

Group education and exercise is feasible in knee and hip osteoarthritis

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ABSTRACT

INTRODUCTION: Clinical practice does not reflect current clinical guidelines recommending an early multimodal non-surgical treatment for knee and hip osteoarthritis (OA). The purpose of this study was to examine the feasibility of such an initiative (Good Life with osteoArthritis in Denmark (GLA:D) in persons with mild to moderate knee and/or hip OA-related pain.

MATERIAL AND METHODS: This was a pilot study with a 36-patient cohort and three-month follow-up. The treatment consisted of two 1.5-hour sessions of patient education and six weeks of individualized supervised neuromuscular exercise according to the previously published NEuroMuscular Exercise programme. The primary outcome was pain on a visual analogue scale (0-100). Secondary outcomes were Euro-Quality-of-Life – 5 Dimensional form (EQ-5D), Arthritis Self-Efficacy Scale (ASES), 30-second chair stand test, timed 20-meter walk and body mass index. Furthermore, compliance was registered.

RESULTS: Thirty-four (94%) participants completed the follow-up. There were significant improvements ($p < 0.05$) in the primary outcome pain (-16 mm), in time in the 20-meter walk test (-0.7 s), in EQ-5D (0.053), in ASES (7.3) and in the number of complete chair stands (1.4). Compliance was high in relation to both patient education and exercise.

CONCLUSION: The pilot study demonstrated that the intervention is feasible and that it is possible to implement GLA:D in clinical care. Introducing GLA:D nationwide could improve the adherence to clinical guidelines and the quality of the treatment of knee and hip OA.

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TRIAL REGISTRATION: not relevant.

Osteoarthritis (OA) is a major cause of chronic musculoskeletal pain and functional disability in the elderly population [1]. Up to 40% of people aged 65 years or older suffer from knee or hip pain associated with OA [2].

Early-stage OA treatment strategies could be a way to deal with the rising number of persons with OA [3, 4]. It is recommended that the treatment of knee and hip OA should include multiple treatment modalities [5, 6] and that the treatment should be tailored according to the characteristics of the individual [5]. According to ex-

isting evidence, a combination of patient education, exercise and weight loss is recommended as first choice of treatment in knee and hip OA [5, 6]. However, clinical practice does not reflect these recommendations [7-9]. This could be due to the fact that a comprehensive approach is needed to successfully implement guidelines [10].

In a recently published annual report on the national Swedish initiative called Better Management of patients with OsteoArthritis (BOA), the results of such an initiative were presented. BOA was found to be both feasible and effective in reducing pain and improving quality of life and, furthermore, the initiative gave rise to the creation of a national quality register with a unique possibility to register characteristics of persons with early-stage knee and hip OA [9]. The elements in this promising initiative could be key factors in implementing the evidence-based recommendations in clinical practice in Denmark and other countries.

The purpose of this pilot study was to examine the feasibility of the evidence-based, individualized, non-surgical treatment programme Good Life with osteoArthritis in Denmark (GLA:D) in patients with mild to moderate knee and/or hip OA-related pain.

MATERIAL AND METHODS

Study design

This was a pilot study with a three-month follow-up.

Participants

A total of 36 consecutive patients (31 women, 56-65-year-old), forming part of a free treatment programme that the Municipality of Aalborg offered to employees with non-acute knee (27 patients), hip (six patients) or knee and hip (three patients) pain participated in the study (Table 1). The exclusion criteria were comorbidities influencing physical activity (e.g. neurological diseases), dementia and lack of understanding of Danish language.

The study was conducted in accordance with the Helsinki Declaration.

Process of translation and differences between Good Life with osteoArthritis in Denmark and Better Management of patients with OsteoArthritis.

All the material used in this pilot study was translated

ORIGINAL ARTICLE

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 TABLE 1

Baseline characteristics.

Characteristic	Baseline
Women, n (%)	31 (86)
Age, years, mean (range)	59.3 (56-65)
Duration of symptoms, months, mean (range)	53.9 (2-384)
Body mass index, kg/m ² , mean (range)	27.1 (21-40)
Pain, visual analogue scale 0-100, mean (range)	41.5 (11-85)
Problems with hand and/or fingers, n (%)	17 (47)

ed directly from the Swedish BOA material. The translation was conducted by the first author. When any doubt occurred during the translation process, the people behind BOA were contacted.

