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ACCELERATED NAIL GROWTH IN DIABETICS

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Abstract: **Diabetes mellitus is fast turning into one of biggest scourges on modern age. The disease cripples not only the patient but also imposes a huge budgetary health outlay, a burden on third world countries can ill-afford to expend on. Apart from clinical symptoms and signs, confirming diagnosis is based almost wholly on expensive laboratory investigations. Towards making the screening for disease and its diagnosis simpler, it is suggested that finger nail growth as an external indicator be used as exploited as a tool. Changes in nail shape, color, texture are usually fairly reliable external markers of disease processes. Observations on the appendage form an important component of general physical clinical examination in establishing preliminary diagnosis. Presented in this brief study present are the findings on rate of nail growth as an external clue to the presence of diabetes mellitus. The accelerated rate of growth could be a cost effective reliable mass tool in establishing preliminary diagnosis of the disease in the community. It is surmised that merely measuring the forward shift in voter's ink mark (applied as a proof of casting a ballot during general elections) one can estimate the rate of growth of the nail – the more rapid the shift, the higher the possibilities of diabetes mellitus.**

Keywords: **diabetes mellitus, nails, ectoderm, micro-angiopathy.**

I. INTRODUCTION

Per square centimetre of surface, the hand yields more clinical information than any other part of the body. Of particular interest to the clinician it's cutaneous appendage, the nail. Nail colour, shape, marking, splintering and pulsation have been found to be fairly early, yet constantly reliable indicators of systemic or local disease.

To correlate the interrelationship of nail growth with the disease process in diabetes, we took up a pilot study investigating rate of nail growth in diabetics as compared to controls. The project involved weekly recording of nail growth in 26 known diabetics and 25 controls over a period of time. Statistical analysis of our observations show that the rate of nail growth in diabetics was significant enough for us to confidently conclude that the nail could be included among others, as an external marker of diabetes. We are positive that a larger study, involving a third group, the pre-diabetics, will show interesting results patterns.

II. MATERIALS AND METHODS

Weekly measurements were made of the index digit nail over a period of 9 months. Flush with the nail fold a linear transverse groove was etched into the base using an ampoule file. The mark was rendered permanent with the use of Indian ink, with instruction to the subject to avoid any manipulation of the nail or its base. The distal displacement of the transverse groove was measured with a slide caliper at weekly intervals. Cyclostyled pro-forma were used to collect and collate the dat. The results obtained were analysed for statistical significance. This study was conducted at the Dt. Wenlock Hospital in Mangalore and involved patients attending the out – patient diabetes clinic attached to the department of Medicine. The subjects were of either sex and their age ranged from 16 to 72. The index digit nail was measured in both hands.

III. OBSERVATIONS AND RESULTS

The most glaring and obvious observation was the accelerated nail growth rate in diabetics. Irrespective of the mode of treatment, sex or age, the mean value of the rate was constantly of a higher reading in diabetics as compared to controls.

Within the diabetic group, the rate was greater in the below 40 age patients than in those above. Sex of the diabetics made no discernible difference to growth rate, nor was there any anomaly between the measurements of right or left hand.

Statistical methods of the data showed that the increased nail growth rate in diabetics were significant enough to warrant further study to confirm the efficacy of using nail growth as an additional reliable external marker of diabetes and the possibility to applying the method on a population based survey to identify undiagnosed diabetic or the latent one. That even diabetics on treatment showed accelerated nail growth established that the rate may be even more pronounced in the pre-diabetics or untreated diabetics.

Table 1

Distribution of subjects

Subject	Age		Sex		Mode of Treatment		
	40 Below / Above 40		M	F	Oral	Medication	Insulin
Diabetics	6	20	21	5	10	10	16
Controls	15	10	20	5			-

Table II

Nail Growth / Week in mm

No. of Patients	Rate	No. of Controls	Rate
26	0.60-0.93	25	0.62-0.80
Mean Growth	0.77		0.67

Table III

Rate in Groups in mm

Diabetics	Males	Females	Juveniles	Adults	Oral	Insulin
No. 26	21	5	6	20	10	16
Mean 0.77	0.77	0.75	0.85	0.74	0.78	0.735

Table IV

Growth Record in controls in mm

Total Controls	Males	Females	Below 40 Yrs.	Above 40 Yrs.
25	20	5	15	10
Mean Rate	0.67	0.66	0.68	0.65

Table V

Statistical significance of data applying 't' test

Growth in diabetics / growth in controls	:	't' = 4.38
Diabetics below 40 / controls below 40	:	't' = 5.69
Diabetics above 40 / controls above 40	:	't' = 2.56
In diabetics : Below 40 / Above 40	:	't' = 2.48
In diabetics : Oral drug / Insulin	:	Not significant
In controls : Below 40 / Above 40	:	Not significant

As exemplified in Tables I, II, II, IV &V, an increase of 0.10 mm nail growth rate was recorded in diabetics when compared to controls. Applying the ' t' test t = 4.38, P 0.01, highly significant at 1 % level for 48 d. f. in diabetics below 40, the rate was on an average 0.17 mm more than in controls of same age. The 't' here was 5.69, P 0.001 highly significant at 01% level for 9 d. f. In the above 40 age group the rate was 0.09 mm. More in diabetics compared to controls of the same age. The 't' = 2056, p 0.05, significant at 5% level for 39 d. f. Within the diabetics' rate below and above 40 age groups was also statistically significant. The 't' = 2.48, P 0.05 significant at 5% level for 24 d. f.

