

Non-pharmacological Community Intervention, Especially Pain Management, in Rheumatoid Arthritis: A Review of the Literature

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ABSTRACT

Objective: Rheumatoid arthritis (RA) is a crippling disease with significant impact on a patient's life. The objective of this study is to describe the role of unimodular and multi-modular, non-pharmacological community intervention effectiveness, especially pain management interventions in RA.

Methods: This review is built on a preliminary literature search, covering 2009 up to December 2013. Selective review of current literature was produced by searching for the terms 'non-pharmacological intervention', 'self-management programme', 'self-care', and 'rheumatoid arthritis', to capture all spectrums of RA non-pharmacological interventions. Twenty-six reviews were included in this overview.

Results: A substantial and remarkable number of studies of non-drug care interventions in RA are available. Twenty-six reviews were included in the present overview, which indicated a beneficial effect of cognitive behavioural therapy and psychotherapeutic intervention, self-management, and physical therapy (exercise), but a few studies indicated a beneficial effect of the multi-disciplinary education programme and specific dietary interventions. The evidence of effectiveness varies among the different non-pharmacological modalities and indicates a need for further investigation into the most clinical and cost-effective strategies to deliver individual, non-pharmacological treatment modalities, as well as comprehensive arthritis service delivery models for patients with RA.

Conclusion: This article gives a summary of the available evidence regarding the effectiveness of non-pharmacological treatment modalities which are often prescribed as an adjunct to standard care in RA, but the data require scientific appraisal into the most clinically and cost-effective strategies.

Keywords: Non-drug therapy, intervention studies, pain management, rheumatoid arthritis.

INTRODUCTION

The spectrum and severity of rheumatoid arthritis (RA) are not very different in developing and developed countries, but in the developing countries inadequate rheumatology services further compounds the burden of the disease (1). The incidence and prevalence of these conditions has been proved, is dynamic, not static, and

appears to be influenced by both genetic and environmental factors (2). Ample information has been collected in the Community Oriented Program for the Control of Rheumatic Disease (COPCORD) studies (3), which shows wide differences in the prevalence of RA. The prevalence of clinical RA recently reported by the WHO ILAR COPCORD in urban and rural surveys in India

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varied from 0.45% to 0.68% (4). It was noted that 0.33% of urban population and 0.19% of rural population are affected with RA in Iran (5, 6). In Asia-Pacific countries, it was calculated as 0.33% (7), and in developed populations, it was 0.5% to 1% of the adult population (8).

Despite substantial advances in medical treatment, RA is a disease that continues to affect the lives of individuals considerably (9, 10). The challenge is to find a cost-effective treatment for better disease control (11, 12). Pharmacological treatment has recently seen great advances, but it is associated with increased toxicity and cost, and also the long-term outcome is still unknown. Non-pharmacological treatment is cheap, there is less toxicity and better long-term outcome (4, 9, 10, 13).

The objective of this literature review is to present the most recent evidence related to the non-pharmacological intervention programme for the management of RA to inform the development of evidence-based recommendations for general practitioners working in the healthcare setting.

MATERIALS AND METHODS

This review is built on a preliminary literature search. The literature review was conducted in July 2010 up to 2014. Articles published from 1990 to 2013 were considered. The literature review was done by a thorough search conducted in MEDLINE, PubMed (PubMed Central and PubMed Health), EMBASE, Web of Science, and the Cochrane Library to identify studies for inclusion.

Search strategies were adapted to apply to the other databases. The MESH terms—‘rheumatoid arthritis’, ‘arthritis’, ‘rheumatic diseases’, ‘joint’, ‘complementary therapies’, ‘nonprescription drugs’, ‘intervention studies’, ‘self-care’, ‘pain management’—were used to capture all spectrums of RA non-pharmacological intervention and self-management practices. Inclusion was limited to English language publications. The final search strategy sought to identify non-pharmacological intervention studies at all levels of evidence. Concurrently, a manual search was carried out to find an article review of reference lists of retrieved papers. In the beginning, the papers were selected for inclusion, based on the title and abstract. Studies providing evidence on the efficacy of an intervention compared to another intervention were included. Initial searches failed to identify many articles related to non-pharmacological intervention programmes for management of RA.

Participants relevant to this literature review were people aged 16 years or over with a diagnosis of RA.

The review focused on data in adult populations (above 16 years of age). Intervention in the form of any non-pharmacological intervention used to manage RA was eligible for inclusion. Articles focusing on non-pharmacological interventions in RA, with a community approach, big sample size, with control, randomized control trial (RCT) and having a core measure of pain visual analogue scale (VAS), were selected. Other alternative treatment controversies have arisen over the employment of therapies, such as occupational therapy, podiatry, hydrotherapy, joint protection, ultrasound, acupuncture, laser therapy, use of compression gloves, thermotherapy, use of splints or orthoses, homeopathy, and transcutaneous electrical nerve stimulation, which were not eligible for inclusion.

