

OA: Clinical Aspects and Outcomes

436 DIABETICS SHOW ACCELERATED PROGRESSION OF CARTILAGE AND MENISCAL LESIONS: DATA FROM THE OSTEOARTHRITIS INITIATIVE

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Purpose: Both osteoarthritis (OA) and diabetes mellitus (DM) are conditions that are increasing in incidence and OA is one of the leading causes of musculoskeletal disability. Both diseases share a number of common risk factors and DM is reportedly present in a high proportion of knee OA subjects. However, the pathophysiological mechanisms causing the coexistence of these two diseases remains not quite clear, since only a few studies have focused on the associations between DM on OA. Some studies suggest hyperglycemia-induced systemic inflammation as a potential risk factor with severe impact on the progression of OA. Previous compositional MR imaging studies found altered cartilage composition in diabetics when compared to diabetes-free controls including a more varied, heterogeneous, and disordered cartilage composition in diabetic patients, suggesting that the cartilage microarchitecture is altered by the effects of elevated blood glucose levels. These findings suggest that DM may alter all knee joint tissues and accelerate joint degeneration. Purpose of this study was to investigate structural abnormalities in the knees of diabetics when compared to diabetes-free controls over 4 years using morphological MR imaging.

Methods: We examined the right knee of 392 subjects with (n = 196) and without DM (n = 196), selected from the Osteoarthritis Initiative (OAI) cohort. In all subjects, 3 Tesla MRI at baseline and 4-year follow-up MRI scans were obtained including a 3D dual echo steady-state gradient-echo with water excitation sequence, a coronal intermediate-weighted (IW) turbo-spin echo (TSE), and a sagittal IW TSE with fat suppression sequence. Groups were group-matched for age, sex, KL score, and BMI. Evaluation of the morphological knee structures was performed using the Whole-Organ Resonance Imaging Scoring system (WORMS), assessing the following abnormalities: cartilage lesions, bone marrow edema pattern, subarticular cysts, meniscus lesions, ligament tears, popliteal cysts, and joint effusion. All MR images were independently reviewed by two musculoskeletal radiologists, both blinded to clinical information and the DM status. Statistical analyses were performed using conditional logistic regression models.

Results: Both study groups were similar in age (63.3 years vs 63.0 years, $P = 0.76$), BMI (31.0 vs 31.2 kg/m², $P = 0.70$), sex (female 53.4% vs 53.4%, $P = 0.92$) and KL score distribution ($P = 0.93$). With respect to the WORMS score, diabetics showed a significantly higher increase of cartilage defects within 4 years when compared to the diabetes-free controls (average over all compartments: 2.66 vs 1.73, respectively; $P < 0.001$). In addition, diabetics showed also a higher increase of cartilage defects in all individual compartments, with significantly higher results at the patella ($P = 0.025$) and the lateral femur ($P = 0.015$) (Fig. 1). Furthermore, diabetics showed a significantly higher increase of meniscus lesions, increasing twice as much compared to the diabetes-free control group (1.26 vs 0.62, respectively; $P = 0.004$) (Fig. 1). Changes in bone marrow edema, subarticular cysts, ligaments, popliteal cysts, and effusion were not statistically significant between the two groups.

Conclusions: Diabetics showed a significantly higher increase of cartilage defects when compared to matched diabetes-free controls over 4 years. Additionally, a higher increase of meniscus lesions in the knees of diabetics was found. Ultimately, our study shows that diabetics are at higher risk of developing OA.

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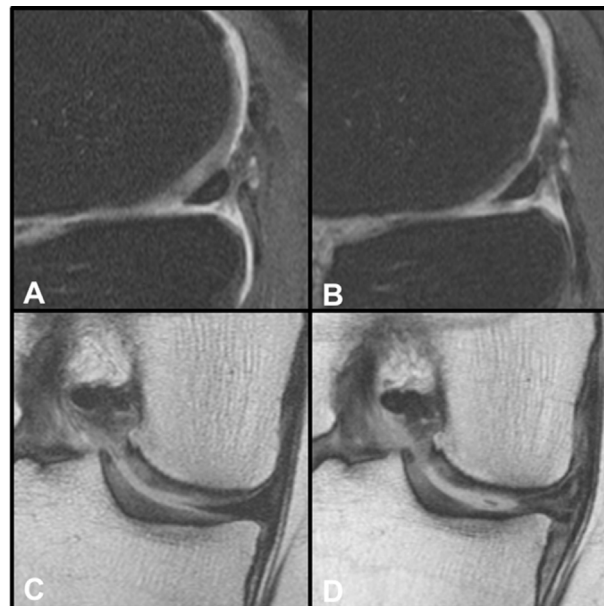


Fig. 1. Sagittal IW TSE with fat suppression of a diabetic subject shows at baseline (A) no cartilage defect on the lateral femoral condyle, whereas, the 4 year follow up scan (B) shows now cartilage thinning along the posterior aspect of the femoral condyle accompanied by partial- and also full-thickness defects. Coronal IW TSE of a diabetic subject at baseline (C) shows a normal medial meniscus with low signal intensity. The follow-up scan (D) shows a new horizontal meniscal tear along with intrasubstance, high signal intensity, abnormalities and new extrusion of the medial meniscal body.

