

## THE USE OF NONPHARMACOLOGICAL APPROACHES IN MANAGEMENT OF OSTEOARTHRITIS

### NEMEDIKAMENTINIS OSTEOARTRITO GYDYMAS: BŪDAI IR METODAI

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#### SANTRAUKA

*Reikšminiai žodžiai:* osteoartritas, nemedikamentinis gydymas, fiziniai veiksniai, fiziniai pratimai, paciento mokymas.

Osteoartrito gydymo tikslas yra malšinti skausmą, gerinti sąnario funkcinę būklę, mažinti neįgalumą, mokyti pacientą objektyviai suvokti ligos sukeltus simptomus ir jos gydymo tikslus. Gausūs mokslinės literatūros duomenys, pagrįsti klinikiniais ir epidemiologiniais tyrimais, analizuoja medikamentinio osteoartrito gydymo būdus. Tačiau dar nepakanka moksliskai pagrįstų tyrinėjimų, vertinančių nemedikamentinę šios ligos korekciją, efektyvumą ir santykį su galimu nepageidaujamu poveikiu. Nustatyta, kad mokymas, fizinis aktyvumas ir antsvorio mažinimas labai pagerina pacientų, sergančių osteoartritu, sveikatos būklę. Įrodyta, kad tinkamų fizinių pratimų skyrimas yra ekonomiškai vertingas ir gali daryti poveikį gydymo rezultatams, todėl būtina šį nemedikamentinį osteoartrito valdymo būdą taikyti kuo didesniai pacientų skaičiui. Nustatyta, kad geriausias poveikis būna tuo atveju, kai kartu taikomos kelios nemedikamentinio gydymo priemonės. Nemedikamentinis gydymas turi būti taikomas atsižvelgiant į paciento būklės kitimą ir ligos eigą. Pacientas turi būti aktyvus gydant ligą. Tačiau reikia atlikti daugiau įrodymais pagrįstų tyrimų, vertinančių ne tik nemedikamentinės osteoartrito korekcijos efektyvumą, bet ir galimą nepageidaujamą poveikį. Šiuo metu literatūroje skelbiama nemažai mokslinės informacijos apie nemedikamentinį kelio sąnario osteoartrito gydymą. Vis dėlto reikia atlikti daugiau tyrinėjimų, vertinančių nemedikamentinės korekcijos poveikį pacientams, sergantiems klubo sąnario osteoartritu. Atsižvelgiant į pasaulinius laimėjimus, daugiau mokslinių tyrimų, vertinančių nemedikamentinio gydymo efektyvumą pacientams, sergantiems osteoartritu, turėtų būti atlikta Lietuvoje.

#### ABSTRACT

*Key words:* osteoarthritis, nonpharmacological treatment, physical factors, exercises, education.

Management of the patients with osteoarthritis should be comprehensive aimed to reduce pain, maintain or improve joint function, decrease disability, and educate the patients about the disease and its therapy. Multitudinous scientific data, based on the clinical and epidemiologic trials, are analyzing pharmacological treatment of osteoarthritis; however there is lack of evidence-based studies, evaluating nonpharmacological management of this disease, its effectiveness and harm. It is established that patients' education, physical activity and weight reduction improve health status for patients with osteoarthritis. Mode of exercise delivery has cost implications and may influence overall outcome. The challenge remains to increase the proportion of patients exercising. Combinations of treatment modalities for symptom control are better than isolated therapy for symptom relief. The disease course and patient's requirements often change over time, thus requiring a periodic review and readjustment of therapy. Patient has to be involved in management process of his disease. It is necessary to perform more evidence based trials evaluating nonpharmacological correction of osteoarthritis, furthermore, the need for changing attitudes in the assessment of safety of nonpharmacological treatment is required. The data bases are better provided with scientific information related to the nonpharmacological treatment of knee osteoarthritis, therefore more clinical trials should be carried out to evaluate the effectiveness of nonpharmacological correction of hip osteoarthritis. Also, more investigations evaluating effectiveness of the nonpharmacological management of OA should be carried out in Lithuania.

#### INTRODUCTION

Management of the patients with osteoarthritis (OA) should be comprehensive aimed to reduce pain, maintain or improve joint function, decrease disability, and educate

the patients about the disease and its therapy. Nonpharmacological aspects of the treatment program are as important as drug therapy and often-even more important than pharmacological correction. Indeed, many nonpharmacological

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therapies are fundamental to the treatment of any chronic diseases and should be instituted concurrently with pharmacological therapy; however management of the patients with OA should be started with nonpharmacological modalities. Several nonpharmacological interventions for OA are in different stages of development, investigation, and application. Such interventions capitalize on current knowledge of the causes of symptoms, disease progression, and disability in patients with OA. Many nonpharmacological interventions are low in cost and incorporate self-management approaches or home-based activities and, as such, may ultimately have substantial public health impact [1–4].

Unfortunately, nearly all tested and used strategies for management of OA are drugs or surgery, or both. In a recent meta-analysis, 60% of trials assessed the effect of drug treatment and 26% evaluated surgical procedures [5, 6]. The lack of studies evaluating rehabilitation techniques, including bracing and other self management techniques, has been labeled „research agenda bias” and partly is a consequence of lucrative opportunities for drug development. Although the positive results of the effectiveness and safety of drugs used for OA treatment are reported in evidence-based resources; however the data of some clinical studies performed to investigate the toxicity and adverse event profile of the most commonly used existing treatments (such as nonsteroidal anti-inflammatory drugs (NSAIDs), cyclo-oxygenase-2 (COX 2) inhibitors, and total joint replacement) present an unfavorable effect of these treatment strategies compared with conservative interventions such as exercise, weight loss, braces, and orthotics [5, 7–9].

