Hand measurements in ankylosing spondylitis

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Patients with ankylosing spondylitis often seem tall and slim, but it may be difficult to measure their height accurately because of fixed spinal deformities. This study was designed to test the hypothesis that patients with ankylosing spondylitis are taller than normal controls by measuring radiographs of the bones of the hands, since such measurements have been shown to reflect abnormalities of body build (Sinclair, Kitchen, and Turner, 1960; Parish, 1960).

Methods

Standard postero-anterior radiographs of the left hand were taken with a tube-film at a distance of 30–36" (Parish, 1966). The lengths of the 2nd to 5th metacarpals and proximal phalanges were measured to the nearest millimetre. The widths of these bones were also measured to the nearest half millimetre at the exact mid-point. The metacarpal index was calculated by dividing the sum of the lengths of the 2nd to 5th metacarpals by the sum of their widths. The proximal phalangeal index was calculated by an analogous method. The films were measured by one observer (JH). The heights of control subjects were known to the nearest inch.

The bones of the left middle finger have already been shown to have a low co-efficient of variability in normal subjects (Parish, 1966). It was therefore decided to restrict the study of individual bones to this finger.

Seventy male patients with ankylosing spondylitis who attended the Department of Rheumatology at The London Hospital in a 6-months period, were compared with 131 males from a random sample of the Watford population (Ansell and Lawrence, 1966). This sample was chosen because of its geographical proximity to our catchment area. The ages and heights of the two groups together with those of Parish (1972) are shown in Table I.

Results

CONTROL GROUP

When our control group was compared with a previously published series (Parish, 1966, 1972), several important differences emerged. The present series was significantly older and taller, and had a greater metacarpal index indicating slimmer metacarpals (Table I).

The relationship between age, height, and hand measurements was then examined in our control group. There was a significant positive correlation between height and all the hand measurements that

Table I Comparison of spondylitics with Watford controls and those of the series of Parish (1966, 1972)

Series		Controls		Spondylitics
		(Parish)	(Present series)	
Number of cases		51	131	70
Clinical data (means)	Age (yrs)	34.2**	39.8**	41.1
	Height (cm.)	171.59*	173.55*	Not measured
	3rd left metacarpal length (mm.)	66.5	66.8	66.7
	Metacarpal index	7.02**	7.31**	7.4
	3rd left proximal phalangeal length (mm.)	45.6	45.4	45.6
	Proximal phalangeal index	Not measured	3.70**	4.11**

* = Significant at $P < 0.05$ (*t*-test).

** = Significant at $P < 0.005$ (*t*-test).

we made (Table II). The closest correlation was observed between height and the 3rd left metacarpal length ($r = 0.67$; $P \leq 0.001$). The older subjects were significantly shorter ($P = 0.05$) and their phalangeal and metacarpal indices were slightly lower than the younger subjects.

Table II Correlation of hand measurements with height

Measurement (mean value)	Correlation coefficient (r)	P
3rd left metacarpal length	0.6712	0.001
3rd left proximal phalangeal length	0.5634	0.001
Left proximal phalangeal index	0.2985	0.001
Left metacarpal index	0.2517	0.01
3rd left Metacarpal width	0.2771	0.01
3rd left proximal phalangeal width	0.2159	0.05

ANKYLOSING SPONDYLITIS

There was no significant difference between the average length of the 3rd left metacarpal in the Watford control subjects (66.8 mm.) and that of the patients with ankylosing spondylitis (66.7 mm.) (Table I). Therefore, if the strongly positive correlation between metacarpal length and height observed in these controls also holds good for the spondylitics, there would appear to be no evidence for difference in height between the two groups.

The only significant difference between hand measurements of the patients with ankylosing spondylitis and those of the Watford controls was in the phalangeal index which was significantly greater in the spondylitics.

The relationship between the phalangeal index and disease duration was then examined. The spondylitic patients were divided into groups according to disease duration and each patient was paired for age with a member of the control group. The mean difference in phalangeal index between each patient and his control was plotted for each group according to disease duration. The phalangeal index was greater in the spondylitics in every group, but there was no significant trend. This suggests that the difference appears early in the course of the disease or antedates its onset (Figure).

Discussion

We have shown that height and, to a lesser extent, age influence hand bone proportions. The observation that the metacarpal index of our controls from Watford was greater than that of Parish's series may be partly explained by the difference in height between the two groups. However, if this were the whole explanation, we should expect differences in phalangeal and metacarpal lengths also, but these were not

FIGURE Relation of duration of disease to proximal phalangeal index. Difference between ankylosing spondylitics and matched controls ± 2 S.E.M.]

observed. Furthermore, the Watford group was older, which would tend to reduce their metacarpal indices. It must be recalled that the Watford group of controls was a random population sample, whereas Parish's group was drawn from patients attending a Physical Medicine department.

Other studies have demonstrated that hand dominance and occupation may also be important variables, but it was not possible to take these into account in the present study.

The finding of abnormally slim phalanges in those spondylitics who had had their disease for the shortest time suggests that these changes may occur very early in, or even antedate, the disease. There is already evidence that genetic factors are of importance in the aetiology of ankylosing spondylitis (see Boyle and Buchanan, 1971, for review of the literature), and the abnormal phalangeal index may support this. It should be noted that, if we had used existing control groups, we might have erroneously concluded that spondylitis was associated with abnormally slim metacarpals as well. This emphasizes the need for carefully matched control groups in studies of this type.

Summary

Hand radiographs of 131 control subjects were compared with those of seventy patients with ankylosing spondylitis. In the control group there was a significant positive correlation between height and 3rd left metacarpal length. No difference in height could be detected between the two groups using this indirect measurement. The proximal phalangeal index was significantly greater in the spondylitics and it is suggested that this may be due to a genetic difference in these patients. The control group was compared with a previously published series and significant differences were found.

We wish to thank Dr. P. H. N. Wood of the Arthritis and Rheumatism Council Field Unit for Epidemiological Investigations for allowing us to use the normal hand films and Dr. J. G. Parish for his helpful criticism and advice.

APPENDIX

Hand chart for normal males (Watford Population Sample) age 20-70 yrs (mean 39.8)

Hand	Right				Left			
	Mean length (mm.)	Standard deviation	Mean width (mm.)	Standard deviation	Mean length (mm.)	Standard deviation	Mean width (mm.)	Standard deviation
Metacarpal 2	69.12	4.13	9.45	0.87	69.19	4.20	9.34	0.82
3	66.52	4.13	9.32	0.80	66.75	4.19	9.27	0.78
4	59.47	4.20	7.65	0.73	59.27	3.76	7.53	0.75
5	55.20	3.61	8.87	0.99	55.42	3.29	8.50	0.85
Proximal phalanx 2	40.79	2.36	11.24	0.81	40.77	2.47	10.82	0.74
3	45.45	2.66	11.25	0.81	45.45	2.68	11.10	0.79
4	42.79	2.55	10.47	0.83	42.74	2.61	10.27	0.82
5	34.15	2.01	9.29	0.80	33.93	2.11	9.09	0.78
Metacarpal index	7.17 (S.D.—0.58)				7.31 (S.D.—0.59)			
Proximal phalangeal index	3.90 (S.D.—0.28)				3.70 (S.D.—0.28)			

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