437 HIGH INTENSITY PHYSICAL ACTIVITY IMPROVED BLOOD PRESSURE OF PATIENTS WITH KNEE OA

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Purpose: Physical exercise and educational programs promote several benefits for patients with knee osteoarthritis (OA). However, little is known about their effects on blood pressure (BP) of this population. Our purpose was to assess the role of physical activity on BP of subjects under treatment for knee OA submitted to an interdisciplinary educational program.

Methods: One hundred and thirty six sedentary subjects (25/111 men/women; age = 67.6 ± 9.6, BMI = 30.6 ± 4.4 kg/m²), under treatment for primary knee OA, were submitted to an interdisciplinary educational program emphasizing the recommendation for regular practice of physical exercise, and have their BP, physical fitness (six minute walking test- 6MWT), body mass index (BMI) and daily living physical activity (International Physical Activity Questionnaire short version) assessed before (pre) and after 12 months of follow-up. Subjects were then classified, according to their physical activity status during follow-up, in sedentary-to-sedentary (SED-SED, sedentary/insufficiently active at pre and post follow-up), sedentary-to-active (SED-ACT, sedentary/insufficiently active at pre follow-up and active/very active at post follow-up), active-to-sedentary (ACT-SED, active/very active at pre follow-up and sedentary/insufficiently active at post follow-up) and active-to-active (ACT-ACT, active/very active at pre and post follow-up) groups and have their BP and physical 6MWT compared.

Results: Systolic BP increase (11 ± 3 mmHg, $P < 0.01$) and maintenance in diastolic BP were found in SED-SED, whereas tendency toward

increase in systolic BP (12 ± 6 mmHg, $P = 0.07$) and increase in diastolic BP (5 ± 1 mmHg, $P < 0.01$) were found in ACT-SED during follow-up. On the other hand, maintenance in systolic BP and reduction in diastolic BP (5 ± 2 mmHg, $P < 0.01$) were found in SED-ACT, whereas maintenance in systolic BP and tendency toward reduction in diastolic BP (3 ± 2 mmHg, $P < 0.07$) were found in ACT-ACT during follow-up. The positive effects on BP in SED-ACT and ACT-ACT were accompanied by improvements ($P < 0.05$) on 6MWT (SED-ACT = $8.5 \pm 2.7\%$; ACT-ACT = $9.3 \pm 3.6\%$) and BMI (SED-ACT = $2.9 \pm 0.9\%$; ACT-ACT = $3.8 \pm 2.0\%$), whereas no changes were found in SED-SED and ACT-SED.

Conclusions: To increase or maintain the physical activity levels in active or very active status resulted in BP reductions, whereas to maintain or reduce it to sedentary or insufficiently active status resulted in BP increase levels in subjects under treatment for knee OA. This results suggest that high levels of physical activity may have a positive role on prevention/management of high BP in subjects under treatment for knee OA.

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QUADRICEPS STRENGTH IN INDIVIDUALS WITH COEXISTING MEDIAL AND LATERAL OSTEOARTHRITIS: TOWARD AN IDENTIFICATION OF MODIFIABLE RISK FACTORS IN IMPORTANT SUBGROUP OF MILD RADIOGRAPHIC DISEASE

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Purpose: Recent study revealed that knee with concomitant lateral and mild medial OA was more symptomatic compared to those without lateral OA (Iijima H, OAR 2017). These findings indicate that individuals with coexisting lateral OA may be a distinct subgroup in mild medial knee OA that should be treated. This study aimed to further characterize individuals with coexisting lateral OA in mild medial knee OA compared to those without lateral OA in terms of lower limb muscle strengths.

Methods: In individuals with Kellgren/Lawrence (K/L) grade 2 OA in the medial compartment ($n = 153$; age: 48–88 years; 83.7% female), anteroposterior knee radiography was used to assess the presence of lateral OA, using the grading systems from the Osteoarthritis Research Society International (OARSI) atlas and the K/L classification. The isometric maximum muscle strengths of hip abductor, extensor, and knee extensor were compared between individuals with and without lateral OA using an analysis of covariance. Furthermore, binary logistic regression analysis was performed, with presence of lateral OA as a outcome and each muscle strength as a predictor.

