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CHANGE IN LIFESTYLE OF PEOPLE ALONG WITH GLOBALIZATION IN THE PAST CENTURY HAS INCREASED THE INCIDENCE OF DIABETES

General Medicine

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ABSTRACT

Introduction-Change in the lifestyle of people along with globalization has increased the incidence of diabetes. Neuropathies are common among people with diabetes. People with diabetes, exhibit increased platelet reactivity. **Aims and objectives**-This study was conducted to study the platelet indices and their correlation with nerve conduction velocity (NCV) in diabetic neuropathy patients. **Material and methods**- The study was conducted in J.L.N. Medical College & Hospitals, Ajmer on 200 patients of both genders with more than 18 years of age. Blood parameters like CBC, RFT, LFT, Blood sugar, HbA1C, S. Electrolyte, Lipid profile, platelet indices and nerve conduction velocity were investigated. **Results**- The mean age of the patients was 56.48±13.30 and 54.20±15.21 years in the case group and in the control group, respectively with mean duration of diabetes was 7.60±5.59 years. No significant difference was found between groups for the platelet indices. The mean value of PDW, MPV, P-LCR and PCT were 12.21±1.70, 10.56±0.87, 28.84±5.46 and 0.295±0.08, respectively in the case group. **Conclusion-** In this study, it was concluded that PDW and MPV of platelet indices have positive correlation with duration of NCS in diabetic sensory neuropathy.

KEYWORDS

INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterised by hyperglycemia, resulting from defects in insulin secretion, insulin action or both. It can be Type 1 diabetes (immune-mediated beta cell destruction, usually leading to absolute insulin deficiency), Type 2 diabetes (may range from predominantly insulin resistance with relative insulin deficiency to a predominantly insulin secretary defect with insulin resistance) and Specific types of diabetes.[1]

Change in the lifestyle of people along with globalization in the past century has increased the incidence of diabetes. A finding of a report by Ramachandran et al.,[2] has proved urbanization of India causing a high prevalence of diabetes. Indians develop diabetic complications at an early age. Prevention of complications associated with diabetes is achieved by primary prevention by modifying risk factors such as insulin resistance and obesity. [3]

Neuropathies are common among people with diabetes and it can have serious consequences (e.g. foot ulcers, amputations, silent myocardial infarction and premature death) for the affected patients. By far the most common diabetic neuropathies are chronic sensor motor distal symmetric polyneuropathy (DPN) and cardiac autonomic neuropathy (CAN).[3] Neurologic complications occur equally in all types of diabetes–type I, type II and all other types of diabetes.[4] The most important diagnostic criteria for diabetic neuropathy, which are confirmed by experts, are disturbances in nerve conduction velocity, increased threshold of sensory nerves, and disturbances in autonomic system function tests.

People with diabetes, exhibit increased platelet reactivity. Hyperglycemia contributes to greater platelet reactivity through direct effects and by promoting glycation of platelet proteins.[5] Recent studies have shown significant increases in platelet parameters in diabetic subjects when compared with controls, particularly in mean platelet volume (MPV) and platelet distribution width (PDW).[6] Diabetes mellitus is suggested as a prothrombotic state because platelet function and morphology are usually altered in these patients.

Mean platelet volume (MPV) is considered one of the important markers of platelet activation. It can be easily measured as part of whole blood count. Whether MPV is related to glycometabolic markers such as FBG, PBG and HbA1c is unclear. There is a range of different data about this issue in the literature. Also, the relationship between MPV and diabetic microvascular complications remains to be clarified. Thus, studying the relationship between platelet indices and Nerve Conduction Velocity (NCV) in Diabetic neuropathy becomes crucial.

OBJECTIVE

To study the correlation between platelet indices & nerve conduction velocity (NCV) in diabetic neuropathy patients.

MATERIALS AND METHODS

The study was conducted in the Department of Medicine, J.L.N. Medical College & Hospitals, Ajmer on 200 patients of both genders with more than 18 years of age. Two groups the case group and the control group, were formed. The case group had 100 patients having diabetic neuropathy and the control group had 100 patients without diabetic neuropathy.

Qualifying patients were undergone detailed history, clinical examination & following investigations like CBC, RFT, LFT, blood sugar, HbA1C, S. Electrolyte and Lipid Profile. Special investigations conducted on platelet indices and nerve conduction velocity using machine SYSMEX XN-550 [6-Part Fully automatic analyzer]and EMG NCV EP (model RMS SALUS 4) respectively.

Statistical analysis was done using SPSS version 20 (IBM SPSS Statistics Inc., Chicago, Illinois, USA) Windows software program.

RESULTS

In this study the mean age of patients was 56.48±13.30 and 54.20±15.21 years in the case group and in the control group, respectively. There were 56.00% female and 44.00% male in the case group while in the control group, male population was 76.00% and female population was 24.00%.

