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FREQUENT AUTONOMIC NEUROPATHY
IN MALNUTRITION - RELATED DIABETES MELLITUS (MRDM)

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INDEXING WORDS

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SYNOPSIS

Parasympathetic and sympathetic function was assessed in 10 patients with malnutrition-related diabetes mellitus (MRDM). Parasympathetic dysfunction was present in 50% of the patients studied and 50% also showed sympathetic dysfunction. Either of these dysfunctions was observed in as high as 80% of the patients. This common complication suggests the importance for the examination of autonomic function in the patients with MRDM.

INTRODUCTION

Autonomic neuropathy is one of the complications of diabetes mellitus.^{1, 3)} While the results can be as serious as sudden death

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due to cardiorespiratory arrest,^{4, 6)} this complication usually is clinically silent, and little attention has been paid to it. New sensitive methods of measurement using the cardiovascular reflexes have been applied to insulin-dependent and non-insulin-dependent diabetes mellitus (IDDM and NIDDM) but not yet to malnutrition-related diabetes mellitus (MRDM), which is generally encountered in tropic countries. MRDM is characterized further by malnutrition, resistance to ketosis and to insulin treatment, dysfunction of the exocrine pancreas, and frequent occurrence among young people.¹⁰⁾ The present study suggests another characteristic - autonomic neuropathy.

SUBJECTS AND METHODS

Ten patients from Dr. Sutomo Hospital in Surabaya, Indonesia, were diagnosed as having MRDM according to criteria published elsewhere.⁹⁾ These patients required at least 20 U of insulin daily, and had not had any ketones in their urine before insulin treatment. Furthermore, they had no C-peptide response to 75g of glucose orally and/or were excreting less than 60% of a given dose of BT-PABA (N-benzoyl-L-tyrosyl-p-amino benzoic acid) in their urine. Their average age was 37 ± 1 years, their average duration of diabetes 31 ± 2 months, and their average fasting blood glucose level was 208 ± 7 mg/dl (mean $\pm$ SEM). A parameter called relative body weight, calculated as weight in kg divided by the height in cm minus 100 and multiplied by 100%, gave an average value of $66 \pm 1\%$. In addition, seven patients had peripheral neuropathy and one had retinopathy. Peripheral neuropathy was diagnosed when the knee and/or ankle jerk was absent, when vibration sense was impaired, or when gross defects of tactile sensation were observed.

Parasympathetic function was assessed using the beat-to-beat variation (BBV) technique described by Taniguchi et al.^{7, 8)} Briefly, we recorded the patient's heart rate after 15 minutes of rest in the supine position during 5 maximum respirations in which inspiration and expiration each lasted 5 seconds. We used a computerized calculator (Autonomic R-105, M.E. Commercial Corp., Tokyo), which calculated the heart rate from the ECG R-R intervals. The mean difference between the fastest and slowest heart rates observed in each of 5 respirations was expressed as

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BBV. None of the subjects had arrhythmia, lung or heart diseases, or hypertension. Normal ranges of values were determined from age-matched controls described in a previous paper.⁷⁾ Thus, as abnormal BBV value was one less than 15.3 in a subject less than 20 years old, one less than 12.5 in a subject between 20 and 29, or less than 7.6, 6.0, 4.7, or 3.9 in the age groups 30-39, 40-49, 50-59, and 60-69 respectively.

Sympathetic function was assessed after 25 min bed rest. The blood pressure was taken, and then the patient was asked to stand up within 3 sec from the supine position. The blood pressure was taken again once a minute for ten minutes after such exercise. Any drop of more than 25 mmHg in systolic blood pressure was recorded as an abnormality of function. The test was halted if a patient collapsed upon standing.

RESULTS

Two patients had both abnormal BBV values and abnormal postural hypotension. Three patients showed only the former symptom and three others only the latter (Table 1).

Table 1. Beat-to-beat variation and change of blood pressure after standing in 10 patients with malnutrition-related diabetes mellitus.