The search strategy was formulated by Ovid in cooperation with a medical librarian to make it applicable to all the databases. A computerized, broad search strategy was developed. Retrieved hits were assessed by four of the authors (HY, FA, MY, NK), who screened the titles and abstracts to identify relevant studies. If there was doubt about a study’s relevance, one of the expert authors (AC) was consulted. The relevant full-text article was read by three authors (AC, HY, RF). The methodological quality of the included review was independently assessed by two reviewers (AC, HY). Data were extracted by two of the authors (HY, NK, EG). If there was doubt, one of the other authors (AC) was consulted. In the search finding, the following statement was used to indicate the direction of reduced pain effect.

RESULTS

The literature search identified 14 362 references, which were first examined on the basis of titles and abstracts. Of these, 13 963 references were not related to the non-pharmacological intervention programme for management of the RA disease. A total of 261 references were not RCT studies; 138 references were retrieved in full text; and 112 reviews were excluded: 49 because of conducted to mixed rheumatic and musculoskeletal disease, and 41 were conducted by other than RA. A total of 19 references were excluded because of no relevant intervention on pain, and 3 because of duplicate publication. Twenty-six reviews were included in this overview (Fig. 1).

Cognitive behavioural therapy and psychotherapeutic intervention

A hospital, based on six-month studies by Sharp *et al*, designed and conducted studies to examine the efficacy of cognitive behavioural therapy (CBT) (Fig. 2)

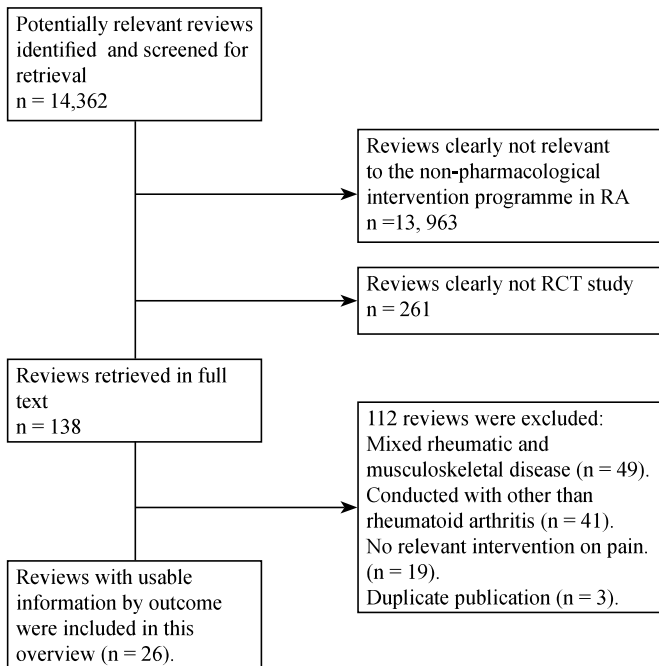


Figure 1: Selection process of eligibility reviews from all identified citations.

CBT: Included 8 individual sessions, each 1 hour per week, developed from standard pain management approaches and self-help educational material developed for patients with arthritis. The programme included an educational component plus the self-management skills of relaxation training, attention diversion, goal-setting, pacing, problem-solving, cognitive restructuring, assertiveness and communication, and management of flare-ups or high-risk situations [14].

LMAP: Included two modules, each with four meetings of 2.5 hours duration and one 2-hour review meeting (one rheumatology OT, one community OT and one rheumatology PT delivered module). Participants could attend two LMAP modules and review meetings over a 3- to 9-month period as convenient to them. Module 1 was developed from a behavioural, joint protection programme. The concepts discussed in meeting 1 were RA, health beliefs, personal impact of arthritis, understanding the multiple factors affecting symptoms, attitudes, personal experiences, self-management methods and motivation for change. Meetings, 2-4, focused on ergonomic approaches to reduce pain, exercises, fatigue management and the benefits of splints. Module 2 focused on participants' exercise beliefs, barriers and problem-solving. Cognitive symptom management included stress management and coping, pain management, distraction and relaxation practice. The review meeting included progress with goals, drug therapy, investigations, communicating with health professionals, team care and topics of participants' choice (eg, diet, complementary therapies, work-support services, Social Security Benefits). Participant workbooks were provided for each module with key points, illustrations and diaries to record practicing joint protection, pacing and exercise [15].