On the contrary, there is little evidence – based data evaluating effectiveness of nonpharmacological modalities: the best studied and most successful nonpharmacological interventions are patient education, self-management, and exercise. There is some evidence for the pain-relieving efficacy of thermotherapy, transcutaneous electrical nerve stimulation (TENS), but not of electrotherapy overall, acupuncture, homeopathy, or manual therapy. The value of interventions aimed at improving function and maximizing independence (occupational therapy, walking aids, workplace adaptation) is also unclear [3, 10].

The Osteoarthritis Research Society International (OARSI) Treatment Guidelines Committee provided a review estimating 25 carefully worded, evidence-based, international consensus recommendations, whose covered the use of 12 non-pharmacological modalities for the management of hip and knee OA: education and self-management, regular telephone contact, referral to a physical therapist, aerobic, muscle strengthening and water-based exercises, weight reduction, walking aids, knee braces, footwear and insoles, thermal modalities, TENS and acupuncture. According the obtained data, the efficacy of some modalities

of therapy was confirmed by the results of randomized controlled trials (RCTs) published between January 2002 and 2006. These included exercise (strengthening effect size (ES) 0,32, (95% confidence interval (CI):0,23-0,42), aerobic ES 0,52 (95% CI:0,34-0,70) and water-based ES 0,25 (95% CI:0,02-0,47). Examples of other treatment modalities where recent trials failed to confirm efficacy included ultrasound ES 0,06 (95% CI:-0,39-0,52), massage ES 0,10 (95% CI:-0,23-0,43) and heat/ice therapy ES 0,69 (95% CI:-0,07-1,45) [11, 12].

Ethgen et al. amplified that studies assessing the reporting of harm have focused mainly on pharmacological treatment, whereas nonpharmacological treatment represents a wide range of management strategies proposed to patients, also authors compared the reporting of harm in reports of trials of both pharmacological and nonpharmacological treatment. The analysis of 193 articles were made and data on harm were more described in pharmacological treatment reports than in nonpharmacological management reports in reporting adverse events OR (odds ratio) 5,2 (95% CI:2,1-12,9), reporting withdrawals due to adverse events OR 4,6 (95% CI:2,0-10,9), reporting severity of adverse events OR 3,7 (95% CI:1,5-9,1), and allocating space for describing harm OR 1,6 (95% CI:1,2-2,3). It was concluded, that the lack of reporting harm in trials assessing nonpharmacological treatment in rheumatic disease (hip or knee OA and rheumatoid arthritis (RA)) is an important barrier to evaluating the benefit-harm balance of nonpharmacological treatments [13].

***Patients' attitude to the nonpharmacological management of OA:*** Although much has been written about the roles of nonpharmacological modalities for managing OA, limited information is available on how often these treatments are recommended and used by patients. A survey of 326 participants aged over than 55 years was conducted in Ontario, Canada, in order to determine the use of nonpharmacological treatment by patients with OA and RA, also to indicate the reasons why the studied participants stopped the treatment, and to establish the factors associated with the use of nonpharmacological modalities. Only 73% of patients with OA had been told to use nonpharmacological modalities, but 98,8% had tried at least 1 type of treatment. Most patients continued to use treatment once they had tried before. Exercise at home or in a group setting (33,4%) and weight management (31,3%) were the most often recommended treatments to patients with OA, one-third of the OA group had been advised to try land exercises, similar trends was noticed in the use of heat or cold, also assistive devices. Only 5% of patients with OA had been told to attend education classes. The common reason for stopping treatment was the lack of access to programs and motivation, also an increased pain in joint. Among patients

with OA who used methods for weight management, the most often cited reason for stopping was poor compliance. These findings indicate that patient should not only be informed about the use of nonpharmacological treatments, but should also be referred to the appropriate rehabilitation professional if further instructions are required. Furthermore, it should be noted that appropriate use of nonpharmacological treatment could be enhanced through patient education [14]. The data of other study whose aim was to examine the prevalence of self-reported use of common nonpharmacological therapies (exercise, physical therapy, and dietary/herbal supplements) among 205 participants, also patient and physician-related predictors of use, presented a relatively low use of exercise, physical therapy (PT), and dietary/herbal supplements: only 46% of subjects reported current use of exercise, 11% reported using PT, and 12%-dietary/herbal supplements. However, females were more likely to report exercising than males ( $p < 0,05$ ), and patients with greater disease severity were more likely to report current use of PT ( $p < 0,001$ ). Physician demographic characteristics were not strong predictors of patients' use of therapy, but physician recommendation for exercise and PT predicted patients' use ( $p < 0,05$ ). These results signal the importance of interventions aimed at educating both patients and physicians about these therapies as well as outcomes of previously reported trial [15].

According to the data of Lithuanian researchers, exercise, joint protection, assistive devices and heat were the methods most commonly used among patients with OA and RA, however more patients with OA than with RA used assistive devices ( $p = 0,042$ ) and considered assistive devices to be the most effective self-management method ( $p = 0,016$ ) [16].

