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A multidisciplinary and multidimensional intervention for patients with hand osteoarthritis

MJPM Stukstette¹, TJ Hoogeboom¹, R de Ruiter¹, P Koelmans¹, E Veerman¹, AA den Broeder¹, H Cats¹, JW Bijlsma², J Dekker³ and CHM van den Ende¹

This series of articles for rehabilitation in practice aims to cover a knowledge element of the rehabilitation medicine curriculum. Nevertheless they are intended to be of interest to a multidisciplinary audience. The competency addressed in this article is ‘The trainee will be able to understand the importance of mutual goal setting in the management of hand osteoarthritis, to demonstrate knowledge about treatment options for hand osteoarthritis and to understand the principles of the systematic development of complex interventions’.

Abstract

Background: Although several guidelines recommend that treatment programmes in patients with hand osteoarthritis should be both multidisciplinary and multidimensional, currently no such treatment programme for hand osteoarthritis has been described. Therefore the aim of this study was to systematically develop a multidisciplinary and multidimensional non-pharmacological treatment programme and to give a detailed description on the content of this treatment programme.

Development of the treatment programme: The programme was developed in phases. In a preclinical theoretical phase, disease-specific problems, current evidence and the influence of patient characteristics on the benefit of interventions were explored. In a modelling phase, the treatment programme was designed.

Treatment programme: The programme contains an individual intake, four weekly nurse and occupational therapist-led group sessions and a booster session after six months. Treatment components of the programme are self-management, daily home exercises to enhance joint mobility and grip strength and education about ergonomic principles. The treatment programme is tailored to the needs of individual patients with hand osteoarthritis.

Conclusions: A non-pharmacological multidisciplinary and multidimensional treatment programme for patients with hand osteoarthritis was developed. Further research is necessary to investigate the

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effectiveness of this treatment programme. Currently, the programme is being evaluated in an ongoing randomized clinical trial.

Keywords

Osteoarthritis, OA, Hands, Rheumatology, Rehabilitation, Occupational Therapy, Physiotherapy

Background

Osteoarthritis is the most common joint disease, frequently affecting the joints of the hands.¹ In elderly people (>70 years) the prevalence of symptomatic hand osteoarthritis is estimated to be 26% for women and 13% for men.² Symptomatic hand osteoarthritis has a great impact on daily functioning³ and health-related quality of life.⁴ Patients suffer from pain and joint stiffness and grip strength is reduced by more than 40% compared to healthy persons.³ Also, on average, hand mobility is restricted in all digits, in particular digits I, II and III.⁵ Furthermore, patients with hand osteoarthritis suffer from fatigue, limitations in activities and participation.^{2,3,5-12}

Pharmacological treatment recommended for hand osteoarthritis includes paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs), and symptomatic slow-acting drugs for osteoarthritis (SYSADOAs).² Pharmacological treatments are symptomatic, as none of these treatments have been shown to slow down the features of osteoarthritis. As a result, people with hand osteoarthritis are commonly referred to non-pharmacological treatment modalities to improve functional performance.¹³ A combination of pharmacological and non-pharmacological treatment modalities is also strongly advised in the EULAR recommendations for treatment of patients with hand osteoarthritis. However, no evidence and no guidelines are available about the optimal content and mix of non-pharmacological components.¹⁴

In a cross-sectional study on activity limitations and participation restrictions in patients with hand osteoarthritis it was concluded that activity limitations are closely associated with hand impairments, while performance and satisfaction are more influenced by personal factors.³

As a consequence, Kjekken et al. recommend that rehabilitation programmes should be provided by different health professionals (multidisciplinary) and focus on multiple dimensions (activities, participation and personal factors) of the International Classification of Functioning (ICF).³ A rehabilitation programme that consists of a number of components that may act both independently and inter-independently (such as in both multidisciplinary and multidimensional interventions) is called a complex intervention.¹⁵ To our knowledge, up till now no such programme for hand osteoarthritis has been developed. This is confirmed in recent systematic reviews in which treatment modalities for hand osteoarthritis were evaluated.¹⁶⁻¹⁹ None of the interventions evaluated were both multidisciplinary and multidimensional.