GESO: The programme consisted of 5 weekly, 2-hour group sessions for 8 patients, with or without a significant other. The programme included 3 booster sessions of 2 hours each after 3, 6, and 9 months. Each group had 2 trained leaders (during the 2 days of training): a specialized arthritis nurse and a nurse with experience in working with RA patients. Patients received a programme book with information on the sessions, a self-help guide, various brochures on RA, and an audiotape with relaxation exercises. The programme included contracting, goal-setting, self-management and problem-solving, information on RA and treatment, pain management and relaxation, physical exercises, and coping with depression. In the booster sessions, the accomplishments of goals and problems during the past 3 months were discussed and feedback was given. The assessments were done before, immediately after, and 6 and 12 months after intervention [18].

MSCG: In the programme, patients who participated in 10 sessions, were supported by a manual for patients and led by 2 supervisors. All sessions lasted 2 hours. The first 8 sessions were weekly sessions, the 9th session was 2 weeks after the 8th session, and the 10th session was 3 weeks after the 9th session. At the end of every session (except for the very first session), homework assignments were given. In the CIG, the programme was teaching patients action-directed coping and coping by seeking social support; and 4 problem-solving steps: 1) describe the problem; 2) think about all kinds of possible solutions; 3) choose 1 or more solutions; 4) implement the solution or solutions and evaluate the results. In the MSCG programme, topics of conversation for all sessions were determined by the patients during the first session to exchange information, experiences, feelings, and emotions of the participants. The sessions were led by 2 patients who were trained in supervising mutual support groups [19].

In-patient treatment consisted of a fixed period of 11 days. Each weekly session was performed by the physical therapist, occupational therapist and social worker, with prescribed regimens of bed rest and a daily individual range of motion, muscle-strengthening exercise programme, joint protection, self-care, household and work activities, joint splints, adaptive equipment and coping with the disease. During out-patient care, the prescription of drugs, paramedical treatment and splints was left to the attending physician in the out-patient clinic [21, 22]. The training programme was scheduled for nine sessions within 2 weeks, each group consisted of eight patients, and encompassed a multidisciplinary cooperation between rheumatologists, orthopaedists, physiotherapists, psychologists, and social workers. The following fields were covered: mechanisms of RA, drug therapy, physiotherapy, practical exercise, relieving pain and muscle tension, joint protection devices, joint replacement, coping strategies, stress management and relaxation exercise, dietetics, social assistance, and utilization of public social resources [23].

ASMP: This 6-week series of classes for 2 to 2.5 hours per session (total 12 hours) included information about arthritis, self-management principles, exercise, cognitive symptom management, relaxation, energy-saving techniques, cognitive pain management, dealing with depression, nutrition, communication with family and health professionals, and contracting [24].

SMART: Mailed intervention is a 'tailored, print intervention' which includes a 1-page questionnaire asking questions about pain, disability, exercise levels, and other arthritis-related behaviours. Participants also received a copy of the Arthritis Help book and quarterly follow-up materials. These included a second book, Arthritis: A Comprehensive Guide, a relaxation tape, and a pamphlet on physician/patient communications. The sequence of the questionnaire, letter, and report delivered is repeated every 4 months for 1 year. The result showed that there was an improvement in all baseline variables for SMART and ASMP groups with higher benefit in self-efficacy and doctor visit rate [22].

CDSMP: It is a community-based, a 2.5 hour lecture per week over a 6-week period which included topics such as healthy eating, starting and maintaining exercise, pain and fatigue management, managing sleep, stress management, relaxation techniques, communicating with health providers, managing medications, and planning and problem solving [29].

Figure 2: Uni-modular and multi-modular self-management programme.

in preventing psychological and physical morbidity in patients with RA. The results indicate efficacy in producing reductions in both psychological and physical morbidity (14) (Table 1). Another study, conducted by the same groups over 18 months, revealed that the capacity of coping with pain and depression improved, but no change was observed in other variables (15); see Table 1. A longitudinal study was conducted by Hammond *et al* to develop a modular behavioural group programme—'The Lifestyle Management for Arthritis Programme'