**Physicians' attitude to the nonpharmacological management of OA:** Recommendations for management of knee OA were developed in 2000 by the American College of Rheumatology (ACR) and the European League Against Rheumatism (EULAR). These recommendations, which particularly concern pharmacological and nonpharmacological first line therapeutic management of outpatients with knee OA, were expected to be useful in improving practice. Nevertheless, difficulties with the implementation of recommendations have been well documented in many medical fields. One of the main EULAR 2000 recommendations "Optimal management of knee OA requires a combination of pharmacological and nonpharmacological treatment modalities. Nonpharmacological treatment of knee OA should include regular education, exercise, appliances (sticks, insoles), and weight reduction" was used to assess adherence to the recommendations. In order to document adherence to the EULAR 2000 recommendations for knee OA, concerning nonpharmacological first line management, and to

identify factors influencing adherence to the recommendations a prospective study was carried out. Data were obtained from 967 physicians and 2430 patients. The EULAR 2000 recommendations were familiar to 79% of the family physicians; 99% agreed with the nonpharmacological part and adherence was 74,8%. Factors increasing adherence to the nonpharmacological recommendation were patient body mass index (BMI) more than 35 kg/m<sup>2</sup> OR 0,11 (95% CI: 0,06-0,21), patient's stated preference for a treatment OR 0,43 (95% CI: 0,55-0,97), and physician's regular continuance of medical education OR 0,76 (95% CI: 0,59-0,98); however, patient's age and duration of symptoms decreased adherence. Nonpharmacological treatments were prescribed often, regardless of whether the physician knew that these prescriptions were recommended by EULAR [17].

#### **Nonpharmacological modalities of OA management:**

**Exercise:** Exercise has generated interest as an important nonpharmacological treatment for symptomatic OA of the hip and knee. It increases aerobic capacity, muscle strength, and endurance and also facilitates weight loss; therefore people capable of exercise should be encouraged to take part in a low impact aerobic exercise programme (walking, cycling, or swimming or other aquatic exercise). Effect sizes in exercise interventions are small to moderate for pain and functional improvements and are similar to those observed for improvement in pain for NSAIDs. However, in contrast to NSAIDs, exercise interventions are safe and improve function through a direct effect on muscle strength and function. Both aerobic and strengthening exercises seem to be equally effective in regard to pain and function in patients with OA. In obese patients with OA, a combination of diet and exercise may be advantageous for optimal benefits in health-related quality-of-life and physical function. An exercise program under the supervision of a physical therapist combines warm-up using heat, range of motion (ROM) exercise, followed by quadriceps muscle-strengthening techniques. This program leads to reduction in pain, improves function and reduces symptoms of depression [4, 5, 18].

A recent study has demonstrated positive effects of moderate exercise on glycosaminoglycan content in knee cartilage. This 4-month trial conducted in 45 individuals demonstrated that a supervised, moderate, thrice weekly exercise program yielded an improvement in knee cartilage glycosaminoglycan content, as assessed by magnetic resonance imaging, compared with no intervention. However, the precise implications of these findings for changes in OA cartilage over time remain to be established in future long-term studies [19, 20]. It is thought that a quadriceps muscle-strengthening exercise program can not only reduce pain, but also improves sleep in severely demented elder with OA, however this presupposition should be confirmed

by further clinical trials [21]. The data of pragmatic, factorial randomized controlled trial of 786 participants aged 45 years or over, indicated that at 24 month follow-up, highly significant reduction in knee pain were apparent for the pooled exercise groups compared with the non-exercise group, similar improvements were observed at 6, 12 and 18 months. The reduction in pain was greater the closer patients adhered to the exercise plan. The observed group which had only a regular telephone contact (to monitor symptoms of OA and to offer simple advice on the management of knee pain) did not reduce pain [22]. Although a variety of exercise programs for knee OA have been described in the literature generally focusing on improving quadriceps strength, little attention has been paid to improving the strength of other lower limb muscle groups such as the hip abductors and adductors, therefore some researchers underline to investigate the influence of the strengthening of hip abductor and adductor muscles on joint loading and/or OA-related symptoms [23]. Whereas the most trials suggest data presenting knee OA, the lack of evidence on the effectiveness of exercise for OA joints other than the knee is of concern [24].

A recent trial has shown that group exercise sessions are as effective as individual exercise therapy (standardized response mean 0,42 for individual exercise versus 0,65 for group therapy), which suggests that the cost effectiveness of exercise interventions can be greatly improved, making exercise more attractive as a long-term intervention [24, 25].

The data of a pilot study of 11 subjects with knee OA enrolled to *Iyengar yoga* classes (90-minute classes once a week for 8 weeks) presented statistically significant reduction in WOMAC (Western Ontario and McMaster Universities index) Pain, WOMAC Physical function comparing participants' pre-course and post-course status. Arthritis Impact Measurement Scale 2 (AIMS2) Affect Component and other criteria suggested by The American College of Rheumatology Guidelines also indicated a statistically significant improvement in their scores. Yoga may provide a feasible treatment option for previously yoga-naive, obese patients over 50 years old and offers potential reductions in pain and disability caused by knee OA, however further studies should compare yoga to other nonpharmacological interventions for knee OA, such as patient education or quadriceps-strengthening exercises [26].

**Self-management strategies:** *Knee taping* is a simple, inexpensive method believed to relieve pain by improving alignment of the patellofemoral joint and/or unloading inflamed soft tissue, but there is little evidence to justify its use. Therefore, a randomized single blind controlled trial (87 participants with OA) with three intervention arms (therapeutic tape, control tape, and no tape) of three weeks' duration and three week follow up was performed. A si-

gnificant association was evident between intervention and change in pain at three weeks ( $p=0,000$ ), with 73% (21/29) of the therapeutic tape group reporting improvement compared with 49% (14/29) of the control tape group and 10% (3/29) of the no tape group. Significantly greater improvement in pain and disability was observed on most secondary outcomes in the therapeutic tape group compared with the no tape group. Benefits of therapeutic tape were maintained three weeks after stopping treatment. These results indicate that the therapeutic knee taping is an efficacious treatment for the management of pain and disability in patients with knee OA; however the further studies evaluating the long term effects of knee taping are required [27].