In the development of complex interventions some recommendations must be taken into account. First, several authors underline that a systematic approach to the development of a complex intervention leads to more effective interventions.^{20,21} Furthermore, Haynes et al. indicate that the development of an evidence-based treatment programme should synthesize information from three key sources with equal weighting, namely expert opinions, patient perspectives and research evidence.²² A framework for the development and evaluation of complex interventions to improve patients' health, has been proposed by the Medical Research Council (MRC).^{15,23}

The aim of the current study is twofold. The first is to describe how we systematically developed a complex non-pharmacological treatment programme for patients with hand osteoarthritis, following a stepwise approach, with reference to the MRC framework^{15,23} and the recommendations of Haynes et al. to incorporate expert

opinions, patient perspectives and research evidence.²² A problem in implementing research evidence in clinical practice is a lack of treatment details in the description of trials and reviews.²⁴ Therefore the second aim of this manuscript is to give a detailed description on the content of the treatment programme developed. The evaluation of the effectiveness of this multidisciplinary treatment programme is in progress (Dutch Trial Register trial number NTR1191). This paper does not provide the results of the evaluation of the intervention.

Development of the treatment programme

According to the framework for the development and evaluation of complex interventions of the MRC we distinguished three phases in the development and evaluation of the treatment programme:^{15,23} (1) a preclinical theoretical phase to identify disease-specific problems, explore the current evidence for treatment modalities, and explore the influence of patients' characteristics on the benefit of intervention programmes; (2) a modelling phase to formulate treatment goals, to weigh and prioritize the relevance of potential components and to decide on the set-up of the treatment programme (content, number and frequency of sessions, duration of sessions); and (3) an exploratory phase to investigate the effectiveness of the treatment programme. With respect to Haynes et al.²² we incorporated expert opinions, patient perspectives and research evidence in each step. The steps we followed during the different phases are described in more detail below.

In the preclinical and theoretical phase specific problems due to hand osteoarthritis and the evidence base for non-pharmacological treatment were explored. Disease-specific problems due to hand osteoarthritis were identified by a literature search in MEDLINE from 1990 to October 2007. Because research into the effectiveness of non-pharmacological treatment in patients with hand osteoarthritis is scarce, we extended our search to studies on the effectiveness of

non-pharmacological treatment in patients with hip or knee osteoarthritis. We also analysed the results of interviews of 50 patients with hand osteoarthritis referred to the multidisciplinary hand clinic of the Sint Maartenskliniek, a specialized rheumatology hospital in the Netherlands. Interviews were conducted according to the Canadian Occupational Performance Measure (COPM)²⁵ as part of routine care. The COPM is a semi-structured interview specially designed to identify and prioritize patient-specific problematic activities.²⁵ In an expert panel meeting the results of the interviews and the findings from the literature were discussed and supplemented in the case of missing information. The expert panel consisted of two rheumatologists, an occupational therapist, a specialized nurse, a physiotherapist and two physiotherapy researchers of the Sint Maartenskliniek.

According to Newman et al., knowledge of the influence of patients' characteristics on treatment outcomes is needed to improve the benefit of intervention programmes.²⁶ Determinants of pain and limitations of activities were identified on the basis of a broad literature search concerning hand, hip and knee osteoarthritis.

The modelling phase started with a meeting of the expert panel to formulate treatment goals. Assumptions used in the formulation of treatment goals were: (1) treatment goals should match specific problems due to hand osteoarthritis as formulated in the preclinical and theoretical phase; (2) treatment goals should not conflict; and (3) treatment goals should be realistic and feasible in a rheumatology outpatient centre.

Then, components of the treatment programme matching treatment goals were selected utilizing information of the preclinical theoretical phase. Identified components and treatment elements were discussed with patients with hand osteoarthritis.