Table 1: Unimodular self-management programme for rheumatoid arthritis

Year	Name of study	Sample size	Design	Duration of study	Duration of RA	Intervention	Key efficacy variable	Key finding	Reference
1993–1994	Vegetarian diet—clinical effect of psychological characteristics	124	RCT 3 arms: vegetarian diet, omnivorous diet and control groups Site: hospital-based rheumatology	13 months	Mean: 13 years intervention and 10 years controls	Vegetarian diet Omnivorous diet	GHQ-20, MHLCS, pain VAS, ESR, TJC, TJS, believe in ordinary and alternative treatment VAS	GHQ (anxiety), internal MHLCS, believe in ordinary and alternative significant improvement and psychological distress decreased	Kjeldsen-Kragh <i>et al</i> (1994) ³⁴
1997–1998	Effects of uncooked vegan diet, rich in lactobacilli, in RA	43	RCT 2 arms: vegetarian diet and control groups Site: hospital-based rheumatology	6 months	Mean: 12.6 ± 12.3 years in intervention and 16.1 ± 13.6 years in control groups	Uncooked vegan diet, rich in lactobacilli	DAS28, TJC, TJS morning stiffness protein (S-CRP), pain VAS, HAQ and global patient	Lost weight, pain VAS, DAS28, HAQ disease activity improved	Nenonen <i>et al</i> (1998) ³⁵
1993–1995	Efficacy of physical therapy	127	Single-blind RCT 2 arms: control wait list; intervention care Site: community-based rheumatology	2 years	Mean 7.6 ± 11 and 7.4 ± 10 in experimental and control group, respectively	Nutrition, exercise, background Std care (RA)	Self-efficacy, pain VAS, disease activity, duration of morning stiffness, tender joint count	Improvement in all variables except pain and disease activity	Bell <i>et al</i> (1998) ³³
1994–1996	Cognitive behaviour intervention in preventing psychological and physical morbidity	53	Single blind (assessor) RCT 2 arms: control; intervention care Site: hospital-based clinical psychologist	6 months	Less than 2 years	Cognitive behaviour therapy, background Std care	HADS, HAQ, pain VAS	HADS, depression and anxiety, HAQ showed significant improvement but no benefit in pain	Sharp <i>et al</i> (2001) ¹⁴
2001	Effect of patient education programme on adherence to drug treatment	100	Single blind (assessor) RCT 2 arms: control and intervention care Site: hospital-based clinical pharmacology	6 months	Median: 12 years	Patient education program, background Std care (RA)	Articular index, morning stiffness, pain VAS	Improvement in drug adherence but no clinical benefit	Hill <i>et al</i> (2001) ¹⁹
2001	A vegan diet free of gluten improves the signs and symptoms of RA	66	RCT 2 arms: vegan diet and non-vegan diet Site: hospital-based rheumatology	1 year	Mean 5.2 ± 2.5 years in intervention and 5.8 ± 2.8 years in control groups	A vegan diet free of gluten and a well-balanced non-vegan diet	IgG, β -lactoglobulin, X-ray, TJC, TJS, CRP, PhGA	Significant improvement in clinical parameters, IgG, β -lactoglobulin level decreased, no significant differences in X-ray	Hafström <i>et al</i> (2001) ³⁶

Table 1 (cont'd)

Year	Name of study	Sample size	Design	Duration of study	Duration of RA	Intervention	Key efficacy variable	Key finding	Reference
1994–1996	Long-term efficacy of cognitive behaviour therapy	53	Single blind (assessor) RCT 2 arms: control and intervention care; Site: hospital-based clinical psychology	18 months	Less than 2 years	Cognitive behaviour programme (CBP), background Std care (RA)	HADS, HAQ, pain, VAS, coping, Ritchie articular index	Coping and depression improved but no change in other variables	Sharp <i>et al</i> (2003) ¹⁵
2004–2005	Mediterranean dietary on fat intake and composition of fatty acids in serum phospholipids	51	RCT (assessor blind) 2 arms: control and dietary intervention Site: community-based rheumatology	3 months	NA	Mediterranean dietary: advised to replace high fat dairy products with low fat products	Fat, total saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, n-6 fatty acids, n-3 fatty acids	A lower ratio of n-6 to n-3 fatty acids, better clinical improvement, higher intake of n-3 fatty acids and a lower ratio of n-6 to n-3 fatty acids	Hagfors <i>et al</i> (2005) ³⁷
1997–2002	Cod liver oil (n-3 fatty acids) supplementation in daily NSAID requirement in RA	97	RCT double-blind placebo-controlled 2 arms: vegetarian diet and control groups Site: hospital-based rheumatology	9 months	Mean 13 ± 1.26 years in intervention and 13 ± 1.4 years in control groups	Take either 10 g of cod liver oil containing 2.2 g of n-3 EFAs or air-filled identical placebo capsules	CRP, TJC, TJS, DAS28, pain VAS, HAQ, IgM, EMS, daily NSAID requirement	Significantly reduce daily NSAID requirement no significant differences in the clinical parameters of RA disease activity	Galarraga <i>et al</i> (2008) ³⁸
2007–2008	Vegan diet on blood lipids (oxLDL) and natural atheroprotective (anti-PCs).	66	RCT 2 arms: vegan diet and control non-vegan diet Site: community-based rheumatology	1 years	Mean 5 years vegan group and 5.8 years controls	Vegan diet free of gluten	BMI, DAS28, HAQ, biochemical variables, OxLDL, anti-PC drugs	Decreased LDL and oxLDL levels and raised anti-PC IgM and IgA levels	Elkan <i>et al</i> (2008) ³⁹
2007–2011	Internal family system-based (IFS) psychotherapeutic intervention	79	RCT (assessor blind) 2 arms: control and intervention care Site: hospital-based rheumatology	4 years	Mean ± S.D 18.9 ± 10.8 and 13.9 ± 9.2 in IFC and control groups, respectively	IFS model intervention, background Std care (RA)	DAS28-CRP4, pain VAS, depression, anxiety, physical function, medication usage	Disease activity and medication use unchanged, benefit seen in all other variables	Shadick <i>et al</i> (2013) ¹⁸