An experimental study was carried out where participants were randomly assigned to an experimental group ( $n=65$ ) or a one-year wait list control group ( $n=48$ ). Participants in the experimental group participated in an intervention called *I'm taking Charge of my Arthritis*. The intervention was based on cognitive-behavioral principles and consisted of one-hour weekly home visits by a practitioner (occupational therapist, physiotherapist, social workers, kinesiologist) for six consecutive weeks. The impact of the intervention on five health behaviors was examined, namely exercise, relaxation activities, leisure activities, everyday coping behaviors, also use and accessibility of social networks. Adjusted multilevel modeling analyses indicated that from pre to post intervention, experimental participants significantly increased their weekly frequency of exercise and relaxation activities, so it is concluded that a self-management intervention can successfully improve involvement in exercise and relaxation among housebound older adults with arthritis, however patients' psychological state and economic situation is important how people become involved in such programs and the degree which they change their habits [28]. Although there is evidence that psychosocial interventions (educational programs, coping skills training, cognitive behavioral therapy) improve coping and self efficacy, reduce psychological distress and pain, at least in short term, but more studies into their effectiveness are required. Cost-effectiveness has yet to be adequately assessed [29].

**Physical factors:** *Pulsed ultrasound* has been recommended for acute pain and inflammation, and *continuous ultrasound* for the treatment of restricted movement; however, two meta-analyses conclude that there is poor evidence to support either the use or the nonuse of therapeutical ultrasound in the treatment of a variety of musculoskeletal conditions for pain control. Some authors also found no support in the literature for ultrasound treatment before therapeutic exercise in the management of knee pain. It also was found no benefit over placebo or short-wave diathermy for patients with knee OA for pain relief, range of motion, or functional status. An insufficient evidence for the inclu-

sion of ultrasound in the treatment of patellofemoral pain syndrome was found as well. Therefore, for a more definitive answer on the use of therapeutic ultrasound in OA and in patellofemoral pain, large trials will be necessary [3].

*Pulsed electromagnetic field therapy*, considered a remedy for delayed-union fractures, has also been suggested as an alternative treatment for OA. Physical stress on bone leads to the appearance of piezoelectric potentials that may act as the transduction signals that promote bone formation. It is thought that similar mechanism exists in cartilage that stimulates chondrocytes to increase proteoglycan synthesis. According the data of a double-blind placebo-controlled randomized trial lasting 6 weeks, there was no significant difference between active *magnet pulse* and sham treatment groups in pain reduction, WOMAC score, or EuroQol score, however, paired analysis of follow-up observations on each patient showed significant improvements in the actively treated group, but not in the control group in the WOMAC overall score, WOMAC physical function, and EuroQol score at the end of the study, compared with baseline [3, 30].

A randomized controlled trial of *magnetic bracelets* for relieving pain in OA of the hip and knee was carried out with 194 people aged 45-80 years with OA of the hip and knee in order to determine the effectiveness of commercially available magnetic bracelets for pain control. Participants were divided to the groups wearing a standard strength static bipolar magnetic bracelet, a weak magnetic bracelet, or a non-magnetic (dummy) bracelet for 12 weeks. Mean pain scores were reduced more in the standard magnet group than in the dummy group (mean difference 1,3 points, 95% CI:0,05- 2,55), so it was concluded that pain from OA of the hip and knee decreases wearing magnetic bracelets, however, it is uncertain whether this response is due to specific or non-specific (placebo) effects. Further work is needed to replicate these findings and determine whether the effect extends beyond 12 weeks [31].

*Electrical stimulation* therapy was found to have a small to moderate effect on outcomes for knee OA, all statistically significant. The clinical benefit ranged from 13% to 23% greater with active treatment versus placebo was established. This therapy appeared to be less effective for cervical spine OA with modest relative improvements in pain score and in joint pain or motion, and only one outcome for knee OA was clinically important. These findings demonstrate the need for larger studies to examine whether the statistically significant results translate to clinically important benefits [3]. One of other two randomized, placebo-controlled trials of *pulsed electrical stimulation* (PES) reported the better response to intervention for the active device than placebo for the outcome measures of pain, physical function, physician global assessment and duration of joint stiffness in

the morning ( $p < 0,05$ ); however no statistically significant difference was observed for range of knee joint motion, joint tenderness, joint swelling, knee circumference and 50 feet walking time. The second PES trial has reported significant and clinically meaningful results in patient global assessment, a pain and symptom visual analogue scale (VAS), WOMAC function and stiffness and overall WOMAC score. Only WOMAC pain change between the placebo and active groups did not reach statistical significance. Whereas, there are limited studies examining the effects of PES and no randomized, controlled trials studying this particular modality over a longer time period have been found, the longer term effectiveness of PES should be investigated; however the data analysis of a prospective cohort study of 288 (95 men, 193 women) patients who had used the PES device from 16 to more than 600 days (mean: 889 hours) presented an improvement in all efficacy variables ( $p < 0,001$ ), also a dose-response relationship between effect size and hours of usage was observed as cumulative time increased to more than 750 hours and an improvement in patient or physician global assessment occurred in 59% of patients who used it less than 750 hours, and for 73% of those who used it more than 750 hours. An economic analysis of a sub-group of patients showed that 45,3% reduced NSAIDs use by 50,0% or more, so a highly optimized PES device successfully attenuated knee OA symptoms in patients who had failed non-surgical therapy [32, 33, 34].