After formulating treatment goals and selection of components the format of the treatment programme was designed by the expert panel. The expert panel decided for each treatment component on the build-up and time and number

of sessions needed to attain treatment goals. A slide presentation for each treatment session, a therapist manual and a patient manual were developed (available in Dutch, send request to the author).

In a pilot with seven patients referred for multidisciplinary treatment due to hand osteoarthritis, patients and therapists were asked to comment on the treatment programme and materials used. Based on this pilot the protocol was adapted and refined.

Content and justification of the treatment programme

Treatment goals

Hand osteoarthritis has consequences on the levels of body functions and structures (pain, joint stiffness, fatigue, reduced muscle strength and joint mobility^{2,3,5-12,27-32}), activities (e.g. opening jars and bottles, doing and undoing buttons, riding a bike) and participation (self-care, leisure activities, commuting, and job participation).^{2,3,5,32} After synthesizing the information from the literature with the results of our inventory of problematic activities, the following goals covering all these levels were formulated:

- the patient has control over pain and joint stiffness;
- the patient has control over fatigue;
- the patient is able to maintain/improve muscle strength and joint mobility;
- the patient can anticipate difficulties in limitations in activities;
- the patient can anticipate difficulties on the participation level.

Treatment programme

Individual intake. Only certain subgroups of patients participating in non-pharmacological interventions successfully reach and maintain target physical performance levels on the short term. One of the most frequently mentioned reasons for these phenomena is lack of patient

motivation.²⁹ Patient motivation is closely linked to 'goal ownership', in other words, the degree to which patients consider the target health behaviour as their own self-chosen personal goal.³³⁻³⁵ Therefore, setting individual treatment goals is an important component of the treatment programme in order to enhance the effectiveness of treatment.³⁶⁻³⁸

Experienced limitations in activities and participation will vary among patients and are also influenced by the environment in which patients interact. Therefore, it was decided that patients have to be facilitated in formulating their own personal treatment goals in an individual intake session with a duration of one and a half hours. During the intake the COPM interview is conducted. The COPM is unique in that it obtains patient-specific information in a structured way, it helps patients in prioritizing their own specific problems and helps them formulating their own treatment goals.²⁵ It is a very helpful tool to bring the theory of a client-centred approach into practice and provides patient-specific information which cannot be obtained with other instruments that measure health.³⁹ On the basis of the COPM, treatment goals are preferably set following the SMART principle, that is: goals should be specific, measurable, jointly set, realistic and time based.

Multidisciplinary group-based sessions. Given the broad range of activities and functions possibly affected by hand osteoarthritis the intake is followed by four weekly multidisciplinary sessions led by a hand therapist and a specialized rheumatology nurse. To ensure both group learning and sufficient individual guidance the treatment programme is delivered in a group setting, with a minimum of 3 and a maximum of 9 participants per group. Six months after finishing the treatment programme a booster session is planned to reinforce adherence. The treatment components are described below. The treatment programme is summarized per session in Table 1.

Table 1. Final treatment programme

| Session | Duration (hours) | Clinicians | Treatment components | Content of the session |
|---------|------------------|--|---|---|
| Intake | 1.5 | Occupational therapist | Screening Formulating individual treatment goals | Screenings questionnaire Semi-structured interview (COPM) |
| 1 | 2.5 | Occupational therapist and specialized nurse | Self-management to enhance self-efficacy to cope with pain, limitations in activities and participation Ergonomic principles Daily home exercises to improve strength and hand mobility | Discussion about common problems due to hand osteoarthritis Education about osteoarthritis and treatment options (medication, splints, exercise) Ergonomic principles Practising exercises to increase grip strength and joint mobility Instruction to fill in a diary (activities, pain, fatigue and joy) |
| 2 | 3 | Occupational therapist and specialized nurse | Self-management to enhance self-efficacy to cope with pain, fatigue, limitations in activities and participation Ergonomic principles Daily home exercises to improve strength and hand mobility | Discussion about the relation of daily activities versus pain, fatigue joy and limitations in activities by means of discussing diaries Education and discussion about strategies to cope with pain, fatigue and limitations in activities (balance between rest and physical activity, individual use of medication, use of compensatory strategies in daily activities, use of aids, use of splints) Demonstration of aids and practicing with aids and ergonomics Practicing exercises to increase grip strength and joint mobility Formulating an individual action plan to achieve individual treatment goals |
| 3 | 2.5 | Occupational therapist and specialized nurse | Self-management to enhance self-efficacy to cope with pain, fatigue, limitations in activities and participation Referral for splints if necessary Daily home exercises to improve strength and hand mobility Ergonomic principles | Discussion on the progress of the action plan to achieve individual treatment goals Discussion about problems experienced in daily life and possible solutions by means of the diaries Discussion and reflection on strategies to cope with pain, fatigue and limitations in activities (balance between rest and physical activity, individual use of medication, use of compensatory strategies in daily activities, use of aids) Education and discussion about splints (referral for splints if necessary); Practising exercises to increase grip strength and joint mobility Practising with aids and ergonomics in a kitchen |