oxLDL = oxidized low-density lipoprotein; anti-PCs = antibodies against phosphorylcholine; BMI = body mass index; LDL = low-density lipoprotein; IgM = immunoglobulin M; MHLCS = multi-dimensional health locus of control scale; GHQ-20 = General Health Questionnaire; EMS = early morning stiffness; IgG = immunoglobulin G; PhGA = physician global assessment; CRP = C-reactive protein; RA, rheumatoid arthritis; RCT, randomized control trial.

(LMAP); see Fig. 2. It evaluated its longer term effects on pain, physical and psychological status. The study findings indicated that the behavioural group continued to have decreased pain and fatigue; better functional ability, psychological status and self-efficacy scores; and greater use of health behaviours (16); see Table 2.

A recent longitudinal study by Vriezolk *et al* was conducted to describe the development and feasibility of the integration of a CBT within a multi-modal rehabilitation programme for highly distressed patients

with rheumatic diseases. The study concluded that a significant improvement was noticed in physical and psychological functioning, attendance rate and satisfaction (17); see Table 3. A study by Shadick *et al* was conducted for proof of concept of psychotherapeutic intervention on disease activity and psychological status in RA. The study results indicated that the intervention model was feasible and acceptable, provided some sustainable benefits for patients and may complement medical management of the disease (18); see Table

Table 2: Multi-modular self-management programme (SMP) in rheumatoid arthritis

Year	Name of study	Sample size	Design	Duration of study	Duration of RA	Intervention	Key efficacy variable	Key finding	Reference
1992–1993	Intensive, in-patient, multi-disciplinary care vs standard care (out-patient)	80	RCT 2 arms: control; intervention care; site: Hospital-based rheumatology	1 year	0.5–33	In-patient training in exercise, coping and occupational therapy in interventional arm, background Std care (RA)	Pain VAS, Ritchie articular index, HAQ, anxiety and depression scale.	Reduced pain, improved indices of function; no benefit for anxiety, depression after 12 weeks	Vlieland <i>et al</i> (1996) ²⁴
1992–1993	Intensive in-patient multidisciplinary care vs standard care	80	RCT 2 arms: control; intervention care; site: Hospital-based rheumatology	2 year	0.5–33	In-patient training of exercise, coping and occupational therapy in interventional arm, Background Std care (RA)	Pain VAS, Ritchie articular index, HAQ, patient and physician global assessment.	no significant change in HAQ; rest - significant improvement	Vlieland <i>et al</i> (1997) ²³
1999	Long-term benefit of multi-disciplinary arthritis training programme	68	Study 1: Prospective RCT 2 arms: control; intervention care; Site: Community-based internal medicine Study 2: Cross-over, non-controlled observation	Study 1: 1 year; Study 2: 5 years	0.4 to 30 years	Multi-disciplinary arthritis training programme, background Std care (RA)	HAQ, coping, Beck depression, knowledge of drug therapy, physiotherapy, joint protection, relaxation exercises.	Significant improvement in all variables in intervention arm	Scholten <i>et al</i> (1999) ²⁵
2003	Group education in patient of RA and their partner	218	RCT; 3 arms: control ; intervention care; Site: Hospital based communication studies	12 months	Mean 11.7 ± 9.8 Years	Education programme, background Std care (RA)	Self-efficacy pain, exercises, coping, DAS28, fatigue -VAS.	Improvement in fatigue and coping with no change in rest variables	Riemsma <i>et al</i> (2003) ²⁰
2008	Lifestyle management for arthritis programme (LMAP)	167	Parallel-group RCT; 2 arms: control; intervention care; Site: Hospital-based rehabilitation centre	12 months	Mean 7.34 ± 6.9	LMAP vs standard self-management programme (SP), Background Std care (RA)	Pain VAS, self-efficacy, fatigue, HAQ, psychological status, exercise, joint protection	Significant improvement in all variables	Hammond <i>et al.</i> (2008) ¹⁶

Table 3: Uni-modular self-management programme (SMP) in arthritis

Year	Name of study	Sample size	Design	Duration of study	Duration of RA	Intervention	Key efficacy variable	Key finding	Reference
2001	Effect of coping intervention in rheumatic diseases	168 RA 67%, OA3.6% and RA54.5%, OA9.1% and RA55.4% OA10.7% in CIG and MSCG and WLCG, respectively	Single Blind (assessor) RCT 3 arms: control; intervention care; Site: Hospital-based health education	6 months	Mean were 12.6 ± 10.75	CIG programme: vs MSCG programme, background Std care	Coping, functional, health status, life satisfaction	CIG showed better improvement in coping and functional state than other arms	Savelkoul <i>et al.</i> (2001) ²¹

1. These results suggest that CBT can be an effective adjunctive treatment for patients with RA and can help them in both psychological and physical morbidity.

