POS1101

THE OMERACT KNEE INFLAMMATION MRI SCORING SYSTEM: VALIDATION OF QUANTITATIVE METHODOLOGIES AND TRI-COMPARTMENTAL OVERLAYS BY COMPARISON WITH THE MRI OSTEOARTHRITIS KNEE SCORE

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Background: Randomized controlled trials have targeted reducing the size of BML and degree of synovitis for the treatment of OA. We have developed the OMERACT Knee Inflammation MRI Scoring System (KIMRISS) and have recently refined it to maximize reliability and sensitivity to change. Innovations include electronic overlays for assessment of BML in 500 subregions, a web-based interface with direct online scoring, and real-time iterative calibration (RETIC) prior to reading exercises. Synovitis-effusion (S-E) is also scored on all consecutive sagittal slices on a web-based interface.

Objectives: We aimed to test the feasibility, reliability, and responsiveness of KIMRISS versus an established method, MOAKS, in two multi-reader exercises.

Methods: KIMRISS incorporates web-based graphic overlays for each of femur, tibia, and patella (range 0-500). S-E is recorded as the largest diameter perpendicular to the longest axis of this feature (range 0-100). All scores are pro-rated for a standardized number of MRI slices. In a pre-reading exercise for KIMRISS, readers scored sufficient cases in RETIC to attain scoring proficiency, pre-specified as an ICC of ≥ 0.80 and ≥ 0.70 for status and change scores of BML and S-E compared to developer reads. A new web-based scoring platform with overlays designating different subregions for scoring BML was developed for MOAKS. We compared reliability for status and change scores of BML and S-E in 2 international multi-reader exercises of baseline and one-year MRI scans from the Osteoarthritis Initiative: A. 4 expert readers and an OMERACT fellow scored 38 cases selected for MOAKS BML score ≥ 1 . B. 7 expert readers and an OMERACT fellow scored 60 cases selected for MOAKS BML ≥ 3 and Kellgren-Lawrence (K-L) grade < 3 . Reliability was assessed by intra-class correlation coefficient (ICC) and Smallest Detectable Change (SDC), responsiveness by the standardized response mean (SRM), and feasibility using the System Usability Scale (SUS scoring range 0-100).

Results: For exercises A/B, subjects were 55.3%/ 26.7% male, mean($\pm$ SD) age 61.7($\pm$ 9.1)/61.9(8.8) years, and radiographic K-L grade ≤ 2 in 39.4%/100%. Change was small in both exercises ($< 5\%$ of scoring range for KIMRISS and MOAKS BML and S-E) with comparable responsiveness (Table 1). Despite this, ICC for change was consistently good to very good for both BML and S-E and consistently better for KIMRISS (Table 1). Mean SUS scores were 88.2 for KIMRISS and 54.3 for MOAKS.

Table 1. KIMRISS and MOAKS scores in Two International Multi-reader Exercises

Method	MRI feature	Scores mean (SD)			SDC (% of max)	P value	SRM
		Baseline	One-year Follow up	Change			
EXERCISE A							
MOAKS	BML	3.6 (2.9)	3.4 (2.3)	-0.2 (1.9)	1.0 (2.2%)	0.72	-0.11
	Synovitis-effusion	1.3 (0.8)	1.5 (0.8)	0.2 (0.4)	0.4 (13.3%)	0.017	0.5
KIMRISS	BML	15.7 (13.3)	21.2 (22.5)	5.5 (15.3)	5.6 (1.1%)	0.022	0.36
	Synovitis-effusion	21.8 (12.0)	24.3 (11.9)	2.5 (7.4)	2.8 (2.8%)	0.043	0.34
EXERCISE B							
MOAKS	BML	4.2 (2.6)	3.7 (2.4)	-0.5 (2.1)	1.1 (2.4%)	0.083	-0.24
	Synovitis-effusion	1.2 (0.7)	1.3 (0.8)	0.0 (0.5)	0.4 (13.3%)	0.59	0.0
KIMRISS	BML	18.0 (17.5)	15.9 (14.3)	-2.1 (12.3)	5.9 (1.2%)	0.19	-0.17
	Synovitis-effusion	21.8 (9.3)	22.9 (10.8)	1.1 (7.1)	2.2 (2.2%)	0.25	0.15
Intra-class Correlation Coefficients (95%CI)							
Method	MRI feature	Exercise A			Exercise B		
KIMRISS status	BML	0.86 (0.78-0.92)			0.80 (0.70-0.87)		
KIMRISS change	BML	0.88 (0.81-0.93)			0.72 (0.64-0.80)		
MOAKS status	BML	0.71 (0.46-0.85)			0.67 (0.56-0.77)		
MOAKS change	BML	0.76 (0.64-0.85)			0.69 (0.60-0.78)		
KIMRISS status	Synovitis-effusion	0.88 (0.81-0.93)			0.75 (0.52-0.86)		
KIMRISS change	Synovitis-effusion	0.87 (0.79-0.92)			0.87 (0.82-0.91)		
MOAKS status	Synovitis-effusion	0.66 (0.4-0.79)			0.65 (0.52-0.75)		
MOAKS change	Synovitis-effusion	0.52 (0.36-0.67)			0.48 (0.37-0.60)		

Conclusion: The KIMRISS method for scoring BML and Synovitis-Effusion scores highly for feasibility and demonstrates consistently high reliability when compared to MOAKS. Further validation for responsiveness is necessary in cases with greater change in MRI features than in the OAI dataset.

Disclosure of Interests: None declared.

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Osteoarthritis

POS1102

TEMPORAL TRENDS AND FACTORS ASSOCIATED WITH VITAMIN D PRESCRIPTION AND INTAKE

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Background: Vitamin D has proven skeletal effects and its administration is recommended in patients with osteoporosis by many national and international guidelines. Nevertheless, the compliance to treatment of patients with osteoporosis is scarce. Understanding the factors associated with low vitamin D intake and prescription might help design future intervention aimed to improve adherence.

Objectives: This study aims to investigate the temporal trends and factors associated with vitamin D prescription and intake.

Methods: Using a web-based fracture risk-assessment tool, we collected demographic, densitometric and clinical data of women at high risk for fractures. To determine the factors associated with low vitamin D intake we ran a multivariable logistic regression analysis. We described the public general interest in the term "vitamin D" using the Google Trends tool.

Results: 12,419 women were included in the study. 6,748 (54.4%) individuals had a prevalent fragility fracture and 8,950 (72.1%) individuals were on < 800 IU of vitamin D per day and 11,434 (92.1%) were taking $< 1,200$ IU of vitamin D per day. The factors associated with vitamin D intake were evaluated with a multivariable logistic regression analysis, which results are presented in Table 1. We found that low BMD levels, the presence of associated comorbidities and glucocorticoid utilization were associated with greater vitamin D intake. Falls were associated only with lower risk of receiving very low dose of vitamin D (< 250 IU day). Smoking status was associated with lower vitamin D intake. Overall, the internet interest in vitamin D was higher during the winter season Figure 1.

Figure 1. Google trends interest in the term "vitamin D" from January 2010 to October 2020

Conclusion: Low vitamin D intake (< 800 IU day) was common in our cohort of women at high risk for fractures. The factors associated with greater vitamin D intake were: having low BMD levels, associated rheumatic diseases and glucocorticoid use. Falls were associated with lower risk of receiving very low dose of vitamin D (< 250 IU day). Smoking status was associated with lower vitamin D intake.

