A prospective comparative analysis of mobility in osteoarthritic knees

DOES LIFESTYLE HAVE AN INFLUENCE?

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We have sought to clarify whether the traditional Arabic lifestyle prevents restriction of movement in patients with degenerative arthritis of the knee. The range of movement of 68 osteoarthritic knees of Arabic patients was compared with that of 51 healthy knees of Muslim patients and 83 osteoarthritic knees in non-Arabic patients.

The range of flexion of the osteoarthritic knees in the Arabic patients matched that of the healthy control knees, but was significantly better than that of the osteoarthritic knees in the non-Arabic patients. There was also a statistically significant difference between the mean extension deficit of the two groups with osteoarthritis. Exercises may help to prevent restriction of movement in osteoarthritis of the knee.

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In Muslim patients presenting with advanced degenerative arthritis of the knee the movements of the affected joint are often preserved (Fig. 1). It has been suggested that this is because the traditional Arabic way of sitting and the Muslim way of praying force the knees into deep flexion for long periods many times a day. We have compared the range of movement of knees with osteoarthritis in Arabic and non-Muslim patients.

Patients and Methods

Between January 1997 and January 1999, 154 patients (209 knees) were entered into the study. Permission was obtained from all patients and the data were entered anonymously.

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mously. Each therefore had the right to refuse to answer questions about their religious and cultural activities and thus not to be involved in the study.

All the Arabic patients were seen by the first author (GS) at the Department of Orthopaedic and Trauma Surgery of Tawam Hospital. All the non-Muslim patients were seen by the second author at the Department of Orthopaedic Surgery of the University of Pécs.

Plain AP and lateral weight-bearing radiographs were taken of all the knees. We used the classification of Ahlbäck¹ to determine the severity of the degenerative changes. In bilateral cases only the knee reaching or exceeding grade III according to Ahlbäck was included.

There were three groups as follows:

Group 1. This comprised patients of Arabic origin practising praying and sitting according to Muslim and Arabic tradition. The diagnosis was restricted to osteoarthritis of the knee with radiological changes of grade III or higher according to the classification of Ahlbäck.¹ Patients with a history of previous knee surgery or evidence of systemic disease affecting the locomotor system were not included.

There were 42 patients (33 men, 9 women; 68 knees) with a mean age of 53 years (50 to 74).

Group 2. This consisted of a control group of patients of Arabic origin practising praying and sitting in the Muslim and Arabic tradition. All the knees were considered to be healthy. Patients with extra-articular problems around one of the knees but without limitation of joint movement were included. Those with a history or clinical evidence of systemic disease and those with radiological evidence of degenerative changes (Ahlbäck grade I or higher) were excluded. There were 51 patients (40 men, 11 women; 51 knees) with a mean age of 55 years (50 to 61). The reasons for referral were aseptic prepatellar bursitis (3), minor soft-tissue injury (20), ganglion (1), exostosis (3), sciatica causing knee pain (11) and causes other than orthopaedic conditions (13).

Group 3. In this group were patients of non-Arabic origin with osteoarthritis of the knee and who did not follow the Muslim religion. Only those with degenerative changes of grade III or higher¹ were included. Those who had undergone previous surgery to the knee or were suffering from systemic disease affecting the locomotor system were excluded.

Fig. 1a

Fig. 1b

Plain radiographs of an osteoarthritic knee of a Muslim patient showing a) an AP view in full extension and b) a lateral view in full flexion (150°).

There were 61 patients (39 women, 22 men; 83 knees) with a mean age of 56 years (50 to 71).

In both centres the range of movement was measured by a similar technique using hinge goniometers with a resolution of 1°. The fully extended knee was considered as the zero position. The degree of the flexion and the extension deficit, when present, were recorded and the total range of movement was calculated by deducting the value of the extension deficit from that of maximum flexion.

Statistical analysis. This was performed using SPSS (SPSS Inc, Chicago, Illinois). The data were expressed as the mean and standard deviation. We used Student's *t*-test to ascertain the significance of differences between the mean values of two continuous variables. The Mann-Whitney U test was used for non-parametric distribution. One-way analysis of variance (ANOVA) was done for comparison of several group means and to determine the presence of significant differences between group means of continuous variables. Pearson's correlation coefficient was

used to evaluate the strength association between two continuous variables. Statistical significance was set at $p < 0.05$.