Education

A study by Hill *et al* demonstrated improvement in drug adherence with an education programme (19); see Table 1. Another study by Riemsma *et al* was designed to determine the effects of group education. The study findings indicated that participation of a significant other in psycho-educational programmes does not have only positive effects. Instead of stimulating patients to adopt beneficial health behaviours and increase their self-efficacy expectations, participation of a significant other led to decreases in self-efficacy and increased fatigue, whereas patients participating in group education

without partners showed increases in self-efficacy and decreased fatigue (20); see Table 2. A study by Savelkoul *et al* was conducted to assess the effects of a coping intervention group (CIG) and the manual support control group (MSCG), with rheumatic diseases (Fig. 2). The results showed that, at post-intervention, the coping intervention resulted in more action-directed coping than in the mutual support groups (21); see Table 4. A study by Ünsal and Kasikçi was conducted to determine the effects of education on the self-efficacy perception of individuals with arthritis. Study findings indicated that self-efficacy levels after education were significantly improved in the experimental group (22); see Table 3.

Few studies have explored the effect of patient education (PE) in patients with RA, but it seems to be an essential part of the successful management of RA disease.

Table 4: Multi-modular self-management programme (SMP) in arthritis

Year	Name of study	Sample size	Design	Duration of study	Duration of RA	Intervention	Key efficacy variable	Key finding	Reference
1998	Patient education of ASMP - 6 weeks vs 3 weeks version	151 (14% RA, 56% OA, Other 19%)	Comparison study 2 arms: control; intervention care; Site: Community-based patient education	4 months	NA	ASMP 6-week module vs 3-week module, background Std care	Pain VAS, disability, depression, exercise, physician's visit	6-week ASMP better than 3-week ASMP	Lorige <i>et al</i> (1998) ²⁶
1998	Long-term outcome of ASMP in arthritis	112 (RA 46% OA 44% Other 10%)	Pre-test post-test 1 arms intervention care; Site: Community-based psychological rheumatology	12 months	1-49 years	ASMP, background Std care	Self-efficacy pain, exercise, communication with physician, HAQ, pain VAS, HADS, GP visit	Significant improvement in all variables	Barlow <i>et al</i> (1998) ²⁷
1999	Arthritis self-manager through an adult education programme	89 (RA 45%, OA 48%, Other 42%)	Pre-test, post-test 1 arms intervention care; Site: Health service network, arthritic care network and community-based psychological rheumatology	4 months	0-50	ASMP, background Std care	MHAQ, pain VAS, fatigue VAS, depression, self-efficacy for pain VAS, exercise, communication with physician	Significant improvement in all variables	Barlow <i>et al</i> (1999) ²⁸
2000	ASMP in arthritis in UK	544 (RA 37% vs 33% OA 52% vs 52% Other 11% vs 14% in intervention and control groups, respectively)	Pragmatic RCT 2 arms: control; intervention care; Site: Community-based psychological rheumatology	16 months	Mean 10.7 ± 11.2 vs 11.3 ± 10.9 intervention and control groups	ASMP, background Std care (RA)	Exercises, diet communication with physician, MHAQ, pain VAS, HADS	Significant improvement in all variables	Barlow <i>et al</i> (2000) ²⁹

Multi-disciplinary programme

Two studies by Vlieland *et al* were designed to compare the effects of in-patient, multi-disciplinary treatment with standard out-patient care. The results showed that the percentage of patients responding to the ACR criteria was significantly greater in the in-patient group (23, 24) (Table 2). Scholten *et al* conducted two studies to assess the sustainable benefits of a professional, multi-disciplinary training programme for patients with RA. Results of the one-year study and 5 years after baseline evaluation indicated significant improvements in HAQ, decreased depression, reduced fatigue, increased coping capacity and knowledge of drug therapy, sustained improvement in physiotherapy, and focus on joint protection and relaxation exercises (25); see Table 2. The review of studies demonstrated a rheumatology clinic with multi-disciplinary team care has a beneficial effect with respect to disease activity and emotional status. Therefore, a multi-factorial approach, utilizing medications and self-management techniques, is necessary. Fortunately, with proper counselling, individuals with RA can safely exercise, improve overall physical fitness, enjoy greater ease with daily living activities, and improve a sense of well-being.