The elements of GLA:D were the same as the elements in BOA except for the exercise and the functional tests and the fact that patient education was organized in two instead of three sessions. The exercise in BOA is not specified, while the exercise in GLA:D was a supervised neuromuscular exercise programme called NEuroMuscular EXercise (NEMEX) employing biomechanical and neuromuscular principles tailored to patients with OA of the knees or hips [11]. NEMEX was integrated into GLA:D to enhance the quality of the intervention, since NEMEX has previously been shown to be feasible in patients with knee and hip OA [11]. Additionally, functional tests were implemented in the outcome measures in GLA:D. This was done to allow for evaluation of the effects of GLA:D on functional performance.

Good Life with osteoArthritis in Denmark

The long-term purposes of the GLA:D initiative are to introduce first-line treatments for hip and knee OA nationwide in Denmark and to establish a national quality register for patients with mild to moderate knee and/or hip OA-related pain.

The core element of GLA:D was two 1.5-hour sessions of patient education. Afterwards, the participants could choose whether they preferred six weeks of NEMEX in classes or at home (Figure 1). GLA:D was delivered by two physiotherapists trained and educated in the GLA:D concept and by a dietician and a patient with OA.

Patient education

The contents of the patient education were evidence-based and its overall focus was to increase the knowledge of the participants regarding OA and how to treat it. Furthermore, patient education focused on involving the participants.

The first session featured information on the diag-

nosis, its aetiology, risk factors and symptoms in OA. Additionally, the first session introduced possible treatments.

The second session featured an extended description of treatment of OA (focus on exercise and how to lose weight) and help to self-help.

NeuroMuscular EXercise

NeuroMuscular EXercise (NEMEX) is a training programme based on biomechanical and neuromuscular principles [11] that aims at restoring a neutral functional alignment of the lower extremities (Figure 2) by improving sensorimotor control and obtaining compensatory functional stability. Neuromuscular exercise is thus different from strength training (aiming at improving muscle force) and aerobic training (aiming at improving cardiorespiratory fitness). The exercise programme was adopted from the original paper [11].

Each exercise session lasted 60 minutes and was completed twice weekly for six weeks. Each participant was monitored individually to ensure that the training was tailored to the individual's level of function and pain. Participants were admitted continuously to the class. In this way experienced participants could motivate novices to keep exercising. Participants were encouraged to continue the exercise after the six weeks.

Since pain is a significant problem for patients with OA [12], the participants were requested to monitor their pain during training in collaboration with the physiotherapists using a visual analogue scale (VAS). Pain up to five was "acceptable" during and after the exercise session; furthermore, pain should subside to "pain as usual" the morning after an exercise session. If pain did not subside, the level of training was reduced [11].

Outcome measures

The primary outcome was the change from baseline to the three-month follow-up in mean pain intensity during the last month (VAS 0-100).

Secondary outcome measures were the Euro-Quality-of-Life – 5 Dimensional form (EQ-5D) as a measure of health-related quality of life and an average score for the two subscales Pain and Other symptoms of the Arthritis Self-Efficacy Scale (ASES) as a measure of self-efficacy (10-100 with terminal descriptors of "very uncertain" and "certain"). The 30-second chair stand test and time in the 20-meter walk test were used as measures of functional performance, while change in body mass index from baseline to follow-up was applied to evaluate the effect on weight.

Furthermore, intake of pain medication (paracetamol or nonsteroidal anti-inflammatory drugs) at baseline and at the three-month follow-up was registered.

The outcome measures were evaluated in a stand-

ardized manner by the same physiotherapist at baseline and at the three-month follow-up.

Other measures

Compliance with exercise was monitored in the class-based exercise as the total number of exercise sessions completed out of the expected 12 sessions. Compliance with the elements of GLA:D in general was registered for all participants completing the three-month follow-up on a five-point scale assessing the adherence to the treatment (never, every month, every week, every day, several times a day). Additionally, the participants were asked to rate their opinion of GLA:D on a five-point scale (very bad, bad, neither bad nor good, good, very good).

Database

As with BOA, GLA:D holds a database where baseline characteristics and outcome measures have been registered.

Statistical analysis

Data were found to be normally distributed, confirmed by Q-Q plots. Paired samples t-test was applied in the statistics. Only one joint per individual was included in the statistical analysis (the joint most affected by pain). p-values < 0.05 were considered significant. All analyses were performed using SPSS Statistics (Version 19).

Trial registration: not relevant.