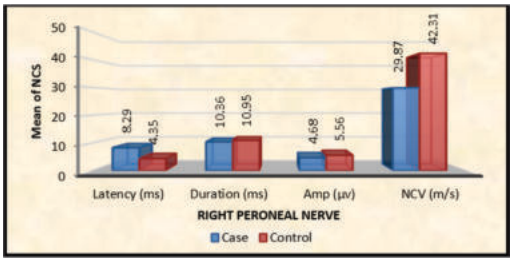
The mean height in the case group and control group was 1.57±0.07 meter and 1.66±0.09 meter respectively. The mean body wt. of the case group participants was 62.08±10.86 kg while it was 55.92±7.66 kg in control group. Likewise, mean BMI was 25.16±5.05 and 20.46±3.56 in the case and control group, respectively.

Mean duration of diabetes was 7.60±5.59 years and 4.38±2.92 years in the case group and control group, respectively which were very significantly more in the case group. The mean value of fasting blood sugar was 193.59±42.84 and 170.50±20.78 in case and control group respectively while the mean value of post-prandial sugar level 294.46±69.65 and 244.80±40.96 in case and control group respectively.

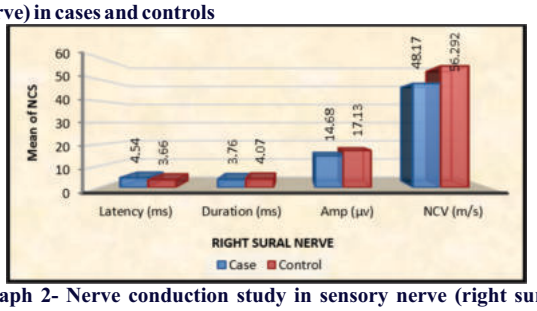
In the case group, the mean value of Hb was 11.64±1.76 and it was 12.65±2.22 in the control group. The mean value of Hb was significantly lower in case group in comparison to the control group.

The mean value of HbA1c was 9.56±1.68 in cases group and 9.13±1.45 in controls group. No significant difference was observed between these values.

For right peroneal nerve, the mean value of latency was 8.29±7.59 m/s among the studied participants of the case group which was significantly higher in comparison to the control group (4.35±1.05 ms). The mean value of NCV was 29.87±10.93 m/s which was very significantly less than control group where mean value of NCV was 42.31±1.84 m/s.



Graph 1- Nerve conduction study in motor nerve (right peroneal nerve) in cases and controls



Graph 2- Nerve conduction study in sensory nerve (right sural nerve) in cases & controls

The mean value of PDW was 12.21±1.70 and 12.42±1.72 in the case and control group respectively. The mean value of MPV was 10.56±0.87 and 10.73±1.01 in the case and control group respectively. The mean value of P-LCR was 28.84±5.46 and 28.51±6.19 in the case and control group respectively. The mean value of PCT was 0.295±0.08 and 0.29±0.06 in the case group and control group respectively. No significant difference was observed between mean values of platelet indices in both groups.

Table-1: Platelet indices among case and control groups

		Mean ± S.D.	P value
PDW	Cases	12.21 ± 1.70	0.38
	Controls	12.42 ± 1.72	
MPV	Cases	10.56 ± 0.87	0.21
	Controls	10.73 ± 1.01	
P-LCR	Cases	28.84 ± 5.46	0.68
	Controls	28.51 ± 6.19	
PCT	Cases	0.295 ± 0.08	0.94
	Controls	0.29 ± 0.06	

Table-2: Correlation between various parameters of NCS of motor and sensory nerves with platelet indices

		Platelet indices			
		PDW	MPV	P LCR	PCT
Motor Nerve Study					
Latency	Pearson Correlation	-0.086	0.054	-0.034	-0.02
	Sig. (2-tailed)	0.394	0.594	0.736	0.832
	No.	100	100	100	100
Duration	Pearson Correlation	-0.068	-0.105	-0.002	0.106
	Sig. (2-tailed)	0.05	0.3	0.986	0.295
	No.	100	100	100	100
Amp	Pearson Correlation	0.007	0.109	-0.037	-0.07
	Sig. (2-tailed)	0.943	0.282	0.718	0.51
	No.	100	100	100	100
NCV	Pearson Correlation	-0.066	0.009	0.051	0.172
	Sig. (2-tailed)	0.513	0.926	0.613	0.086
	No.	100	100	100	100
Sensory Nerve Study					
Latency	Pearson Correlation	0.072	0.158	0.024	-0.07
	Sig. (2-tailed)	0.476	0.116	0.814	0.467
	No.	100	100	100	100
Duration	Pearson Correlation	0.235	-0.254	-0.071	-0.05
	Sig. (2-tailed)	0.01 (S)	0.01 (S)	0.484	0.596
	No.	100	100	100	100
Amp	Pearson Correlation	0.173	-0.082	0.077	-0.01
	Sig. (2-tailed)	0.086	0.415	0.446	0.963
	No.	100	100	100	100
NCV	Pearson Correlation	-0.014	-0.05	0.139	-0.01
	Sig. (2-tailed)	0.889	0.618	0.168	0.917
	No.	100	100	100	100