Self-management

A longitudinal, community-based study by Lorig *et al* was designed to compare the 3- and 6 Arthritis Self-management Programme (ASMP). The results indicated that the 3-week ASMP intervention (Fig. 2) was not as effective in changing health behaviours, health status or healthcare utilization as the 6-week ASMP (26); see Table 5. Barlow *et al* conducted a study to determine the long-term effect of ASMP on physical and psychological well-being of patients suffering from arthritis. Data were collected via mailed, self-administered questionnaires. The findings of the study had demonstrated that patients with arthritis derive substantial and prolonged benefits in terms of perceived ability to manage arthritis, reduction in pain and improved physical and psychological well-being (27); see Table 5.

Another study was designed by Barlow *et al* to determine the ASMP's effectiveness when delivered in an adult education setting. The finding of the study showed that the ASMP programme was not only acceptable to people with arthritis, but can offer substantial benefits in terms of an enhanced sense of control, a reduction in pain, increased use of cognitive and behavioural techniques, and enabled persons to discuss arthritis in health settings (28); see Table 5. In 2000, Barlow *et al* conducted

a study to determine whether the ASMP improves perceptions of control, health behaviours and health status, and changes the use of healthcare resources. Participants were given a copy of the Arthritis Help book. The ASMP had a significant effect on arthritis self-efficacy for other symptoms, pain subscales and health behaviours, resulting in less depression and a greater, positive mood (29); see Table 5. Lorig *et al* tried to examine two studies on the Self-management, Arthritis Relief Therapy (SMART) and compare it with the ASMP (Fig. 2). Participants were recruited from the Arthritis, Rheumatism and Aging Medical Information System (ARAMIS) databank centres. The findings of the study indicated that a mail-delivered SMART programme was similarly effective in the classic ASMP, with slightly better results in the first year and a slightly more rapid attenuation over the next 2 years (30); see Table 3. Lorig *et al* conducted a study to compare the relative effectiveness of the ASMP and the Generic Chronic Disease Self-management Programme (CDSMP), and background standard care for individuals with arthritis (Fig. 2). The findings of the results showed that both programmes had positive effects, and the CDSMP should be considered a viable alternative (31); see Table 3.

In 2009, Barlow *et al* conducted a study to examine the pattern of scores on self-efficacy, health status and use of self-management techniques among a group of ASMP participants. The results showed that long-term maintenance of self-efficacy, psychological well-being and self-management techniques may be possible following attendance at the ASMP (32); see Table 3. Published literature suggests that patients with RA will need long-term care. The treatment comprises not only drug therapy, but also a self-management programme of educational instruction, guidance and support to cope with the consequences of the disease and manage this persistent, damaging, inflammatory disorder.

Physical therapy (exercise)

An empirical study was conducted by Bell *et al* to evaluate the short-term efficacy of a physical therapy (PT) programme (Fig. 2) for persons with RA. Improvement was noted in the primary variables, such as self-efficacy, disease management knowledge, duration of morning stiffness, and tender joint count, but there was no significant change in the pain VAS and disease status measures (33); see Table 1. Then, the short- and long-term health benefits and risks of physical activity at moderate and vigorous intensity levels had not yet been compared in early or established RA.

Table 5: Multi modular self-management programme (SMP) in arthritis

Year	Name of study	Sample size	Design	Duration of study	Duration of RA	Intervention	Key efficacy variable	Key finding	Reference
1996 to 1997	SMART vs Usual care or ASMP in arthritis	2 RCT: 1 st —1090 2 nd —341 (RA 60% OA 40%)	2 RCT Staff involved in administering was blinded to participant status 2 arms: control; intervention care; Site: Medical information system, (ARAMIS) databank centre, and community-based medicine	18 months and 3 years	NA	SMART vs ASMP, background Std care	HAQ index, pain VAS, depression, role function, doctor visits, self-efficacy	Improvement in all baseline variables for SMART and ASMP groups with higher benefit in self-efficacy and doctor visit rate	Lorig <i>et al.</i> (2004) ³⁰
2002 to 2003	ASMP vs CDSMP in arthritis	355 RA 18% vs 13%, OA 75.7% vs 5.1%, Other arthritis 10.5% vs 19.8% in ASMP and CDSMP groups, respectively	RCTs 2 arms: control; intervention care; Site: Community-based medicine	1 year	NA	ASMP versus CDSMP, background Std care	Disability, global health, pain, fatigue, exercise, self-efficacy, health care utilization	Lesser disability indices, pain, fatigue and health care utilization with improved self-efficacy seen in ASMP group	Lorig <i>et al.</i> (2005) ³¹
2009	ASMP in arthritis	124 (RA 59, OA 59, Other arthritis 6)	Cross-sectional Follow up 2 arms: control; intervention care; Site: Community-based health and life sciences	8 years	Mean 19±11 years	ASMP, background Std care	Self-efficacy, exercise, communication with physician, HAQ, HADS, GP visit	Significant improvement, in all variables	Barlow <i>et al.</i> (2009) ³²
2005	Effect of education on perceived self efficacy in arthritis	80 OA (24 vs 16) RA (9 vs 7) Other (7 vs 17) in intervention and control group, respectively	Pre-test and post-test equivalent control group 2 arms: control; intervention care; Site: Hospital-based health sciences	6 months	6 months to more than 11 years	Education programme -arthritis, treatment, care, preventing method, exercise, background Std care	Self-efficacy in pain, ASES	Significant improvement, in all variables	Unsal and Kasikei. (2009) ²²
2008 to 2009	CBT with multimodal rehabilitation in rheumatic disease	25 (Inflammatory rheumatic disease and OA)	Proof-of-concept study 2 arms: control; intervention care; Site: Rheumatology-based clinic	15 months	NA	Cognitive behaviour therapy with multimodal rehabilitation programme, background Std care	Significant improvement in physical and psychological functioning, attendance rate, satisfaction	Significant improvement in all variables.	Vriezolk <i>et al.</i> (2012) ¹⁷