Meta-analysis of efficacy of physical agents within 1-4 weeks and at follow up at 1-12 weeks after the end of knee OA treatment indicated that within 4 weeks of the commencement of treatment, manual acupuncture, static magnets and ultrasound therapies did not offer statistically significant short-term pain relief over placebo. *Pulsed electromagnetic fields* offered a small reduction in pain of 6,9 mm (95% CI:2,2-11,6; (n=487)). *TENS*, including *interferential currents*, *electro-acupuncture* (EA) and *low level laser therapy* (LLL) offered clinically relevant pain relieving effects of 18,8 mm (95% CI:9,6-28,1; (n=414)), 21,9 mm (95% CI:17,3-26,5; (n=73)) and 17,7 mm (95% CI:8,1-27,3; (n=343)) on VAS respectively versus placebo control. In a subgroup analysis of trials with assumed optimal doses, short-term efficacy increased to 22,2 mm (95% CI:18,1-26,3) for TENS, and 24,2 mm (95% CI:17,3-31,3) for LLL on VAS. Follow-up data up to 12 weeks were sparse, but positive effects seemed to persist for at least 4 weeks after the course of LLL, EA and TENS treatment was stopped, so it might be concluded that TENS, EA and LLL administered with optimal doses in an intensive 2-4 weeks treatment regime, offer clinically relevant short-term pain relief for knee OA. The safety of the physical therapies seems good as no serious adverse events were reported in the 36 RCTs which were reviewed in meta-analysis. The advantage

of physical agents is that they can be used in combination with drug therapy, thus reducing drug dosage and adverse effects. EA, TENS and LLL have potential to become useful adjuncts in knee OA pain management [35]. However there is lack of evidence – based information related to the effectiveness of usage of physical modalities among patients with OA in Lithuania.

**Orthopedic devices:** If “loading” is a major cause in development and progression of OA, then “unloading” may be able to prevent and slow down progression of OA. *Varus* and *valgus* malalignments have been related to medial and lateral knee OA. The course of disease may be controlled to a certain extent by the use of footwear. Reducing the *varus* or *valgus* moment in medial compartmental OA of the knee during gait may play a role in reducing the symptoms of knee OA. Foot *orthoses* may change the mechanical forces on the knee and influence the femoro-tibial angle.

The use of a *lateral wedge insole* is believed to lower medial compartment load and reduce lateral tensile forces by enhancing valgus correction of the calcaneus, whether or not *varus* deformity at the knee is lessened, however the less positive effects have been reported as well. No difference between groups in the percentages of patients with improvement in pain, stiffness, or physical function scale scores were found comparing the effects of lateral wedge insoles and neutral wedge insoles (as control) in patients with medial knee OA. A recent study reported that the efficacy of laterally wedged insoles with subtalar strapping had appeared to be superior compared with a traditional shoe insert wedged insole. It is thought that an optimal duration of daily wear for a strapped insole is 5–10 hours daily. Although it is concluded that pain, stiffness and physical symptoms may improve, and the use of NSAIDs may decrease using footwear, however the indications and limitations of wedged insoles should be analyzed in more details as an adverse effect was observed in a few recent studies.

*Braces* may be used to transfer load to the normal, or at least less diseased, compartment of the knee in order to reduce pain from the narrowed, arthritic compartment. The goal of the *valgus* “unloading” brace in medial knee OA is to produce an abduction moment to shift the joint contact force away from the stressed medial compartment. Knee braces that stabilize the knee joint and provide a valgus stress have been shown to improve pain and function in patients with medial compartment knee OA. Radiographic investigations have supported that a proper designed OA knee brace can change the alignment of the limb and reduce the load on the medial compartment enough to result in radiographic separation of the medial femoral-tibial joint space. According the data of several studies, the use of a brace during gait resulted in reduction of the *varus* moment by a few degrees. Other study was carried out to compare

an effectiveness of a simple hinged brace and a *valgus* corrective brace in 12 patients with OA of the medial compartment. Significant improvements in pain, function and loading and propulsive forces were seen with the *valgus* brace, however the simple brace only showed improvements in loading forces, but both braces improved confidence and function during gait. It may be concluded that the use of knee bracing appears to be clinically effective, however the long-term effectiveness and with that the indication and limitations have to be established [3, 36, 37].

**Acupuncture:** Although *acupuncture* may reduce pain and improve both physical function and related quality of life, and is widely used by patient, there is little evidence of its effectiveness [38, 39]. There are some evidence-based data in the biomedical databases that acupuncture plus routine care is associated with a marked clinical improvement in patients with chronic OA-associated pain of the knee or hip. A randomized controlled trial was performed to investigate the effectiveness of acupuncture in addition to routine care, compared with routine care alone, in the treatment of 3633 patients with chronic pain due to OA of the knee or hip. Patients (357 participants) were randomly allocated to undergo up to 15 sessions of acupuncture in a 3-month period or to a control group (355 patients) receiving no acupuncture. Another group of 2921 patients who did not consent to randomization underwent acupuncture treatment. All patients were allowed to receive usual medical care in addition to the study treatment. Clinical OA severity WOMAC and health-related quality of life Short Form 36 (SF 36) were assessed at baseline and after 3 months and 6 months. At 3 months, the WOMAC had improved significantly in the acupuncture group compared with the control group. Similarly, quality of life improvements were more pronounced in the acupuncture group versus the control group ( $p < 0,001$ ). Treatment success was maintained through 6 months [39]. According the data of Witt et al. who investigated the efficacy of acupuncture compared with minimal acupuncture and with no acupuncture in patients with OA of the knee, after 8 weeks of treatment, pain and joint function were improved significantly more by WOMAC scores compared with acupuncture than with minimal acupuncture or no acupuncture in patients with OA of the knee. However, this benefit had decreased over time [40].