The above table shows correlation between various parameters of motor and sensory nerve with platelet indices. Correlations of motor nerve latency, duration, amplitude NCV and sensory nerve latency amplitude and NCV with platelet indices (PDW, MPV, P-LCR and PCT) were observed to be statistically not significant. In sensory nerve conduction study there is strong correlation between PDW and MPV with duration of NCV in diabetic neuropathy.

DISCUSSION

Diabetes mellitus (DM) is a metabolic disorder characterized by chronic hyperglycaemia with abnormalities in carbohydrate metabolism. Three fourth of neurologically asymptomatic patients may have abnormal nerve conduction.[7] Age, male gender, duration of diabetes and Body mass index increased risk of peripheral neuropathy.[8] Nerve conduction studies (NCS) are most sensitive, specific, reliable and non-invasive investigation to detect diabetic neuropathy.[9]

The mean age of the studied patients was 56.48±13.30 and 54.20±15.21 years in the case group and in the control group, respectively. These results are in agreement with the findings of Parmar and Patel (2020).[10] Our study group is comparable to other studies with the same age group of subjects.[11] Significant difference in the distribution of studied participants on the basis of gender was there between groups. There was slight female preponderance (male: female = 1:1.27) in the case group while male preponderance (male: female = 3.17:1) was quite evident in the control group. DM has been linked to male gender in several studies.[10,12]

In the anthropometric measurements, it was found that mean height was significantly lesser in the case group while mean body wt. (62.08±10.86 kg.) and BMI (25.16±5.05) were significantly higher in the case group participants.

The mean duration of diabetes was 7.60±5.59 years in the case group participants which was significantly higher than the control group participants. Oguejiofor et al. (2010).[13] reported a higher neuropathy in patients with a duration of DM >15 years and lower prevalence of neuropathy in those with duration of DM<15 years.

The blood sugar level (fasting and post-prandial both) were very significantly higher in case group (193.59±42.84 and 294.46±69.65).Many studies have a significant relationship between blood sugar level and symptoms of neuropathy.[14] As the blood sugar level increases the clinical symptoms of DPN and prevalence of DPN also increases.

No significant difference was observed for the mean value of HbA1c, between case and control group (9.56±1.68 and 9.13±1.45, respectively). Parmar and Patel (2020).(10) Reported mean HbA1c to

be 8.1±1.1 and 5.5±0.8 in case and control group, respectively. Previous study reported that HbA1c > 6.5% increased risk for polyneuropathy in DM patients by more than 5-fold. [15]

In our study the NCS for right peroneal nerve, it was found that latency was significantly higher in the case group (8.29±7.59 ms) and NCV was significantly lower in the case group (29.87±10.93 m/s).Prasad Neelambala et al (2013)[16] also reported the similar findings. On comparing the parameters of nerves of both the groups they found that motor distal latency of (right and left) peroneal and tibial nerves were significantly higher ($p<0.05$, $p<0.0001$ respectively) in diabetics.

In our study the NCS for right sural nerve also, latency was significantly higher (4.54±1.38 ms) and NCV was significantly lower (48.17±12.29 m/s) in the study participants of case group. This result is in accordance with the findings of Parmar and Patel (2020)(10) who reported lower NCV in case group (46.8±6.8 m/s) in comparison to the control group (49.7±3.9 m/s).

In present study in relation to the F wave study for right peroneal nerve no significant difference was found between groups. The mean value of M Lat, F min Lat, F max Lat and F mean Lat were 2.59±2.41, 36.87±12.40, 38.85±11.71 and 38.05±11.75, respectively in the case group. F wave study for right peroneal nerve has not been found of having any indicative insight about diabetic neuropathy.

No significant difference was found between groups for the platelet indices. The mean value of PDW, MPV, P-LCR and PCT were 12.21±1.70, 10.56±0.87, 28.84±5.46 and 0.295±0.08, respectively in the case group. It indicates that any change in platelet indices would not necessarily indicate diabetic neuropathy. However there is positive correlation between MPV and PDW with duration of Nerve conduction in sensory nerve of diabetic neuropathy patients.

CONCLUSIONS

In this study, it was concluded that PDW and MPV of platelet indices have positive correlation with duration of NCS in diabetic sensory neuropathy. However a large number of study groups to validate this correlation is required in future.

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