stetson D S et al [11] (1992) in their study in the upper limb nerves (median, ulnar) confirmed that gender did not have any statistically significant effect on SNAP amplitude.Garg R et al [12] in their study of upper limb in malwa region had found that sensory nerve action potential (-SNAP) amplitude was significantly greater in females than males. Bolton CF et al [15-116] had found that the amplitude of human, antidromic, sensory nerve action potentials recorded from nerves is greater in females than males.

Conclusion:

The non-diabetic children of diabetic parents in our pilot investigation showed no discernible difference in the nerve conduction velocity of the motor component of the median nerve. Since the study population was non-diabetics who are genetically susceptible to develop the condition, the absence of change in the nerve conduction parameters could be due to their intact glycemic regulation. However, the thorough assessment of all peripheral nerves' motor and sensory components was employed to confirm the premise that neuronal function was not involved in them. Future studies should therefore focus on evaluating this idea by designing a large population study and taking into account the relationship between the parental contribution and its heredity.The results of the present study have many similarities and some dissimilarity with the reported NCS variables, the probable reasons could be the true differences among populations, and small sample size.

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