Results

There was no significant difference in the three groups regarding the age and gender of the patients.

Table I gives details of mobility for all three groups. There was a highly significant statistical difference ($p < 0.0001$) between the total range of movement in group 1 and group 3 (osteoarthritic knees of Arabic and non-Arabic patients). The Arabic patients had a greater mean range of movement (Table I).

Statistical analysis showed a highly significant difference between the values of the extension deficit in the groups with degenerative arthritis ($p < 0.0001$). The extension deficit was less in group 1 (Table I).

There was no significant difference between group 1 and

Table I. Comparison of the mobility of the three groups of patients

	Group		
	1	2	3
Number of knees	68	51	83
Flexion in degrees (range)	139.5 (100 to 155)	145.3 (140 to 155)	102.8 (60 to 135)
Extension deficit in degrees (range)	6.6 (5 to 10)*		8.0 (5 to 20)†
Total range of movement in degrees (range)	137.4 (90 to 155)	145.5 (140 to 155)	96.5 (65 to 130)
Standard deviation	10.91	4.37	17.21
Standard mean error	1.32	0.57	2.22

* 22 of a total of 68 knees

† 47 of a total of 83 knees

group 2 with regard to maximum flexion (Table I) or between the total range of movement of the osteoarthritic and healthy knees of Arabic patients.

Discussion

The range of movement of the osteoarthritic knee is of considerable functional importance. The mobility of the knee after joint replacement depends significantly on the preoperative range of flexion.²

There have been many reports on the effects of age, body-weight and gender on the mobility of osteoarthritic knees with some contradictory conclusions.²⁻⁵ The effect of continuous passive movement has been reported to have no influence on the function of the knee after total knee replacement.⁶

We have not found any study in the literature which evaluates the possible influence of lifestyle and culture-related activities on the range of movement of knees affected with degenerative arthritis. Yoshino, Shoji and Komagamine⁷ examined the effect of the Japanese way of sitting after total knee replacement in patients with rheumatoid arthritis. There is no mention of the preoperative mobility of the knees in this study, but it may be that the Japanese custom influenced the good postoperative results.

The mean range of movement of our non-Muslim patients with degenerative arthritis was 96.5° (mean flexion, 102.8°, mean extension deficit 8.0°). These values are similar to those reported by others for osteoarthritis of the knee.^{2,8}

The mean range of movement of the osteoarthritic knees of the Arabic patients was 137.4° (mean flexion 139.5°, mean extension deficit 6.6°). We have found no data on the mobility of either healthy or osteoarthritic knees in the Arabic population. In our study the mean total range of movement of the knees with no radiological evidence of degenerative disease in the Arabic patients was 145.5°. We assumed that the range of movement of healthy knees in Muslim and non-Muslim patients is identical. To detect any difference would require a much larger sample with more precise measurement. Even then, other factors such as the soft-tissue volume of the limbs, laxity of the ligaments, and lifestyle would have a significant influence on the measurements.

We found a statistically significant difference between the range of maximum flexion in the affected knees of Arabic and non-Muslim patients but not in the total range of maximum flexion between osteoarthritic and healthy knees of Arabic patients nor in of the total range of movement of osteoarthritic and healthy knees in Arabic patients. The extension deficit was also significantly less in the Arabic patients with degenerative arthritis compared with that in the European patients. We are unable to explain these findings in relation to the traditional activities of Arabic culture, but one explanation for the preservation of movement in the osteoarthritic joint could be the lifestyle-related ligamentous laxity. Genetic factors may also have a role.

Our findings indicate that knees affected with degenerative arthritis in Arabic patients are more mobile than those in non-Muslim patients, that degenerative disease does not necessarily restrict the mobility of the affected knee and that the restriction of movement may be prevented by regular exercise. It is possible that the mobility of osteoarthritic knees of patients who are too young or unwilling to undergo joint replacement can be preserved by regular exercise. The preoperative range of movement is believed to be related to postoperative mobility.^{2,9}

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