IV. DISCUSSION

For any given surface area, the hand present to the alert physician, more clinical information than any other part of the body (1). The ectodermal appendage of the hand the nail has found itself subject to a battery of research from clinicians investigating manifestations of disease process reflected in its anatomy.

Normal finger nail growth is about 0.5 mm week (3.4). nails of individual digits even from the same hand show differing rates of growth (5), being most pronounced in the middle finger and least in the little digit (4) Baden (6) (1970) mentions the rate as 0.1 mm / day. Growth patterns followed over a thirty year period show a gradual decline in growth rate with advance in age (7). Familiar similarities in rate have also been recorded (8). Persistent trauma, as through nail biting, has been shown to produce acceleration in growth (5) the rate here is attributed to increased spurt through manipulation. Heat induced vasodilation in the nail exposed to extremely high environmental temperatures has produced rapid growth (9). Hyperaemias likewise have reflected in spurt in rate (11).

Disturbances in nail growth occur in many clinical conditions like measles, mumps and nutritional deficiencies. A tripling of growth rate has been recorded in pregnancy (4, 5, 9, 10). That there a definite correlation between metabolic processes and nail growth has been proven through studies on the appendage in hyperthyroidism and myxoedema (9.5).

Diabetes affects skin in number of ways; indeed, a cutaneous manifestation may often be the first clue to the underlying diathesis (2). The ectodermal markers in diabetes has been said to be of multifactorial origin. Abnormal carbohydrate metabolism or other altered metabolic pathways, atheroschlerosis, microangiopathies and neurone degeneration, all have, along with impaired host mechanisms reported to the causal to skin change in diabetics. It has however been proposed that skin reaction could also be secondary to treatment (2).

Various theories have been propounded to explain skin changes in diabetes. Earlier studies (12) show that despite a definite thickening in the basement membrane, the diabetic capillaries are leakier to plasma proteins than those of the diabetic. It has been supposed that the diabetic nail is induced to more accelerated proliferation by extravasated plasma protein, or hyperaemia as tresses by Baden (1953) (11), one is not sure at present. Though there is controversy over the factors producing nail change in diabetes, a general agreement exists over the influence of the disease over the appendage. This study conclusive establishes that there is a very significant and statistically reliable increase in nail (13) growth rate, a rate so pronounced that we supposed that the measurement of this growth alone could alter the clinician to the existence of diabetes in an unsuspecting patient, exclusive of any other preliminary investigatory methods. A large scale study may, in our opinion, show the efficiency of this method of diagnosis, especially when major segment of our population are rural based, beyond the ken of laboratories or hospitals that provide standard investigation.

V. CONCLUSION

The rate of growth of finger nails in diabetics on treatment shows a remarkable and definite acceleration when compared with that in controls. The increase in rate stands the confidence of rigours statistical evaluation and scrutiny. Within the diabetic group itself the rate is more pronounced in the below 40 age patient (Juvenile type), than in those above 40 (14, 15). The sex of the individual or the hand used in the study made no effect on the recordings.

The acceleration of growth is significant enough to warrant the application of this method of diagnosis to larger population groups to isolate individuals with silent latent or pre-diabetic tendencies and refer them for standard investigatory techniques. In our opinion, to the best of our knowledge, this study establishes for the first time in medical literature, the pattern of nail growth as an identifiable external marker for diabetes.

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REFERENCES

[1] Toy JL. & McNicol GP. , 1976, Looking at the hand. Journal of Applied Medicine, Vol. II : 703

[2] Sibbald RG. & Schachter RK., 1984, The Skin and Diabetes Mellitus: International Journal of Dermatology. Vol. 23, 567

[3] Copenhaver WM., Kelly DE., Wood RL. Bailey's Textbook of Histology, 17th Ed. 1978, 440-442

[4] Williams & Warwick Gray's Anatomy (Churchill Livingstone) 36th Ed. 1980, 1223, 155-156, 227

[5] Sibinga MS., 1952, Observations on growth of fingernails in health and disease, Paediatrics, 24, 225-233.

[6] Baden H. P., Physical Properties of Nails J. of Investigative Dermatology 1970, 55, 115.

[7] Bean W. B., Nail Growth – 30 years of Study. Archives of Internal Medicine 1974, 134, 497.

[8] Fitzpatrick JB., Eisen AZ., Wolif Klaus, Freedberg IM., Austen KF., Dermatology in General Medicine, 2nd Ed (1979) McGraw Hill Book Co. New York, Chap. 53, 418-437.

[9] Bean WB., 1963, Nail Growth – A Twenty year study, Arch. Of Int. Med. III, 476-482.

[10] Hamilton JB., Terada H & Mestter GE., 1955, Studies of growth throughout the lifespan of Japanese: Growth and size of nails and their relationship of age , sex, heredity and other factors J. of Gerontology; 10, 401-415, 1955

[11] Bean WB., 1963, A note on finger nail growth, j. of investigative dermatol. 20, 27-31,

[12] Joslin's Diabetes Mellitus, 11th Ed. Lea & Febiger, Philadelphia, 1971, 176

[13] Badcock JJ., 1955, Methods of measuring fingernail growth rates in nutritional studies, J. of Nutrition 55, 323-326.

[14] Arunachalam Kumar & Agarwal A, 1988, Diabetes Mellitus & Nail Growth Rate, Bulletin of the Voluntary Health Association

[15] Kumar J C & Arunachalam Kumar , 2004, Nail Growth in Diabetes Mellitus, Proceedings of the International Colloquium on Diabetes, Chennai