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Survey of Joint Mobility and *in vivo* Skin Elasticity in London School Children.

By S. SILVERMAN, L. CONSTINE, W. HARVEY, and R. GRAHAME (*Guy's Hospital Medical School, London, and Johns Hopkins Medical School, Baltimore*)

The survey was conducted in 78 healthy children (39 boys and 39 girls aged between 5 and 11 years) attending a London Primary School. The investigation was carried out with the full consent and co-operation of the children concerned, their parents and the school authorities.

With regard to joint mobility, estimates of the commonly used measurements, *viz.* passive flexion of the wrist and ankle, passive hyperextension of the elbow and knee, were too insensitive to detect any age effect. However, a recently introduced reproducible method of estimating extensibility of the fifth metacarpophalangeal joint in response to a standard load (Grahame and Jenkins, 1972) detected a highly significant inverse correlation between joint mobility and age in the samples tested ($r = -0{\cdot}586$; $P < 0{\cdot}0001$). There was no apparent sex difference.

Skin-fold thickness was estimated using a Harpenden Caliper over the third right metacarpal and the *in vivo* skin elasticity was measured using a suction cup device (Grahame and Holt, 1969; Grahame, 1970). No influence of age or sex was apparent on skin thickness or skin elasticity in children, in sharp contradistinction to the effect of both age and sex on these two parameters in adults. Furthermore, no correlation could be established between joint flexibility and either skin thickness or skin elasticity in this study. Ligamentous laxity and skin hyperextensibility concur in certain hereditary disorders of connective tissues, *e.g.* the Ehlers-Danlos syndrome (Grahame and Beighton, 1969). However, in this study of healthy children, no simple relationship was apparent between the restraining effect of joint ligaments on the one hand and resistance to skin stretch (*i.e.* elasticity) on the other, despite the fact that the tensile properties both these tissues devolve almost exclusively on collagen.

Discussion

PROF. V. WRIGHT (*Leeds*) I am interested to know the reproducibility of the goniometer measurements and I wonder if with measuring things at their limit, one is not looking so much at the joint capsule as at the tendon effects? You will remember that when we did some work with the cat wrist joint we found that in the mid-range of motion the joint capsule was the important factor but at the extremes of joint motion the tendons exerted a check-rein effect. May you not be measuring the looseness of the tendons in these subjects?

DR. GRAHAME The goniometer measurements were the results of two independent observers and they correlated very closely. We have carried out similar experiments on cadaveric fingers where the tendons were not operating and we have got almost identical results with the results shown in the slides. Unfortunately time was not available to get them on the slides; the experiments were too recent.

DR. J. T. SCOTT (*London*) I think testing the reproducibility of these situations is difficult. I once did some studies on metacarpophalangeal extensibility and tried to test reproducibility (Scott, 1960), but found that if you kept on waggling the finger it became looser and looser!

DR. GRAHAME As far as the metacarpophalangeal joint is concerned, tests of reproducibility were undertaken in a previous study (Grahame and Jenkins, 1972), and the reproducibility was very high indeed, so I think this can be a very useful test provided one standardizes the load.

DR. D. S. SMITH (*Harrow*) Did you standardize the time of the day that you did these tests?

DR. GRAHAME They were all done during school hours.

DR. A. ST. J. DIXON (*Bath*) Have you any guide for us in trying to assess the progress of the patients being treated with drugs which injure collagen and may affect joint mobility such as steroids and D-penicillamine?

DR. GRAHAME At the moment we have not, but we are in the process of following patients who are taking D-penicillamine.

DR. A. ST. J. DIXON (*Bath*) You are not doing it on the joints?

DR. GRAHAME No, not on these joints.

DR. A. ST. J. DIXON (*Bath*) I should like something like a grip test that one can do quite quickly as a clinical measurement and then use to follow patients over the years.

DR. GRAHAME Might this not reflect the benefit of the drug on their arthritis rather than on their collagen.

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Bone Density in Osteoarthrosis.

By M. V. L. FOSS (*Institute of Orthopaedics, London*)

A study of a metacarpal index of bone density in patients with fracture of the upper end of the femur and with osteoarthrosis (OA) of the hip showed, in addition to the expected osteoporosis in fracture cases, an abnormally high bone density in the majority of patients with osteoarthrosis. These 100 patients had advanced OA and were undergoing total hip replacement (Foss and Byers, 1972).

This earlier study has now been extended to include 100 patients undergoing osteotomy for OA of the hip. The mean age of this group was some 10 years below that in the first group, and no case was so advanced as to show loss of joint architecture other than joint space narrowing due to cartilage loss.

These two groups showed a very similar pattern of bone density distribution: