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Does Pain Medication Use Influence the Outcome of 8 Weeks of Education and Exercise Therapy in Patients with Knee or Hip Osteoarthritis? An Observational Study

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Abstract

Objective. Patients with osteoarthritis are mainly managed in primary care settings and many patients use pain medication as symptomatic treatment. We investigated in OA-patients receiving an education and exercise program, the use and type of pain medication and its impact on outcomes at 3 months follow-up. **Design, Setting and Subjects.** The design was a retrospective cohort study using prospectively collected data from the GLA: D® registry. The study included 15,918 primary care patients. **Results.** Among the included patients, 62% were pain medication users and 38% were non-users. Among the pain medications users, 35% were classified as paracetamol users, 54% as NSAID users, and 11% as opioid users. Medication users and non-users differed regarding a higher pain intensity, poorer physical and mental health. Pain medication use before and during the education and exercise program was associated with the pain intensity at 3 months follow-up. However, patients either using or not using pain medications improved over time, and the magnitude of the difference between patient groups was small (less than 10 mm on a 0–100 scale). **Conclusions.** Pain medication use is weakly associated with outcome at 3 months follow up in OA-patients receiving an education and exercise program. Between-group differences, however, are small and probably not clinically important.

Key Words: Pain Medication; Hip Osteoarthritis; Knee Osteoarthritis; Cohort Study, Outcome

Introduction

Osteoarthritis (OA) is a chronic condition affecting one or several joints. The prevalence of OA increases with age and body mass index (BMI) and with the global aging population and rice in BMI the burden of OA will increase. Some of the commonly affected joints are the hip and knee with pain and disability as primary symptoms [1–6].

Patients with OA are mainly managed in primary care settings. The recently issued OARSI clinical guidelines recommend education and structured land-based exercise programs as core treatments for the management of knee and hip OA [7]. At the same time many patients with OA use pain medications, but we do not know what their impact is on the outcome of exercise and education programs.

A few studies provide insight into the prescription/use of pain medication for people with OA. In a large study in general practices in the UK, Yu and colleagues showed that in incident cases with clinical OA the proportion of people receiving NSAIDs prescription in the period 2004–2013 varied between 15% and 20%, about 14% received a prescription for a weak combination opioid and another 1% a moderate to very strong combination opioid [2]. Khoja et al showed in an analysis of data from the National Ambulatory Medical Care Survey (USA) in the period 2007–2015 that the NSAIDs prescriptions when visiting an orthopedist for knee OA increased over time from 132 to 278 per 1000 visits and narcotics prescriptions increased from 77 to 236 per 1000 visits [8]. Thorlund et al. reported a 12-month prevalence of opioid use of 23.7% among OA patients in a large cohort study in Sweden [9].

The evidence regarding the efficacy of the various types of pain medication is mostly coming from randomized clinical trials. Cochrane reviews of commonly used pain medications such as paracetamol, NSAIDs, and tramadol for people with OA show only small to moderate effects when compared to placebo [10–12]. While the trials included in the Cochrane reviews supply us with a valid insight of the efficacy of the pain medication in a controlled environment, they are less informative about the impact in clinical ("real life") settings.

We were interested in the use of pain medication of people with hip or knee OA treated with a standardized exercise program and patient education [i.e., the Good Life with osteoarthritis in Denmark (GLA: D®) program] in a primary care setting in Denmark [13]. In a previous study using data from the GLA: D® cohort, we investigated changes in pain medication use before and after the GLA: D® program. We found that the proportion of pain medication users reduced from 62.2% at baseline to 44.1% at follow-up [14].

The objectives of the present study were: 1) to compare the clinical and demographic profiles of patients with OA enrolled in the GLA: D® program using or not using pain medication; 2) to compare the outcome after GLA: D® of patients with OA using pain medication before and/or during the GLA: D® program versus patients not using pain medication; 3) to compare the outcomes of patients using different types of pain medications during the GLA: D® program versus no pain medication.

Methods

Design

This was a retrospective cohort study using prospectively collected data from the GLA: D® registry. This study is reporting according to the reporting of observational studies in epidemiology (STROBE) guideline [15].

Patients

Data were retrieved from patients registered in GLA: D® from the 1st of January 2014 to the 31st of August 2017. Institutional investigational review board (IRB) statement: According to the Danish Data Protection Act patient consent was not required as personal data was processed exclusively for research and statistical purposes. For this study, data from the baseline and post-treatment assessments were used. Patients had to complete the follow-up no later than the 31st of December 2017 and had to participate in the clinical assessment at baseline and follow-up.

Patients with knee and hip OA symptoms participating in GLA: D® receive a treatment package of 8 weeks of education and supervised neuromuscular exercise delivered by a trained physiotherapist. In short, patients receive two to three sessions of patient education (each lasting approx. 90 minutes), topics include general knowledge of OA, treatment of OA with a particular focus on exercise, its beneficial effects on symptoms and general health, and self-help advice. Patients also receive 12 group-based supervised neuromuscular exercise sessions (each lasting 60 minutes) delivered twice weekly for 6 weeks. A more extensive description of the program is published elsewhere [13]. We have no exact data on the time between the baseline measurement and the start of the program, but patients would typically start within 1–2 weeks after baseline

Intake of Pain Medications

Intake of pain medications was assessed by the physiotherapist asking the patients whether they had taken any joint-related medication during the last 3 months, at baseline and after 3 months. If the patients were answering positively, they were subsequently asked which type. In this study, a yes/no dichotomous variable was created for pain medication use. Patients were considered pain medication users if taking at least one of the following drugs: paracetamol, NSAIDs topical, NSAIDs systemic, opioids, tramadol, or codeine. Patients not taking any medication were considered non-users.

To address the second research question the pain medication variable (users vs non-users) was used at baseline and 3-month follow-up to create a 4-category variable with the following options:

- Persistent users: "Yes" pain medication at baseline and "yes" at 3-month follow-up;
- Users before the GLA: D® program: 'Yes' pain medication at baseline and "no" at 3-month follow-up
- Users during the GLA: D® program: "No" pain medication at baseline and "yes" at 3-month follow-up;
- Non-users: "No" pain medication at baseline and "no" at 3-month follow-up.

To address the third research question another pain medication variable was created considering the different types of the most widely used medications (i.e., paracetamol, NSAIDs, opioids (either opioid, tramadol, and/or codeine)) during the GLA: D® program [14]. We used this variable at 3-month follow-up to evaluate the influence on outcome of using different pain medications during the GLA: D® program. This variable classified patients according to the strength of the pain medication used as follows:

- No pain medication users;
- Paracetamol users, including patients taking only paracetamol;
- NSAIDs users, including patients taking NSAIDs but not opioids; these patients could also take paracetamol;
- Opioid users, including patients taking opioids, these patients could also take paracetamol and/or NSAIDs.

Outcome Measurement

The mean pain intensity during the last month in the most affected joint was evaluated at baseline and after 3 months on a 100 mm visual analogue scale (VAS) with terminal descriptors of "no pain" (0 mm) and "maximum pain" (100 mm) [13]. The 3-month follow-up pain intensity measure was used as outcome for the second and third research question in this study.

Data Analysis and Statistics

Descriptive statistics were used to compare patients reporting use versus no use of pain medication at baseline. Multivariable linear regression analyses, adjusting for baseline co-variates were conducted to investigate the association between pain medication use (before and during GLA: D®) and pain intensity at 3 months follow-up. When building the models the following independent variables were considered: age, sex, BMI, educational level, number of comorbidities, pain intensity and self-efficacy and all were included in the final models. The dependent variable was the VAS-pain score (0–100). We checked the assumption for linearity and this assumption was met.

Linear regression analyses with the same adjustments were also used to study the association between the use of different pain medications during the GLA: D®

program (none, paracetamol, NSAIDs, and opioids) and pain intensity at follow-up.

Since both main determinants were categorical variables, dummy variables were created and included in the regression models with pain medication "non-users" as reference category. The assumptions of residuals' normal distribution (through histograms) and (lack of) multicollinearity (VIF < 10) were checked (and met) for all regression models.

Results

Data on 25,113 patients were available, of which 12 patients did not have information on the most affected joint, while 9183 patients did not participate in the clinical follow-up. This led to a study sample of 15,918 patients. Characteristics of those included and patients excluded due to missing data did not differ (Supplementary Data). Among included patients, 62% were pain medication users and 38% were non-users. Among the pain medications users, 35% were classified as paracetamol users, 54% as NSAID users, and 11% as opioid users (Corresponding to 21% paracetamol users, 34% NSAID users and 7% opioid users, respectively, of the total study sample). Supplementary Data shows that 24.3% of the total study sample used a combination of paracetamol + NSAISs.

Comparing Patients Reporting the Use of Pain Medication versus No Pain Medication

Table 1 presents the characteristics of included patients, divided by pain medication intake. As compared to non-users, pain medication users were more frequently women, were more frequently on sick leave in the last year, had higher pain intensity, had lower physical health and mental health, and lower pain self-efficacy (Table 1).

Among the 15,918 included patients, 37% used pain medication at both time points (labelled as persistent users), 26% were users before the GLA: D® program, 7% were users during the GLA: D® program, and 30% were non-users. Data on pain intensity at 3 months were available for 13,832 patients, who had no missing information on the other variables included in the adjusted model. The analyses for the second and third research questions were performed on this sample. The mean pain intensity at 3 months (0–100 VAS) was equal to 34.1 points with a standard deviation of 21.6 points.

Comparing the Outcome of Patients Reporting the Use of Pain Medication versus No Pain Medication

Table 2 presents data on the association between pain medication use and pain intensity at 3 months follow-up. The baseline pain intensity varied between the 4 subgroups with the persistent users showing the highest mean pain intensity (54.3 points) and the non-users the

Table 1. Patients' characteristics (n = 15,918)

	Pain Medication Users (n = 9911)	Pain Medication Not Users (n = 6007)	Paracetamol Users (n = 3420)	NSAID Users (n = 5368)	Opioid Users (n = 1112)
Age, mean ± SD	64.9 ± 9.6	65.1 ± 9.6	67.3 ± 9.2	63.6 ± 9.4	64.3 ± 10.0
Sex, %					
Male	23.8	31.8	23.5	24.6	20.9
Female	76.2	68.2	76.5	75.4	79.1
BMI, mean ± SD	28.7 ± 5.3	27.2 ± 4.6	28.2 ± 5.0	28.8 ± 5.4	29.7 ± 5.6
Missing %	0.2	0.3	0.1	0.1	0.2
Educational level, %					
Primary school	18.2	14.7	21.5	15.6	20.0
Secondary school	10.5	10.4	10.4	10.7	9.7
Short-term education	19.2	17.1	18.7	18.8	22.9
Medium-term education	36.8	39.4	34.5	39.1	33.1
Long-term education	8.7	12.2	8.0	9.5	7.0
Missing	6.7	6.2	7.0	6.3	7.4
Most affected joint, %					
Knee	73.8	76.1	71.1	76.2	70.9
Hip	26.2	23.9	28.9	23.8	29.1
Surgery most affected joint, %					
Yes	23.1	21.4	19.3	25.1	25.7
No	76.9	78.6	80.7	74.9	74.3
Radiograph most affected joint, %					
Yes, > 6 months ago	31.2	34.0	32.8	30.1	32.0
Yes, < 6 months ago	56.7	47.2	54.5	57.6	59.3
No	11.4	17.6	11.9	11.7	8.6
Do not know	0.5	0.9	0.7	0.5	0.2
Missing	0.1	0.2	0.1	0.1	0.0
Number comorbidities, %					
0	31.9	37.9	29.2	35.9	21.6
1	32.4	31.0	34.4	31.7	29.4
2	16.2	13.8	16.5	15.1	20.7
3	5.5	4.1	5.8	4.2	10.3
4	1.6	1.1	1.8	1.1	3.1
5	0.5	0.3	0.4	0.4	1.5
6	0.1	0.0	0.1	0.1	0.7
7	0.0	0.0	0.1	0.0	0.0
8	0.0	0.0	0.0	0.0	0.1
Missing	11.7	11.9	11.7	11.5	12.6
Sick leave because hip/knee last year, %					
Yes	12.3	6.5	8.2	13.6	19.0
No	80.9	87.3	84.6	80.2	72.9
Missing	6.8	6.1	7.2	6.2	8.1
Duration symptoms in months, median (IQR)	24.0 (6.0–60.0)	24.0 (8.0–60.0)	24.0 (7.0–60.0)	18.0 (6.0–60.0)	24.0 (7.0–60.0)
Missing %	19.1	18.6	18.0	19.5	20.7
Number of bodily pain areas, median (IQR)	3.0 (2.0–5.0)	2.0 (2.0–4.0)	3.0 (2.0–5.0)	3.0 (2.0–5.0)	4.0 (2.0–7.0)
Missing %	9.1	9.3	9.2	8.8	10.0
Pain intensity (VAS, 0–100), mean ± SD	51.9 ± 20.9	40.1 ± 20.8	50.2 ± 20.7	51.5 ± 20.5	59.4 ± 21.6
Missing %	6.7	6.2	7.1	6.4	7.4
Physical activity level (UCLA, 1–10), mean ± SD	5.7 ± 1.8	6.1 ± 1.8	5.7 ± 1.8	5.8 ± 1.8	5.1 ± 1.7
Missing %	6.6	6.1	7.0	6.1	7.5
Physical health (SF12-PCS, 0–100), mean ± SD	36.7 ± 8.5	41.3 ± 8.7	37.4 ± 8.4	37.0 ± 8.4	32.6 ± 8.2
Missing %	7.0	6.3	7.4	6.5	8.1
Mental health (SF12-MCS, 0–100), mean ± SD	51.8 ± 9.7	54.3 ± 8.6	52.3 ± 9.4	52.3 ± 9.5	48.2 ± 10.5
Missing %	7.0	6.3	7.4	6.5	8.1
Pain self-efficacy (ASES pain, 0–100), mean ± SD	64.1 ± 19.2	71.2 ± 18.5	64.3 ± 18.7	65.3 ± 19.0	58.8 ± 20.5
Missing %	6.6	6.1	7.0	6.1	7.5

(continued)

Table 1. continued

	Pain Medication Users (n = 9911)	Pain Medication Not Users (n = 6007)	Paracetamol Users (n = 3420)	NSAID Users (n = 5368)	Opioid Users (n = 1112)
40-meter fast-paced walk test (seconds), mean ± SD	29.3 ± 8.5	27.0 ± 7.6	29.9 ± 8.1	28.4 ± 7.8	32.1 ± 11.7
Missing %	3.6	4.0	3.3	3.5	4.5

SD = standard deviation; IQR = interquartile range; BMI = body mass index; VAS = Visual Analogue Scale; UCLA = University of California Los Angeles physical activity scale; SF12-PCS = Physical Component Summary of the Short Form 12; SF12-MCS = Mental Component Summary of the Short Form 12; ASES = Arthritis Self-Efficacy Scale pain score.

lowest mean pain intensity (38.8 points). The data show that patients in all four subgroups experienced a mean improvement (i.e., a reduction in pain intensity) over time. After 3 months follow-up the subgroup which used pain medication before entering the GLA: D® program had the largest reduction (18.6 points) in mean pain intensity, whereas the subgroup which used pain medication during the GLA: D® program had the smallest reduction (6.6 points).

Table 2 also presents an unadjusted model and a model in which we adjusted for age, sex, BMI, educational level, number of comorbidities, pain intensity, and self-efficacy at baseline. In this model we compared the mean pain intensity at 3 months follow-up between the four subgroups, with the subgroup of non-users as the reference group.

In the adjusted model all differences between non-users and pain medication users were less than 10 points of pain on a 0–100 scale. The largest difference found was 8.2 points and indicated that, as compared to non–users, the users during GLA: D® had 8.2 point higher pain intensity at 3 months follow-up.

Comparing the outcome of patients reporting the use of different pain medications (paracetamol, NSAIDS, opioids) during the GLA: D® program versus no pain medication.

Table 3 presents data on the association between the type of pain medication use (paracetamol, NSAIDs, opioids) during the GLA: D® program and pain intensity at 3 months follow-up. The baseline pain intensity again varied between the four subgroups with the opioid users showing the highest mean pain intensity (61.0 points) and the nonusers the lowest mean pain intensity (43.0 points). Patients in all four subgroups experienced a reduction in mean pain intensity over time. At 3-month follow-up, the subgroup using no pain medication showed the largest reduction (14.9 points) in mean pain intensity, whereas the subgroups using NSAIDs (10.0 points) or opioids (10.9 points) during the GLA: D® program showed smaller reductions. The subgroup using opioids did improve over time (10.9 points), however, since their baseline pain intensity was relatively high (61.0 points) their absolute mean pain intensity at 3 months follow-up also remained relatively high (50.1 points).

The adjusted model (Table 3) showed that opioid users had the smallest improvement in pain intensity and

reported a mean of 12.5 points more pain at 3 months follow-up as compared with the non-users. NSAID users reported a mean of 9.8 point- and paracetamol users a mean of 7.0 points higher pain intensity as compared with non-users. The outcomes in the total study population and in the knee pain and hip pain groups, separately, were more or less similar (Table 3).

Discussion

More than half (62%) of the patients entering the GLA: D® program were pain medication users, and 38% were nonusers. Pain medication use is thus common in patients receiving guideline recommended first line care. NSAIDs (34%) were most often used, followed by paracetamol (21%) and opioids (7%).

Pain medication users in our study were more frequently women and had more sick leave in the last year, higher pain intensity, lower physical health and mental health, and lower pain self-efficacy. We consider the type of characteristics in line with expectations of pain medication intake. Tables 2 and 3 show the data of the full cohort as well as of the subgroups with either knee OA or Hip OA separately. The data show that medication use was rather similar in both subgroups of patients as was the association of the use of pain medication with the VAS pain score at 3 months follow-up.

We had special interest in the impact of pain medication use on outcome at follow up in our real life–setting. The results indicated that medication use was associated with outcomes at 3 months follow-up. However, the magnitude of the differences between pain medication users and non-users were less than 10 mm on a 0–100 scale. If we considered the potential impact of the use of different types of pain medication (paracetamol, NSAIDs, opioids) the differences became somewhat larger, but never exceeding 15 mm on the 0–100 scale, which is a difference of uncertain clinical importance and may indicates that the impact of pain medication use in our study group was relatively small. Although our study design does not allow firm conclusions, our findings indicate that people with hip or knee OA who are benefitting from treatment with a standardized exercise program and patient education may not (additionally) benefit from using pain medications.

Table 2. Mean pain intensity (0–100 scale) at baseline and at 3 months follow-up in patient groups according to pain medication use

	Mean Baseline Pain Intensity/SD on 0–100 Scale	Mean Pain Intensity/SD on 0–100 Scale at 3 Months	Unadjusted Model		Model Adjusted for Age, Sex, BMI, Education, Number of Comorbidities, Pain Intensity, and Pain Self-Efficacy at Baseline	
			β (95% CI)	R^2	β (95% CI)	R^2
Non-users (n = 4254)	38.8 ± 20.7	27.0 ± 19.3	Reference	10%	Reference	28%
Persistent users (n = 5043)	54.3 ± 20.5	42.5 ± 21.6	15.4 (14.6; 16.3)		7.7 (6.9; 8.6)	
Users before GLAD® (n = 3533)	48.1 ± 20.7	29.5 ± 20.1	2.4 (1.5; 3.3)		−2.1 (−3.0; −1.2)	
Users during GLAD® (n = 1002)	45.2 ± 20.3	38.6 ± 21.2	11.5 (10.1; 13.0)		8.2 (6.9; 9.6)	
Knee (n = 10,312)						
Nonusers (n = 3262)	39.2 ± 20.8	26.9 ± 19.2	Reference	10%	Reference	29%
Persistent users (n = 3610)	54.7 ± 20.5	42.2 ± 21.5	15.3 (14.4; 16.3)		7.4 (6.4; 8.4)	
Users before GLAD® (n = 2724)	48.5 ± 20.8	29.2 ± 20.1	2.3 (1.2; 3.3)		−2.4 (−3.4; −1.4)	
Users during GLAD® (n = 716)	45.7 ± 20.6	39.0 ± 21.1	12.1 (10.5; 13.8)		8.7 (7.1; 10.2)	
Hip (n = 3520)						
Nonusers (n = 992)	37.3 ± 20.2	27.5 ± 19.5	Reference	10%	Reference	27%
Persistent users (n = 1433)	53.0 ± 20.5	43.1 ± 21.9	15.6 (13.9; 17.3)		8.4 (6.7; 10.1)	
Users before GLAD® (n = 809)	46.8 ± 20.2	30.5 ± 20.1	3.0 (1.1; 5.0)		−1.3 (−3.2; 0.5)	
Users during GLAD® (n = 286)	43.7 ± 19.7	37.5 ± 21.6	10.1 (7.3; 12.8)		6.9 (4.2; 9.5)	

The (un)adjusted models show the association between pain medication use (nonusers as reference) and outcome after 3 months (complete case analysis; n = 13,832).

BMI = body mass index; CI = confidence interval.

Table 3. Mean pain intensity (0–100 scale) at baseline and at 3 months follow-up in patient groups according to type of pain medication use

	Mean Baseline Pain Intensity/SD on 0–100 Scale	Mean Pain Intensity/SD on 0–100 Scale at 3 Months	Unadjusted Model		Model Adjusted for Age, Sex, BMI, Education, Number of Comorbidities, Pain Intensity and Pain Self-Efficacy at Baseline	
			β (95% CI)	R^2	β (95% CI)	R^2
Nonusers (n = 7787)	43.0 ± 21.2	28.1 ± 19.7	Reference	11%	Reference	28%
Paracetamol users (n = 2454)	51.3 ± 20.7	39.2 ± 20.8	11.1 (10.2; 12.0)		7.0 (6.1; 7.9)	
NSAID users (n = 2988)	52.3 ± 20.5	42.3 ± 21.6	14.1 (13.3; 15.0)		9.8 (9.0; 10.6)	
Opioid users (n = 603)	61.0 ± 20.7	50.1 ± 22.3	22.0 (20.3; 23.7)		12.5 (10.9; 14.1)	
Knee (n = 10,312)						
Nonusers (n = 5986)	43.4 ± 21.3	27.9 ± 19.6	Reference	11%	Reference	29%
Paracetamol users (n = 1760)	52.1 ± 20.6	39.3 ± 20.7	11.4 (10.3; 12.4)		7.0 (6.0; 8.1)	
NSAID users (n = 2154)	52.7 ± 20.5	42.0 ± 21.5	14.0 (13.0; 15.0)		9.6 (8.6; 10.6)	
Opioid users (n = 412)	61.0 ± 21.5	50.5 ± 22.0	22.6 (20.5; 24.6)		13.0 (11.0; 14.9)	
Hip (n = 3520)						
Non-\users (n = 1801)	41.5 ± 20.7	28.8 ± 19.9	Reference	10%	Reference	27%
Paracetamol users (n = 694)	49.4 ± 20.8	39.1 ± 21.2	10.2 (8.4; 12.1)		6.8 (5.0; 8.6)	
NSAID users (n = 834)	51.0 ± 20.4	43.1 ± 21.8	14.2 (12.5; 16.0)		10.0 (8.3; 11.6)	
Opioid users (n = 191)	61.2 ± 18.9	49.4 ± 23.1	20.6 (17.5; 23.7)		11.1 (8.1; 14.1)	

The (un)adjusted models show the association between type of pain medication use (non-users as reference) and outcome after 3 months (complete case analysis; n = 13,832).

BMI = body mass index; CI = confidence interval.

Although there are many studies on efficacy of pain medication for people with OA as well as studies on pain medication use in various patient populations, we are not aware of similar studies evaluating the impact of pain medication use in people with OA receiving guideline recommended first line care in a real life setting. There is ample discussion about the relative efficacy of opioids versus other analgesics for people with OA. Recent systematic reviews and meta-analysis report minimal to no clinical benefit of opioids versus placebo for people with hip and knee OA [16, 17]. A recent network meta-analysis including 192 trials and > 100.000 patients recommended topical diclofenac to be the first pharmacological option due to its positive effect and safety profile. The authors of this network meta-analysis further concluded that the clinical benefit of opioids did not outweigh their potential harm [18].

Limitations: In this short report we focused on pain as our primary outcome measure. We acknowledge that other outcomes such as functional changes, global improvement and quality of life are also of interest to investigate the potentially broader impact of pain medication use. We measured pain using the 0–100 VAS for pain as it a valid, reliable and responsive measure which is often used [19]. Of importance is also that we asked the patients to rate their pain intensity specific for the index joint and thus not the overall bodily pain. We do acknowledge, however, that pain experience is multi-dimensional and not all aspects are covered when using VAS-pain.

Another limitation relates to the measurement of medication use. This was measured at two time points without information on the frequency and dosage of the medication. We also had no data on actual use during the 3 months but were limited to the data collected at two time-points: baseline and 3 months follow-up.

Conclusion

This study demonstrated that many patients (62%) use pain medication when entering an education and exercise program, and that medication users and nonusers differ on a range of characteristics. Pain medication use before and during such program is associated with the pain intensity at 3 months follow-up. However, patients in all subgroups, either using or not using pain medications, irrespective of the type of pain medication, improved over time, and the magnitude of the difference between groups was small and probably not clinically important.

Supplementary Data

Supplementary data are available at *Pain Medicine* online.

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