(continued)

Table 1. Continued

| Session | Duration (hours) | Clinicians | Treatment components | Content of the session |
|---------|------------------|--|--|--|
| 4 | 2.5 | Occupational therapist and specialized nurse | Self-management to enhance self-efficacy to cope with pain, fatigue, limitations in activities and participation Daily home exercises to improve strength and hand mobility | Discussion about the relation of daily activities versus pain, fatigue joy and limitations in activities by means of discussing diaries Discussion about strategies to cope with pain, fatigue and limitations in activities (balance between rest and physical activity, individual use of medication, use of compensatory strategies in daily activities, use of aids, use of splints) Discussion on the progress of individual treatment goals Discussion about problems experienced in daily life and possible solutions by means of the diaries Practising exercises to increase grip strength and joint mobility Evaluation whether patients' personal goals were established and evaluation of the treatment programme |

Treatment component 1: Self-management to enhance self-efficacy to cope with pain, fatigue, limitations in activities and participation.⁴⁰⁻⁴⁶

Self-management interventions result in a reduction in pain, fatigue and health distress, as well as an increase in self-efficacy and physical activity. Self-management is the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic disease.⁴⁷ Patients with arthritis view self-management interventions as a way to bring order into their lives, to recognize boundaries, plan, pace and prioritize, and to cope with change in self-identity.⁴⁸ Effective self-management interventions are problem focused, action oriented and utilize patient-generated care plans.⁴⁹

To enhance patients' self-management, our programme includes the following topics:

- education and discussion about hand osteoarthritis and its treatment options: medication, non-pharmacological treatment options,

lifestyle changes, exercises to improve joint mobility and muscle strength, ergonomic principles, aids, splints;

- discussion and reflection upon the influence of the nature and intensity of daily activities on pain, fatigue, and limitations in activities by means of discussing activity diaries;
- discussion and reflection on strategies to cope with pain, fatigue and limitations in activities (balance between rest and physical activity, individual use of medication, use of compensatory strategies in daily activities, use of aids, use of splints);
- formulation of an individual action plan to achieve individual goals.

Treatment component 2: Daily home exercises to improve strength and hand mobility. Patients with hand osteoarthritis suffer from reduced grip strength and reduced joint mobility, in particular in digits I, II and III and the first carpometacarpal joint (CMC I-joint). Joint mobility and muscle strength, in

Table 2. Exercises to enhance joint mobility and muscle strength

| Exercise number | Name of exercise | Patient instruction |
|-----------------|---|--|
| 1 | Mobility of the wrist and finger joints | Put your arms outstretched on a table with your palms together. Move your wrists as far as possible toward your body by bending your elbows. Keep your hands together and keep your fingers extended. |
| 2 | Mobility of the wrist and finger joints | Take a stick loosely in your hands. Create a wringing movement with your wrists. Make the movements with your wrists as large as possible. Please note that you should not pinch the stick. |
| 3 | Mobility of the finger joints | Move your fingertips as far as possible to the base of your fingers (make a small fist). Stretch your fingers and make a completely normal fist (make a major fist), stretch your fingers completely and start over again. |
| 4 | Mobility of the thumb base joint | Put your hand outstretched with your palm upwards on the table. Move the tip of your thumb as far as possible to the base of your fingers. Then move your thumb stretched as far as possible to the table. Make sure the angle between your forefinger and your thumb is as large as possible. |
| 5 | Strength of the intrinsic muscles | Take a piece of clay in your hands and knead the clay. |
| 6 | Strength of the intrinsic muscles | Take a ball of clay between your extended thumb and fingers. Press the clay with your fingers extended as far as possible to your thumb. The lower hand acts as a pallet and to turn the ball of clay. Do this exercise until you notice that your muscles begin to feel tired. |
| 7 | Strength of the extensor muscles | Take a piece of clay in your hands. Pull the clay with your fingertips as far as possible up in your palm and start over again. Do this exercise until you notice that your muscles begin to feel tired. |
| 8 | Coordination of the fingers | Take a ball between your thumb and forefinger. Move the ball as far as possible over the outstretched thumb to the back and away over the outstretched thumb to the front. Repeat the exercise with all your fingers. Do these exercises until you feel your muscles begin to feel tired. |

Photographs of all exercises are available on the *Clinical Rehabilitation* website.

particular grip and pinch strength, are related to limitations in daily activities and pain. Studies have shown the effectiveness of training muscle strength on global hand function⁵⁰ and the effectiveness of training muscle strength and joint mobility on levels of pain.⁵¹ Because improvement of joint mobility and muscle strength could lead to reduced limitations in activities and pain an exercise programme was incorporated in the treatment programme. In Table 2 this exercise programme is described in more detail. To integrate exercises in daily life

activities, patients are encouraged to record on a daily basis the performed exercises and their experiences. Our experience is that exercise diaries are of great value to give health professionals important information on facilitators and barriers to implement exercises in daily life.

Treatment component 3: Ergonomic principles. In patients with rheumatoid arthritis the Joint Protection Programme has been shown to have positive effects on hand pain, joint stiffness and limitations in activities.⁵² In treating patients

with hand osteoarthritis a combination of joint protection and exercise therapy has been shown to be effective.⁵⁰ The following elements of the Joint Protection Programme were considered relevant and adopted in our treatment programme:

- the use of large instead of smaller joints (for example by carrying a bag with the handles on the forearm);
- the use of more joints at a time (for example preferably holding a mug with two hands);
- the use of practical aids to unburden affected joints (for example using a rubberized jar opener, adhesive foam or custom handles, pen- or pencil-holding devices or house/car key adaptations).

To help patients to find a technique or aid that fits their needs, we found that it is important to instruct patients in the use of ergonomic principles by providing them with the opportunity to practise various techniques and to experiment with practical aids in more than one session.

Treatment component 4: Referral for a splint if considered necessary by a hand therapist. Several studies investigated the effectiveness of splints in patients with hand osteoarthritis. Although the quality of most of these studies is weak because of a small study sample or an inappropriate study design, there are indications that the use of splints leads to reduced pain and limitations of activities.^{14,16–19} Patients are referred for a splint if considered necessary.

Build up of the treatment programme. Each component is repeated and built up during several sessions. For example, after formulating and prioritizing individual treatment goals at the intake, during the group sessions patients make an individual action plan which is evaluated by means of diaries discussed during each session. Exercises are also part of every session; in the first session patients are instructed to determine their basic level while in the last two sessions ways to integrate exercises in daily life are emphasized.

Table 3. Take-home messages

-
- Osteoarthritis: it can not be cured, but there is something you can do to deal with it
 - Know which medication you take and how and when to swallow it
 - Ergonomic principles can help you act easier in daily life
 - Be smart and act easier
 - Normal load does not lead to additional joint damage
 - Exercise and normal use of hands does not lead to additional joint damage
 - Maintaining/improving muscle strength helps you to continue to perform activities
 - Pain is not always a reason to worry
 - Know your limit and dare to set your limit
 - Communicate with people in your environment
 - You are experienced with your disease; find out what helps you
 - Exercises help you to reduce joint stiffness
-

For treatment components with a theoretical and a practical part, it was decided that the theoretical part should be discussed before practising is started. Ergonomic principles, for example, were discussed in the first session and practised in a kitchen in the second and third sessions.

During all sessions discussion among patients is encouraged to use patients' expert opinions. Furthermore, each session includes clearly stated take-home messages, such as 'normal use of hands and exercises will not damage your joints'. The take-home messages are listed in Table 3.

Discussion

The aim of this study was to systematically develop a non-pharmacological multidisciplinary and multidimensional treatment programme for patients with hand osteoarthritis. This resulted in a reproducible treatment programme consisting of self-management, daily home exercises and education about ergonomic principles, tailored to the needs of the individual patient with hand osteoarthritis.

In all steps of the development of the treatment programme we searched for evidence from the literature, asked patients' opinions where possible and, where information was lacking, also gathered expert opinions. The involvement of patients was especially important in the identification of patient-specific problems. Patients' specific problems depend on the environment in which they interact and therefore are influenced by cross-cultural differences. For example, in the Netherlands the main transport of many people is a bicycle. Problems experienced in steering a bicycle and using the handbrakes are frequently mentioned problems for patients with hand osteoarthritis. For that reason, possible limitations in cycling were incorporated in the treatment programme and patient materials.

A possible limitation in the development process was that all members of the expert panel involved in developing the multidisciplinary treatment programme were employed in the same rheumatology outpatient clinic. As a result, the views and opinions of the expert panel possibly do not fully represent those of other health professionals nationally and internationally. On the other hand, the involvement of multiple disciplines within our setting helped us to create acceptance and support for the implementation of the treatment programme. Furthermore, by including multiple disciplines of our hospital in the expert panel we ensured a match with the opportunities and facilities within our hospital. It is possible that other settings do not have the same facilities (for example a kitchen to practise with ergonomic principles and aids) and opportunities (for example funding structures) as we have. Therefore, it is likely that the programme is not feasible in its original extent in all other settings.

It has been suggested that we should use a causal modelling approach or a method of concept mapping to define the target group and the desirable health outcome.^{53,54} However, those approaches do not provide practical methods to translate evidence into practice. Therefore, we used a more empirical perspective. Our starting points were the nature of problems of patients with hand osteoarthritis seeking medical care

and the recommendations outlined in guidelines about non-pharmacological treatment for this category of patients. We elaborated on the MRC framework, resulting in a comprehensive treatment programme consisting of components proven to be effective in osteoarthritis and tailored to the needs of patients with hand osteoarthritis. Our study might be a valuable illustration of a feasible and practical method to integrate evidence, expertise and clinical practice into treatment programmes for multidisciplinary teams.

To investigate the effectiveness of our newly developed treatment programme we started a multicentre randomized single-blind controlled clinical trial in 150 patients with hand osteoarthritis according to the American College of Rheumatology Classification criteria for hand osteoarthritis.⁵⁵ The primary outcome measures after three months are the OMERACT OARSI responder criteria^{55,56} and the Australian Canadian Osteoarthritis Hand Index.^{31,57}

In the development process of the treatment programme patients indicated that they would prefer a booster session to discuss how strategies are implemented in daily life and how patients could improve further. In patients with hip and knee osteoarthritis booster sessions seem to maintain the effects of exercise therapy in the long term.⁵⁸ Given the lack of evidence about the effectiveness of booster sessions in patients with hand osteoarthritis, we will also investigate the effectiveness of a booster session six months after a multidisciplinary treatment programme.

In conclusion, a non-pharmacological multidisciplinary and multidimensional treatment programme for patients with hand osteoarthritis was developed following a systematic approach, using the current evidence and patient and expert opinions. Further research is now needed to investigate the effectiveness of this treatment programme.

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