

Knee function and KOOS index in subjects with different radiographic types of knee osteoarthritis in an Estonian longitudinal study.

Ann Tamm¹, Jaanika Kumm^{2,3}, Mare Lintrop³, AguTamm²

¹ Department of Sport Medicine and Rehabilitation, University of Tartu, Estonia

² Department of Internal Medicine, University of Tartu, Estonia

³ Department of Radiology, University of Tartu, Estonia

Background: Development of knee osteoarthritis (KOA) is slow insidious with nonlinear or phasic progression (Kumm et al. 2013). Our follow-up study of the middle-aged population based cohort during six years by KOOS index, revealed significant decrease in some self-reported functional abilities (Tamm et al, 2006). In this report we present data from the last three years period.

Aims : 1) To characterize status of subsets of patients with early and advanced knee OA by KOOS questionnaire; 2) To investigate in the same subsets of patients the associations between functional abilities of lower limb and their radiographic knee OA

Material and Methods. The cohort of 173 subjects (109 females and 64 males) from symptomatic and nonsymptomatic Estonian population with mean age 50 (36-62) years were studied. The status of their knees was assessed before and after three years period by KOOS questionnaire, by functional performance tests and by radiography.

A. KOOS index has the following subscales: symptoms, pain, activities of daily life, ability for more demanding activities for knee joint - sport/recreation (Sp/R) and quality of life. The three first subscales are similar to those of WOMAC index, the two last subscales are only in KOOS (**K**nee Injury and **O**steoarthritis **O**utcome **S**core) index.

B. Functional performance of the legs was assessed (1) by stair climbing test (SCT, the highest steps in cm; separately with left and right leg); (2) rising from the low chair (RC) (the lowest height, in cm); (3) timed UP&GO test (TUG, sec) and (4) 30 meter walking test (with maximal speed, in sec).

A test chair (device) (Figure 1) with regulable height was designed for two purposes: rising from /stepping up). Initial height is that of the standard chair, i.e. 45 cm. In case rising from this height does not cause pain or inconvenience and the person can perform it without the help of the hands, the following tests will be continued by lowering height by 5 cm intervals until the appearance of complaints, but not lower than 20 cm from the floor (Fig1). **Stepping up onto a test chair.** The participants are asked to step up onto and down from a step 15cm (i.e. the lowest height). If the participant has no complaints the step will be increased by 5cm intervals. The test is discontinued when the maximum height is reached (60cm for women and 70 cm for men).



Figure 1. Test-chair.

C. Radiographs of both knees of the tibio-femoral (TF) joint and axial radiographs of the patello-femoral (PF) joint were taken at baseline and three years later and assessed according to Cooper, Spector (1992) and Nagaosa, Doherty (2000) systems. According to longitudinal follow-up the subjects under investigation were divided into six groups (Table 1, G1 – G6).

Results.

Table 1. Clinical and radiographic caharacterization of the groups.

	groups	No	knee complaints	TF grade	PF grade	OA progression
G1	controls	32	NO	0	0	NO
G2	without X-ray features	40	yes	0	0	NO
G3	early OA	34	yes	0	1	NO
G4	advanced OA	26	yes	2 or 3	various	NO
G5	incident OA	14	yes	0 -> 1	0	YES
G6	progressive OA	27	yes	1 -> 2 or 2->3	various	YES

173

KOOS results. As expected highly significant differences expressed by all 5 subscales were observed between the patients (G2-G6) and controls (G1). Among the patients with knee complaints significant differences were found between the female patients from groups G2 and G4: Sp/Rec (p=0.02) and QoL (p=0.002). The

differences were even more expressed between the female patients from G2 and G6 (with progressive OA): Sp/Rec ($p=0.0004$) and QL (0.014). The differences between other groups (G3 and G5) were statistically not significant.

Performance-based tests and radiography. The results of the Chair tests and 30 m walk but not TUG test, were significantly different between the patients (G2-G6) and controls (G1). In more advanced cases of OA (G4 and G6) TUG results were slower in female patients from those of G2. The differences were much more expressed between the above mentioned groups in all chair tests: RC ($p=0.001 - 0.00004$, Fig. 2), SCT ($p=0.003 - 0.0003$, Fig. 2). The differences between other radiographic groups (G3 and G5) were statistically not significant.

Conclusions.