The results based on the data of multicentre, randomized trial performed to investigate the benefit of adding acupuncture (true and non-penetrating acupuncture) to a course of advice and exercise delivered by physiotherapists for pain reduction in patients with OA of the knee indicated that there were no additional improvement in pain scores. Compared with advice and exercise alone there were small, statistically significant, improvements in pain intensity and

unpleasantness at two and six weeks for true acupuncture and at all follow-up points for non-penetrating acupuncture. The small additional benefits from acupuncture were unlikely to be clinically significant, mostly short lived, and could not be attributed to specific acupuncture needling effects; therefore further research is needed to investigate the possible mechanisms of acupuncture, particularly the role of expectancy effects [41].

Otherwise, acupuncture, as a complementary therapy to pharmacological treatment of OA of the knee, was more effective than pharmacological treatment alone. This conclusion was based on the data of a randomized, controlled trial carried out to analyze the efficacy of acupuncture as a complementary therapy to the pharmacological treatment (diclofenac). Acupuncture treatment provided to the intervention group (true acupuncture plus diclofenac) significantly reduced pain, improved physical capability and psychological functioning compared with control group (placebo acupuncture plus diclofenac). In order to evaluate the duration of improvement, more clinical trials should be performed investigating the observation period after treatment [42]. Every clinical trial should attempt to explain the use of the intervention, but many acupuncture trials fail to offer any meaningful rationale, so a physiologic hypothesis from investigators should be sought [43].

**Complementary and alternative medicine (CAM) of nutritional supplementation:** There is preliminary evidence that deficiency of vitamins, such as vitamin D, may be found in patients with OA, for which nutritional supplementation may have impact on relieving symptoms or preventing progression of disease. The available data suggest nutritional supplementation of avocado-soybean unsaponifiables, glucosamine, and chondroitin have a role in the symptomatic relief of OA, and may have structural effects as well. To date, it has not been well established whether any of these substances are capable of complete chondroprotection. This is important to establish since they are widely available and well-tolerated, and may play a significant role in the management of OA. The available *in vitro* and *in vivo* animal and human data suggest nutritional factors may influence the course of OA through a wide variety of mechanisms. Nutritional supplementation remains an important area to investigate in the management of this multifactorial disease [44].

**Hydrotherapy:** Several studies suggest a beneficial overall effect of *spa therapy* in chronic musculoskeletal diseases. An open controlled study investigated the effects of spa therapy at Bourbonne-Les-Bains, France, in 102 patients older than 50 years with hip or knee OA or low back pain. Quality of life was assessed three times at intervals of 4 weeks, twice before and once immediately after 3 weeks of spa therapy, using the Duke Health Profile (five dimensions

and five dysfunctions). Spa therapy was associated with significant improvements in overall quality of life ( $p=0,004$ ), self-esteem ( $p=0,009$ ), and pain ( $p=0,01$ ). Authors concluded that these findings had supported those of other studies conducted in France and in other European countries. They indicated that patients report meaningful improvements in their quality of life after spa therapy; however more evidence-based studies have to be carried out to confirm received data [45].

## CONCLUSIONS

- 1) Three main interventions can reduce arthritis impact: self-management education, physical activity, and weight management. Patients should be thoroughly educated about the natural course of OA. Self-management education programs are proven to reduce pain and depression, delay disability, improve self-efficacy, physical function, and quality of life, and reduce healthcare costs [46, 47].
- 2) Appropriate exercising also decreases pain, improves function, and delays disability. Benefits appear to be additive when exercise is delivered with other interventions such as weight loss. Mode of exercise delivery has cost implications and may influence overall outcome. It appears that supervised exercise sessions are superior to home exercises for pain reduction [46, 47, 48].
- 3) Some treatment modalities (e.g., heat, ice, and electrical stimulation) may make the patient feel better but may not be sufficient alone. Most modalities and therapies do not change the outcome. Combinations of treatment modalities for symptom control are better than isolated therapy for symptom relief [47].
- 4) The low interest in the safety of nonpharmacological management of rheumatic diseases, including OA and RA is established; therefore the need for changing attitudes in the assessment of safety of nonpharmacological treatment is required [13].
- 5) More clinical trials should be performed in order to evaluate the effectiveness of nonpharmacological management of OA among patients with hip OA.
- 6) More investigations evaluating effectiveness of the nonpharmacological management of OA should be carried out in Lithuania.

## REFERENCES

1. Lane NE, Thompson JM. Management of Osteoarthritis in the Primary-Care Setting: An Evidence-Based Approach to Treatment. *Am J Med* 1997; 103(6A): 25–30.
2. Brandt KD. The Importance of Nonpharmacologic Approaches in Management of Osteoarthritis. *Am J Med* 1998; 105(1B):39–44.
3. Sharma L. Nonpharmacologic management of osteoarthritis. *Rheumatol* 2002; 14: 603–7.