Case	1	2	3	4	5	6	7	8	9	10
Duration of diabetes (months)	37	13	24	15	31	26	84	48	3	4
Relative body weight (%)	71	65	59	71	62	60	64	59	73	72
Fasting blood glucose on examination (mg/dl)	140	215	184	150	225	118	327	308	231	180
Beat-to-beat variation (beats/min)	5.6*	4.0*	4.2*	12.8	5.4*	14.2	7.6	11.6*	34.6	22.0
Drop of blood pressure (mmHg)	15	collapse*	10	37*	25*	8	collapse*	10	5	collapse*
Retinopathy							+			
Neuropathy			+	+	+	+	+	+		+

*abnormal

DISCUSSION

Findings of autonomic neuropathy have become more common as neurological tests have become more sensitive. BBV is a new parameter, age-dependent, and lower in diabetics than in controls.^{7, 8)} Using age-adjusted BBV values for comparison, we found five of our ten MRDM patients to be abnormal. Further, there were striking falls in blood pressure on standing in two patients, and three others collapsed. After exhibiting diabetes for as little as a few months, these MRDM patients had already begun to suffer these derangements; within 7 years of onset they had affected eight of our ten patients.

Autonomic dysfunction was much more frequent among this group of MRDM patients than they generally are in NIDDM or IDDM patients.²⁾ Our own unpublished observations among Indonesian diabetics support this. Among NIDDM diabetics of 5.4 ± 0.5 years (mean $\pm$ SEM) duration, none had any abnormal BBV values and 30% had postural hypotension or among IDDM diabetics of 8.2 ± 0.7 years duration, 38% had abnormal BBV values.

Neuropathy in MRDM may be due to metabolic disorders such as deficiencies of vitamin B12 and folate, which also cause anemia in these patients. Actually the patients in the present study had a blood hemoglobin level less than 10 g/dl. While insulin administration might have contributed to the postural hypotension in any of our subjects,⁵⁾ this side effect of insulin is rare. Also, our unpublished observations reveal no postural hypotension among Indonesian IDDM diabetics.

The reason for these autonomic neuropathies in MRDM remain unknown, but clearly their possible existence must be borne in mind by both the researcher and the clinician in the field.

REFERENCES

1. Clark, B.F., Ewing, D.J., and Campbell, I.W.: Diabetologia 1979. 17. 195/212. Diabetic autonomic neuropathy.
2. Dryberg, T., Benn, J., Sandahl Christiansen, J., Hilsted, J., and Nerup, J.: Diabetologia 1981. 20. 190/194. Prevalence of diabetic autonomic neuropathy measured by simple bedside tests.

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3. Hosking, D.J., Bennet, T., Hampton, J.R., and Phil, D.: Diabetes 1987. 27. 1043/1054. Diabetic autonomic neuropathy.
4. Lloyd-Mostyn, R.H., and Watkins, P.J.: Diabetes 1976. 25. 748/751. Total cardiac denervation in diabetic autonomic neuropathy.
5. Page, M.McB., and Watkins, P.J.: Diabetes 1976. 25. 90/95. Provocation of postural hypotension by insulin in diabetic autonomic neuropathy.
6. Page, M.McB., and Watkins, P.J.: Lancet 1987. 1. 14/16. Cardiorespiratory arrest and diabetic autonomic neuropathy.
7. Taniguchi, H., Inui, M., Fujii, M., et al.: Tohoku J. Exp. Med. 1983. 141 (Suppl.). 471/478. Cardiac beat to beat variation as indicator of neuropathy and the frequency of its abnormality in diabetes mellitus.
8. Taniguchi, H., Kanda, F., Mitooka, H., et al.: In: Goto, Y., Horiuchi, A., and Kogure, K., eds., Diabetic Neuropathy (Excerpta Medica, Amsterdam - Oxford - Princeton) 1982. 235/242. Beat to beat variation of heart rate in diabetics with peripheral neuropathy.
9. Tjokroprawiro, A., Santoso, R., Sutjahjo, A., et al.: In: Tjokroprawiro, A., Santoso, R., Baba, S., and Iwai, S., eds., Joint Research Project. Epidemiology and characteristic of nutrition related diabetes mellitus in East-Java, Indonesia. A preliminary report (Diabetic Centre - Airlangga University School of Medicine - Dr. Sutomo Hospital, Surabaya) 1987. Malnutrition-related diabetes mellitus in East-Java Indonesia (1983-1986).
10. WHO study group: In: Technical Report Series 727 (World Health Organization, Geneva). 1985. Diabetes mellitus. Report of WHO study group.