RESULTS

Outcome measures

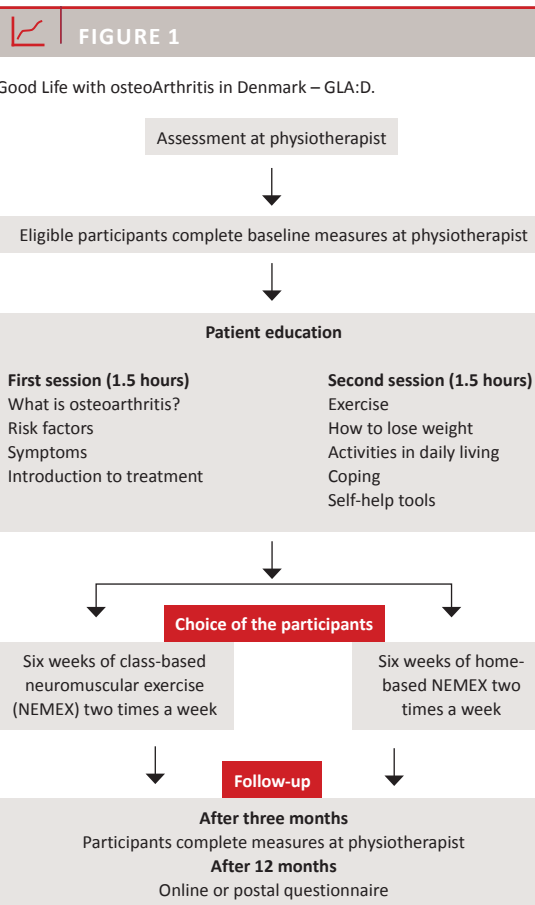
Thirty-four (94%) of 36 participants completed the three-month follow-up. One of the two participants not completing the follow-up stopped for unknown reasons, while the other was not available for follow-up. There was a significant improvement in the primary outcome of pain (−15.9), in time in the 20-meter walk test (−0.7s.), in EQ-5D (0.053), in ASES (7.3) and in the number of complete chair stands (1.4) (Table 2).

Sixteen participants reported using pain medication at baseline, while only eleven were using pain medication at the three-month follow-up.

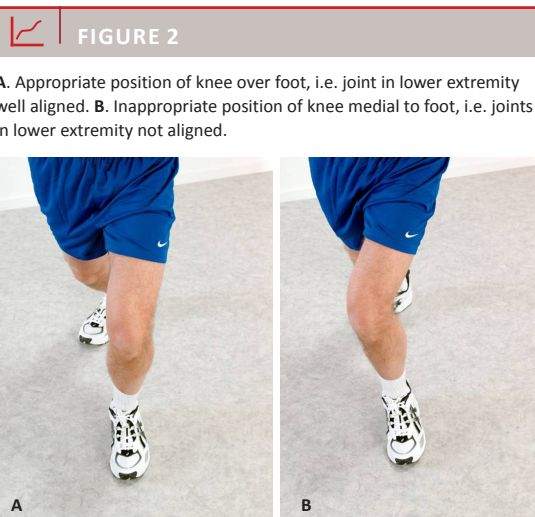
Other measures

Thirty-one (91%) of the participants completing the three-month follow-up participated in the class-based exercise. Of these, 27 (87%) participated in 10-12 sessions, three (10%) participated in 7-9 sessions and one (3%) participated in 1-6 of the total 12 sessions.

A total of 22 (65%) of 34 participants used what they had learned in GLA:D every day or several times a day, eight (24%) used it every week and four (12%) never used it.



NEMEX = NEuroMuscular Exercise.



Source: The figure is previously published in an appendix to [11]. Permission to reprint the figure was granted by the authors.

Thirty-four (100%) of the participants rated their participation in GLA:D as a good or very good experience.

 TABLE 2

Difference in outcome measures from baseline to the three-month follow-up.

Outcome measure	Baseline, mean (SD)	3-month follow-up, mean (SD)	Difference, mean (95% CI)	p-value
Pain, VAS	41.5 (17.0)	26.2 (20.0)	-15.9 (-24.1 to -7.8)	< 0.001
EQ-5D	0.779 (0.086)	0.825 (0.104)	0.053 (0.021 to 0.085)	0.002
ASES	73.6 (18.5)	77.8 (15.3)	7.3 (1.1 to 13.5)	0.023
Chair stand test, n	13.8 (3.2)	15.1 (3.4)	1.4 (0.3 to 2.4)	0.012
20-meter walk, s	11.1 (1.2)	10.4 (1.3)	-0.7 (-1.0 to -0.4)	< 0.001
BMI, kg/m ²	27.1 (4.5)	27.0 (4.8)	-0.1 (-0.4 to 0.2)	0.539

ASES = Arthritis Self-Efficacy Scale; BMI = body mass index; CI = confidence interval; SD = standard deviation; VAS = visual analogue scale.