4. DeAngelo N, Gordin V. Treatment of Patients With Arthritis-Related Pain. *JAOA* 2004; 104(11): 2–5.
5. Hunter DJ, Felson DT. Osteoarthritis. *BMJ* 2006; 332: 639–42.
6. Tallon D, Chard J, Dieppe P. Relation between agendas of the research community and the research consumer. *Lancet* 2000; 355: 2037–40.
7. Jordan KM, Arden NK, Doherty M, Bannwarth B, Bijlsma JW, Dieppe P, et al. EULAR Recommendations 2003: an evidence based approach to the management of knee osteoarthritis: report of a task force of the standing committee of international clinical studies including therapeutic trials (ESCISIT). *Ann Rheum Dis* 2003; 62: 1145–55.
8. Denapienė G, Irnius A, Venalis A, Čepulienė I, Baranauskienė A, Želviienė R, et al. Evaluation of the effect of specific cyclooxygenase-2 inhibitor rofecoxib (vioxx) to the big joints, and safety to the gastroduodenal mucosa for the patients with osteoarthritis. *Medicina (Kaunas)* 2001; 37(10): 1047–52.
9. Gumbrevičius G, Milašius A, Sveikata A. Nesteroidiniai vaistai nuo uždegimo – pasirinkimas tarp žalingo poveikio virškinimo traktui bei galimo širdies ir kraujagyslių pažeidimo (Nonsteroidal anti-inflammatory agents – choice between disturbances of gastrointestinal tract and cardiovascular toxicity). *Kaunas (Medicina)* 2006; 42(5): 429–39.
10. Sarzi-Puttini P, Cimmino MA, Scarpa R, Caporali R, Parazzini F, Zaninelli A. Osteoarthritis: an overview of the disease and its treatment strategies. *Semin Arthritis Rheum* 2005; 35(1): 1–10.
11. Zhang W, Moskowitz RW, Nuki G, Abramson S, Altman RD, Arden N, et al. OARSI recommendations for the management of hip and knee osteoarthritis, part I: critical appraisal of existing treatment guidelines and systematic review of current research evidence. *Osteoarthritis Cartilage* 2007; 15(9): 981–1000.
12. Zhang W, Moskowitz RW, Nuki G, Abramson S, Altman RD, Arden N, et al. OARSI recommendations for the management of hip and knee osteoarthritis, Part II: OARSI evidence-based, expert consensus guidelines. *Osteoarthritis Cartilage* 2008; 16(2): 137–62.
13. Enthgen M, Boutron I, Baron G, Giraudeau B, Sibilia J, Ravaud P. Reporting of Harm in Randomized, Controlled Trials of Nonpharmacologic Treatment for Rheumatic Disease. *Ann Intern Med* 2005; 143: 20–5.
14. Li LC, Maetzel A, Pencharz JN, Maguire L, Bombardier C, and The community hypertension and arthritis project (CHAP) team. Use of Mainstream Nonpharmacologic Treatment by Patients With Arthritis. *Arthritis & Rheumatism (Arthritis care & Research)* 2004; 51(4): 203–9.
15. Hsieh JB, Dominick KL. Use of non-pharmacological therapies among patients with osteoarthritis. *Aging Clin Exp Res* 2003; 15(5): 419–25.
16. Veitienė D, Tamulaitienė M. Comparison of self-management methods for osteoarthritis and rheumatoid arthritis. *J Rehabil Med* 2005; 37(1): 58–60.
17. Denoed L, Mazieres B, Payen-Champenois C, Ravaud P. First line treatment of knee osteoarthritis in outpatients in France: adherence to EULAR 2000 recommendations and factors influencing adherence. *Ann Rheum Dis* 2005; 64: 70–74.
18. Bischoff HA, Roos EM. Effectiveness and safety of strengthening, aerobic, and coordination exercises for patients with osteoarthritis. *Curr Opin in Rheumatol* 2003; 15: 141–44.
19. Roos EM, Dahlber L. Positive effects of moderate exercise on glycosaminoglycan content in knee cartilage: a four-month, randomized, controlled trial in patients at risk of osteoarthritis. *Arthritis Rheum* 2005; 52: 3507–14.
20. Pelletier JP, Martel-Pelletier J, Raynauld JP. Most recent developments in strategies to reduce the progression of structural changes in osteoarthritis: today and tomorrow. *Arthritis Research & Therapy [serial online]* 2006 March [date cited]. Available from URL: <http://www.arthritis-research.com/content/8/2/206>.
21. Tsai PF, Richards K, FitzRandolph R. Feasibility of using quadriceps-strengthening exercise to improve pain and sleep in a severely demented elder with osteoarthritis—a case report. *BMC Nursing [serial online]* 2002 Oct [date cited] Available from URL: <http://www.biomedcentral.com/1472-6955/1/1>.
22. Thomas KS, Muir KR, Doherty M, Jones AC, O'Reilly SC, Bassey EJ. Home based exercise programme for the knee pain and knee osteoarthritis: randomized controlled trial. *BMJ* 2002; 325: 752–56.
23. Bennell KL, Hunt MA, Wrigley TV, Hunter DJ, Hinman RS. The effects of hip muscle strengthening on knee load, pain, and function in people with knee osteoarthritis: a protocol for a randomized, single-blind controlled trial. *BMC Musculoskeletal Disorders [serial online]* 2007 Dec [date cited] Available from URL: <http://www.biomedcentral.com/1471-2474/8/121>.
24. Dieppe P, Brandt KD. What is important in treating osteoarthritis? Whom should we treat and how should we treat them? *Rheum Dis Clin N Am* 2003; 29: 687–716.
25. Fransen M, Crosbie J, Edmonds J. Physical therapy is effective for patients with osteoarthritis of the knee: a randomized controlled trial. *J Rheumatol* 2001; 28: 156–64.
26. Kolasinski SL, Garfinkel M, Tsai AG, Matz W, Van Dyke A, Schumacher R. Iyengar Yoga for Treating Symptoms of Osteoarthritis of the Knees: A Pilot Study. *J Altern Complement Med* 2005; 11(4): 689–93.
27. Hinman RS, Crossley KM, McConell J, Bennell KL. Efficacy of knee tape in the management of osteoarthritis of the knee: blinded randomised controlled trial. *BMJ* 2003; 327: 135–40.
28. Nour K, Laforest S, Gauvin L, Gignac M. Behavior change following a self-management intervention for housebound older adults with arthritis: an experimental study. *International Journal of Behavioral Nutrition and Physical Activity [serial online]* 2006 March [date cited]. Available from URL: <http://www.ijbnpa.org/content/3/1/12>.
29. Backman CL. Arthritis and pain. Psychosocial aspects in the management of arthritis pain. *Arthritis Research & Therapy [serial online]* 2006 Aug [date cited]. Available from URL: <http://arthritis-research.com/content/8/6/221>.
30. Pipitone N, Scott DL. Magnetic pulse treatment for knee osteoarthritis: a randomized, double-blind, placebo-controlled study. *Curr Med Res Opin* 2001; 17: 190–6.
31. Harlow T, Greaves C, White A, Brown L, Hart A, Ernst E. Randomised controlled trial of magnetic bracelets for relieving pain in osteoarthritis of the hip and knee. *BMJ* 2004; 329: 1450–4.
32. Garland D, Holt P, Harrington JT, Caldwell J, Zizic T, Cholewczynski J. A 3-month, randomized, double-blind, placebo-controlled study to evaluate the safety and efficacy of a highly optimized, capacitively coupled, pulsed electric stimulator in patients with osteoarthritis of the knee. *Osteoarthritis and Cartilage* 2007; 15(6): 630–7.
33. Fary RE, Carroll GJ, Briffa TG, Gupta R, Briffa NK. The effectiveness of pulsed electric stimulation (E-PES) in the management of osteoarthritis of the knee: a protocol for a randomised controlled trial. *BMC Musculoskeletal Disorders [serial online]*, 2008 Feb [date cited]. Available from URL: <http://www.biomedcentral.com/1471-2474/9/18>.
34. Farr J, Mont MA, Garland D, Caldwell JR, Zizic TM. Pulsed electrical stimulation in patients with osteoarthritis of the knee: follow up in 288 patients who had failed non-operative therapy. *Surg Technol Int* 2006; 15: 227–33.
35. Bjordal JM, Johnson MI, Lopes-Martins RA, Bogen B, Chow R, Ljunggren AE. Short-term efficacy of physical interventions in osteoarthritic knee pain. A systematic review and meta-analysis of randomised placebo-controlled trials. *BMC Musculoskeletal Disorders [serial online]* 2007 June [date cited]. Available from URL: <http://www.biomedcentral.com/1471-2474/8/51>.
36. Lafeber FP, Intema F, Van Roermund PM, Marijnissen AC. Unloading joints to treat osteoarthritis, including joint distraction. *Curr Opin Rheumatol* 2006; 18: 519–25.
37. Toda Y, Tsukimura N. A 2-year follow-up of a study to compare the efficacy of lateral wedged insoles with subtalar strapping and