Table 1. Binary logistic regression to predict the risk of low vitamin D intake (<800 IU/day)

>800 IU day REF		aOR (95% CI)	p value
400-800 IU day	Age	1.001 (0.995-1.007)	NS
	T-score	1.422 (1.342-1.508)	<0.001
	No comorbidities	REF	
	Rheumatoid arthritis	0.732 (0.583-0.920)	<0.001
	Psoriatic arthritis	0.362 (0.218-0.607)	<0.001
	Connective tissue disease	0.630 (0.486-0.816)	<0.001
	No cigarette smoking	REF	
	Cigarette smoking	1.040 (0.893-1.212)	NS
	Alcohol <3 unit day	REF	
	Alcohol ≥3 unit day	1.201 (0.660-2.187)	NS
	No glucocorticoids	REF	
	Glucocorticoids 2.5-5 mg/day	0.688 (0.550-0.860)	<0.001
	Glucocorticoids ≥5 mg/day	0.739 (0.554-0.986)	<0.001
	No falls	REF	
	Falls	0.875 (0.754-1.015)	NS
250-400 IU day	Age	0.994 (0.985-1.002)	NS
	T-score	1.223 (1.117-1.339)	<0.001
	No comorbidities	REF	
	Rheumatoid arthritis	0.670 (0.463-0.970)	<0.001
	Psoriatic arthritis	0.300 (0.119-0.752)	<0.001
	Connective tissue disease	0.651 (0.435-0.975)	<0.001
	No cigarette smoking	REF	
	Cigarette smoking	1.371 (1.104-1.702)	<0.001
	Alcohol <3 unit day	REF	
	Alcohol ≥3 unit day	1.824 (0.865-3.887)	NS
	No glucocorticoids	REF	
	Glucocorticoids 2.5-5 mg/day	0.930 (0.666-1.297)	NS
	Glucocorticoids ≥5 mg/day	0.743 (0.464-1.189)	NS
	No falls	REF	
	Falls	0.934 (0.741-1.176)	NS
<250 IU day	Age	0.993 (0.988-0.998)	<0.01
	T-score	1.139 (1.079-1.202)	<0.001
	No comorbidities	REF	
	Rheumatoid arthritis	0.645 (0.522-0.795)	<0.001
	Psoriatic arthritis	0.553 (0.376-0.812)	<0.001
	Connective tissue disease	0.697 (0.558-0.871)	<0.001
	No cigarette smoking	REF	
	Cigarette smoking	1.339 (1.171-1.532)	<0.001
	Alcohol <3 unit day	REF	
	Alcohol ≥3 unit day	1.267 (0.749-2.145)	NS
	No glucocorticoids	REF	
	Glucocorticoids <5 mg/day	0.964 (0.796-1.168)	NS
	Glucocorticoids ≥5 mg/day	0.946 (0.736-1.215)	NS
	No falls	REF	
	Falls	0.615 (0.530-0.712)	<0.001

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POS1103 SLEEP DISTURBANCE AND BONE MINERAL DENSITY, RISK OF FALLS AND FRACTURE: RESULTS FROM A 10.7-YEAR PROSPECTIVE COHORT STUDY

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Background: Sleep problems are common in the general population and have been reported to adversely affect bone health and increase risk of falls and fracture. However, no study has investigated whether an increased risk of fracture is attributable to sleep-related low bone mineral density (BMD) and/or an increased risk of falls.

Objectives: This study, therefore, sought to describe the associations of sleep disturbance with BMD, risk of falls and fractures.

Methods: The analyses were performed in a population-based prospective cohort study with 1,099 participants (aged 50–80 years) enrolled at baseline, and 875, 768 and 563 participants traced at a mean follow-up of 2.6, 5.1 and 10.7 years, respectively. At each visit, self-reported sleep disturbance was recorded. BMD (by DXA), falls risk and fracture were measured at each visit. The short-form Physiological Profile Assessment was used to measure falls risk expressed as Z-score. Fractures were self-reported. Mixed-effects model and generalised estimating equations were used for the analyses.