DISCUSSION

To our knowledge, GLA:D is the first Danish attempt to implement early multimodal evidence-based non-surgical treatment in patients with OA-related pain using a comprehensive approach fitted to the specific setting and group of patients. The pilot study showed that GLA:D reduced pain and intake of pain medication and improved function, quality of life and self-efficacy in selected patients with mild to moderate knee and/or hip OA-related pain. Furthermore, the pilot study showed that it was possible to implement GLA:D in Denmark and that the programme was feasible.

The results from this pilot study are in accordance with the findings in BOA with improvements in pain and quality of life [9]. However, the improvement in pain in GLA:D was larger than in BOA and larger than the Minimum Clinically Important Improvement [13]. Since the exercise in BOA is not specified and managed at each centre, one could speculate that the difference in effect between GLA:D and BOA may be owed to the fact that GLA:D has integrated NEMEX. Neuromuscular exercise aims to improve the functional alignment of the lower extremity by improving sensorimotor control and obtaining compensatory functional stability [11, 14]. Knee injuries (anterior cruciate ligament injury, meniscal injury, cartilage damage) cause functional instability [15, 16]. These limitations are also present in people with OA [17, 18]. Another reason may be that quadriceps strengthening exercise, a cornerstone of traditional treatment for OA, is ineffective in reducing pain in people with varus malalignment [19], which is frequently seen in patients with knee OA, maybe because strengthening exercise only increases muscle strength and not necessarily the functional alignment and stability. Our findings support the applicability of neuromuscular exercise in OA [11, 14].

In some of the centres participating in BOA, patients were recruited while on a waiting list to see an orthopaedic surgeon. Around two thirds of 368 consecutive patients considered their improvement to be so

good that they no longer needed to consult an orthopaedic surgeon, while the vast majority of the remaining third of patients had surgery within one year [9]. Although Swedish numbers may not predict observations in Denmark, since orthopaedic referral patterns presumably vary widely between countries and over time, this interesting finding underpins the multiple, possible advantages that may be obtained by introducing a standardized non-surgical treatment package for patients with OA in clinical care. Introduction of GLA:D or similar packages may decrease the number of visits to secondary care and may reduce the number of operations performed. Last, but not least, those patients who do undergo surgery are well informed and well prepared for surgery and may also have a better outcome.

Since around 20% of those who undergo a total knee replacement and over 9% of those who undergo total hip replacement experience little or no improvement in symptoms [20], there is a need to further improve the treatment algorithm for OA. If patients, as recommended [5, 6], go through the elements of GLA:D before seeing an orthopaedic surgeon, one could speculate that this may improve the quality of the treatment of OA.

Another promising perspective of GLA:D is its database. The BOA database, which was initiated in 2008, has now been changed into a national quality register, which gives the possibility to register characteristics of persons with early-stage knee and hip OA [9]. If GLA:D was expanded nationwide in Denmark, it would provide a unique opportunity to follow patients from onset of symptoms until a possible joint replacement by comparing their data with data in The Danish Knee Arthroplasty Registry and The Danish Hip Arthroplasty Registry. Since patients seen in primary care in Denmark cannot be identified based on diagnoses, this database would constitute a new possibility to follow clinical pathways for patients seeking medical care for painful hips or knees for many years before having total joint replacement. This could lead to improved quality of treatment of OA since it would indicate which patients would benefit from which treatment and give the possibility to predict treatment outcome. This would ultimately lead to further individualization of the treatment and an improvement of the treatment algorithm for OA. The generalizability of our findings is limited by the middle-aged study population. Future studies should investigate the effects of this initiative in a randomized design with long-term follow-up comparing the effects with the effects of usual care in patients with mild to moderate knee and/or hip OA.

CONCLUSION

The pilot study showed that the GLA:D treatment was feasible in selected patients with mild to moderate knee

and/or hip OA-related pain and that it would be possible to implement GLA:D treatment in Denmark. Making GLA:D a nationwide initiative could be a significant step towards implementing evidence-based clinical guidelines and improving the quality of the treatment of knee and hip OA.

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