- an in-shoe lateral wedged insoles in patients with *varus* deformity osteoarthritis of the knee. *Osteoarthritis Cartilage* 2005; 14: 231–37.
38. MacAuley D. Managing osteoarthritis of the knee. *BMJ* 2004; 329: 1300–1.
  39. Witt CM, Jena S, Brinkhaus B, Liecker B, Wegscheider K, Willich SN. Acupuncture in patients with osteoarthritis of the knee or hip: a randomized, controlled trial with an additional non-randomized arm. *Arthritis Rheum* 2006; 54(11): 3375–7.
  40. Witt C, Brinkhaus B, Jena S, Linde K, Streng A, Wagenpfeil S, et al. Acupuncture in patients with osteoarthritis of the knee: a randomised trial. *Lancet* 2005; 366(9480): 136–43.
  41. Foster NE, Thomas E, Barlas P, Hill JC, Young J, Manson E, et al. Acupuncture as an adjunct to exercise based physiotherapy for osteoarthritis of the knee: randomised controlled trial. *BMJ* 2007; 335: 436–47.
  42. Vas J, Mendez C, Perea-Milla E, Vega E, Pandero MD, Leon JM, et al. Acupuncture as a complementary therapy to the pharmacological treatment of osteoarthritis of the knee: randomized controlled trial. *BMJ* 2004; 329: 1216–21.
  43. Moffet H. How might acupuncture work? A systematic review of physiologic rationales from clinical trials. *BMC Complementary and Alternative Medicine* [serial online] 2006 June [date cited]. Available from URL: <http://www.biomedcentral.com/1472-6882/6/25>.
  44. Wang Y, Prentice LF, Vitetta L, Wluka AE, Cicuttini FM. The Effect of Nutritional Supplements on Osteoarthritis. *Alternative medicine review* 2004; (9)3: 275–96.
  45. Guillemin F, Virion JM, Escudier P, De Talancé N, Weryha G. Effect on osteoarthritis of spa therapy at Bourbonne-les-Bains. *Joint Bone Spine* 2001; 68(6): 499–503.
  46. Theis KA, Helmick CG, Hootman JM. Arthritis burden and impact are greater among U.S. women than men: intervention opportunities. *J Womens Health (Larchmt)* 2007; 16(4): 441–53.
  47. Hinton R, Moody RL, Davis AW, Thomas SF. Osteoarthritis: diagnosis and therapeutical consideration. *Am Fam Physician* 2002; 65(5): 841–8.
  48. Bennell K, Hinman R. Exercise as a treatment for osteoarthritis. *Curr Opin Rheumatol* 2005; 17(5): 634–40.
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