- 1. We have successfully implemented standardised and quantitatively evaluable methods for clinical assessment of the patient with knee complaints.**
- 2. Highly significant differences were observed between the patients and controls in all KOOS subscales as well as by three out of four performance tests.**
- 3. Significant decline in KOOS subscales Sp/Rec and QoL in female patients with advanced (G4) and progressive (G6) knee OA was found. The finding points to superiority of KOOS questionnaire in comparison of WOMAC index.**
- 4. Female patients with advanced (G4) and progressive (G6) knee OA had worse ability in chair tests in comparison with those without radiographic OA. The differences between early radiographic groups (G3 and G5) were statistically not significant.**
- 5. The test-chair used and designed by us (produced by firma Equa, Tartu, Estonia) serves as a convenient, quantitative and useful device for this purpose. It helps to discover advanced forms of knee OA.**

Acknowledgements

The study was supported by ECTS/Czech Society Young Investigator Grant and grant No 228929, funded by the EC 7th Framework Programme FP7-NMP-2008-L, “NanoDiaRA” project.

Figure 2. Rising from chair: controls and patients with different forms of knee OA

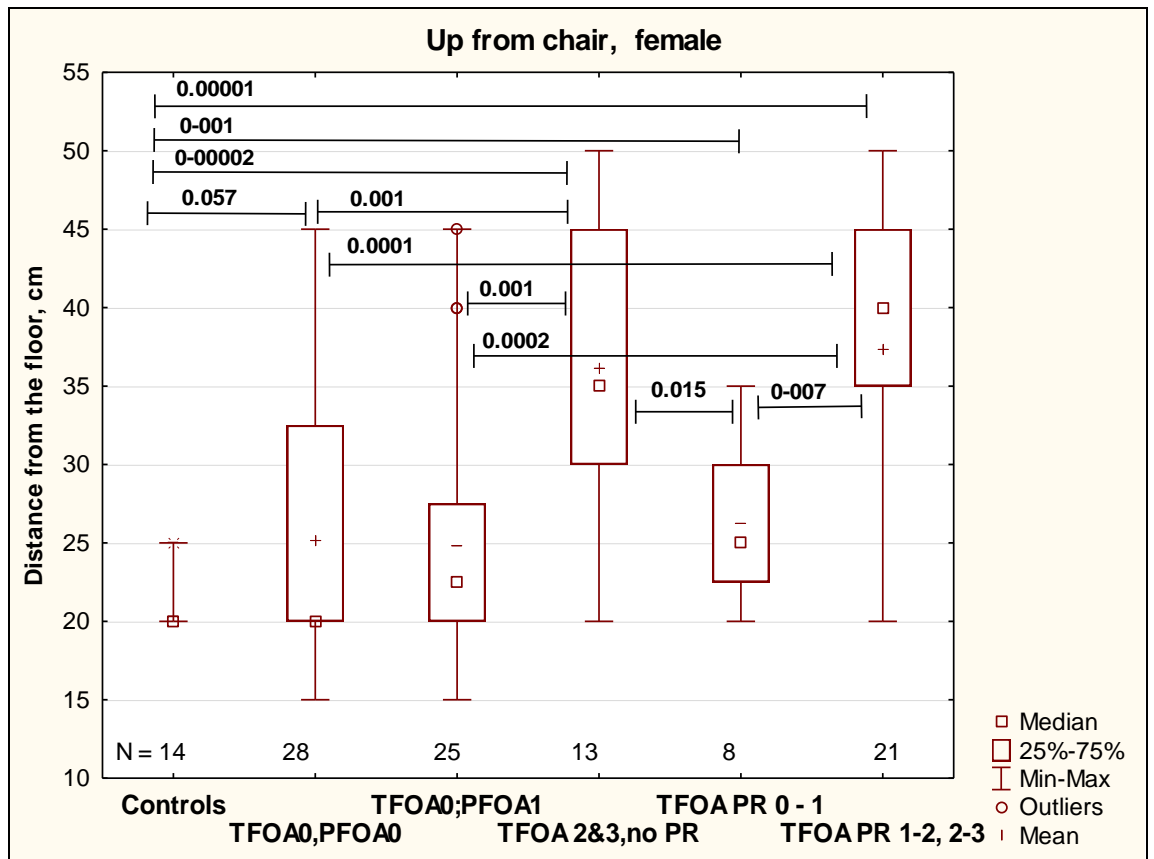


Figure 3. Stair-climbing abilities in controls and in patients with different forms of knee OA