Results: In multivariable analysis, there was a dose-response relationship between extent of sleep disturbance and falls risk score with the strongest association in those reporting the worst sleep disturbance ($\beta=0.15/\text{unit}$; 95%CI 0.02-0.28). The worst sleep disturbance was associated with an increased risk of any (relative risk [RR] 1.30/unit; 95%CI 1.01-1.67) and vertebral fracture

(RR 2.41/unit; 95%CI 1.00-5.80) compared with those reporting no interrupted sleep. This was independent of covariates, hip BMD and falls risk. There was no statistically significant association between sleep disturbance and BMD at hip, spine or total body.

Conclusion: Sleep disturbance was independently associated with a greater falls risk score and an increased risk of fractures, suggesting that correcting sleep disturbance has the potential to reduce both falls risk and fractures.

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POS1104 THE DEVELOPMENT AND VALIDATION OF A RISK STRATIFICATION QUESTIONNAIRE TO SCREEN FOR MEDICATION RELATED OSTEONECROSIS OF THE JAW RISK IN OSTEOPOROTIC PATIENTS

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Background: Given the gaps in knowledge that exist in relation to risk stratification for osteonecrosis of the jaw (ONJ) amongst patients treated with anti-resorptive agents, there is a high need for an evidence-based measure which would facilitate the identification of those patients at higher risk of ONJ development; particularly, most of the available advice is empirically based.

Objectives: to develop a valid self-administered questionnaire to facilitate risk stratification and risk minimisation of medication related ONJ in osteoporotic patients treated with anti-resorptive agents.

Methods: Development of ONJ risk assessment questionnaire (ONRAQ) followed 5 stages: 1. Review of the literature to identify the risk factors associated with medication related ONJ. 2. Item pool development: a list of the main risk factors was compiled. Rare or uncommon factors were excluded. 3. A questionnaire was developed. This was based on the idea that the questions should be straight forward and as clear as possible. 4. Pre-testing of the questionnaire. 5. Validation of the questionnaire by comparing the patients answers with their medical records. Patients at risk were advised to seek dental assessment and the dental report was evaluated. The last prescription was reviewed to verify the current medications. 157 patients were invited to participate and were prospectively monitored for 5-years to assess for the incidence of medication related ONJ. Advice was given regarding how to maintain good dental hygiene to prevent dental disease and to ensure that any dental interventions that are considered necessary are carried out as conservative and preservative as possible. Comprehensibility of the model sections was also assessed.

Results: Stages 1 and 2 identified the risk factors chosen for the questionnaire. These risk factors were stratified into 4 sections: Personal, Dental and oral health, current medications and associated comorbidities. Stage 3 led to the development of the 27 items questionnaire. Personal: 3 risk factors (age, elevated BMI and smoking), Dental and oral health (11 risk factors), current medications (3 risk factors) and associated comorbidities (10 risk factors). Analysis of the answers provided by 126 patients, who completed the study, age range 58-82 years revealed that the mean time to answer the questionnaire was 1.9+0.153 minutes. The ONRAQ has shown a strong validity when compared to the patients' data record (range 0.89-0.97). All patients rated the questionnaire as easily comprehensible. Comprehensibility of the various questionnaire sections ranged between 96.1% and 98.2% denoting that all the questions were well understood by the great majority of patients. 11/126 (8.7%) had a dental procedure in the past 6-months, 13/126 (10.3%) were advised to stop smoking. Whereas 20/126 (20.6%) had associated comorbidities. Risk stratification led to the advice to start oral bisphosphonates/ denosumab rather than IV zoledronate for patients at moderate risk (comorbidities, personal, medication). Treatment was postponed till complete healing for those with recent history of invasive dental procedure (high risk). No ONJ was identified after 5-years of follow up.

Conclusion: Results of this questionnaire revealed that the ONRAQ is valid screening questionnaire. It can be implemented, as a risk minimisation measure, in standard practice. The questionnaire was able to identify patients at risk of developing medication related osteonecrosis of the jaw and facilitate the prospective risk management of ONJ.

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