Results: Knees with coexisting lateral OA had a significantly weaker knee extensor muscle strength compared to those without, after adjusting for age and sex, for both the OARSI atlas (adjusted difference in mean: 0.272 Nm/kg, 95% confidence interval [CI]: 0.143, 0.401) and K/L classification (adjusted difference in mean: 0.185 Nm/kg, 95% CI: 0.061, 0.309). Logistic regression analysis revealed that the weaker knee extension muscle strength increased the odds the presence of lateral OA 7-fold, after adjusting for age, sex, anatomical axis, knee extension and flexion range of motion, and knee pain intensity, when using the OARSI atlas. Muscle strengths of hip abductor and extensor were not significantly different between those with and without lateral OA.

Conclusions: Knees with coexisting lateral OA had a significantly weaker knee extensor muscle strength compared to those without, after adjusting for age and sex, for both the OARSI atlas (adjusted difference in mean: 0.272 Nm/kg, 95% confidence interval [CI]: 0.143, 0.401) and K/L classification (adjusted difference in mean: 0.185 Nm/kg, 95% CI: 0.061, 0.309). Logistic regression analysis revealed that the weaker knee extension muscle strength increased the odds the presence of lateral OA 7-fold, after adjusting for age, sex, anatomical axis, knee extension and flexion range of motion, and knee pain intensity, when using the OARSI atlas. Muscle strengths of hip abductor and

extensor were not significantly different between those with and without lateral OA.

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ADULTS WITH INCIDENT ACCELERATED KNEE OSTEOARTHRITIS ARE MORE LIKELY TO RECEIVE A KNEE REPLACEMENT: DATA FROM THE OSTEOARTHRITIS INITIATIVE

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Purpose: Accelerated knee osteoarthritis (AKOA) is a subset of knee osteoarthritis (KOA) that is characterized by a rapid onset of advanced-stage radiographic KOA. Adults with AKOA report greater pain and functional impairments than those with a more gradual onset form of KOA (common KOA). Despite the rapid onset and significant disease burden, it remains unknown if adults who develop AKOA are more likely to receive a knee replacement than those who develop common KOA or no KOA. We aimed to determine if knees with incident AKOA were more likely to receive a knee replacement than those with common or no KOA.

Methods: We conducted a nested cohort study using data from baseline and the first 9 years of the Osteoarthritis Initiative (OAI). Eligible knees had no radiographic KOA at baseline (Kellgren-Lawrence [KL] < 2). We classified 3 groups using KL grades from radiographs collected during the first 8 years of the OAI: 1) accelerated KOA: a knee progressed to advance-stage KOA (KL 3 or 4) ≤ 4 years, 2) common KOA: a knee with any increase in KL grade (excluding AKOA), and 3) No KOA: no change in KL grade by 8 years. The outcome was knee replacement (partial or total) that was reported or observed on radiographs at or before the 9-year OAI visit (>96% adjudicated). The outcome only occurred after a knee met the classification criteria for the 3 groups. We conducted a logistic regression with generalized estimating equations to adjust for correlations between knees within participants. As a secondary analysis, we conducted a person-based analysis with people who had no radiographic KOA at baseline in both knees and repeated the analysis. In the secondary analysis we had 3 groups: 1) adults who had AKOA in at least one knee, 2) common KOA (had common KOA in at least one knee without AKOA in either knee), and 3) no KOA in both knees. Analyses were adjusted or baseline age, body mass index (BMI), and sex.

Results: We had 213 knees with AKOA (62% female, 61 [8] years old, BMI 29.8 [4.6] kg/m²), 798 knees with common KOA (66% female, 59 [9] years old, BMI 28.4 [4.7] kg/m²), and 2551 knees with no KOA (52% female, 59 [9] years old, BMI 27.1 [4.3] kg/m²). Overall, 14% of knees with AKOA received a knee replacement by the 9th year follow-up compared with 1% and <1% of those with common or No KOA, respectively (see Table). Knees that developed AKOA are >80 times more likely to receive a knee replacement than knees with no KOA and ~25 times more likely than those who develop common KOA (adjusted OR = 25.1; 95% confidence interval = 9.6–65.3). Similar results were observed with a person-based analysis when the sample was limited to people with no KOA in either knee at baseline. The median time from first radiographic evidence of progression to knee replacement was 2.3 years (range: 0.3–7.3 years) compared with common KOA, which was 3.0 (range: 1.7–4.2).

Conclusions: Knee replacements were typically extremely rare in the OAI among knees with no radiographic KOA at baseline; however, almost 1 in 7 knees that develop AKOA received a knee replacement. These data suggest a shorter time window in which to intervene for those with AKOA. Methods to identify adults at high risk for AKOA and prevention strategies regarding the modifiable risk factors for the development of AKOA are needed.