Dietary interventions

Several clinical trials and studies were conducted to assess the effect of dietary interventions in RA (34–39); see Table 1. The findings also showed that dietary interventions can assist with the management of disease symptoms that accompany RA, such as pain; tender, swollen joints; stiffness; and associated disability and

disease progression. Clinical trials demonstrated that a subset of patients will benefit from following a vegetarian, vegan or Mediterranean-style diet, or by eliminating certain foods from their diet (40). This type of diet was shown to be associated with anti-inflammatory effects (30, 31, 41) which are of desired benefit in RA. Mahan *et al* suggested the dietary changes to promote

an anti-inflammatory diet (42). All studies on diet and RA were carried out on an established and prolonged disease. Dietary therapy is an area of self-help which patients with RA frequently want to explore, typically in the early stages of the disease, but little is known about the extent of dietetic involvement in rheumatology. Good nutrition is an essential part of RA self-care because without it the body, and sometimes medications, do not work as well they should.

DISCUSSION

Lifelong disability, excruciating pain, psychological fatigue, anxiety, and decline in life quality are consequences which have always been associated with RA (43). Aggressive therapies with potent drugs like biologics are very effective but fraught with dangers of serious drug toxicity and life-threatening adverse events (4, 9, 10, 13). It was observed that despite excellent advances in management care, patients suffering from RA continue to develop functional limitations, such as deformities (9, 10). It is against this background that more evidence of the efficacy of adjunct therapy with non-pharmacological methods (exercise, diet, cognitive education) be obtained through well-designed studies in RA.

The concept of early and aggressive treatment of RA has occupied centre stage since 1989, when reversing the pyramid (the step-down bridge concept) was published (44). From the year 1990, there was an increasing awareness about the concept: 'A window of opportunity for the therapeutic consultations/treatment in rheumatoid arthritis' (45, 46). Experimental methods were used to find a solution for how we can meet the patients' needs in the best way (47). Three early-period, experimental approaches demonstrated the path of the required change in non-pharmacological treatment measures. The first among the three was the ASMP—the prototype arthritis education programme. Originally developed by Lorig in 1981 at Stanford University, USA, the programme was adopted by the arthritis foundation in 1981 (48). The next one was based on visits carried out by groups of doctors to their patients, and was created by Dr. John Scott in 1997 (49). The third experimental programme focused on patients who stayed far away from city centres in remote areas, and access for medical attention was enhanced using the telephone or by other electronic means such as the Internet (49–51).

Non-drug therapies are often employed as complementary adjuncts to pharmacological treatment to aid the coping mechanism of patients with RA as they combat

the disease (52). Several non-pharmacological, clinical, experimental methods, and/or models such as ASMP or ASHC (28), CBT (14), LMAP (16), SMART (30), and CDSMP (31) were evaluated on patients suffering from arthritis. Tables 2–5 describe the key features of several studies undertaken to evaluate such modalities of treatment. These studies have demonstrated the role of a self-management programme in RA.

Using a multi-modular, self-management programme for patients, Vlieland et al showed improvement in physician global health (PHGH) and patient global health (PTGL) by intensive, in-patient, multi-disciplinary care versus standard care (24). Several studies using a modular multi-programme (Tables 2, 3, 5) made similar observations in different groups of subjects, and noted a significant decrease in pain VAS and physician visit times or healthcare utilization (Tables 3 and 5).

The effectiveness of multi-disciplinary team care in countering established RA is well recognized. The benefits of such non-pharmacological treatments can be gauged from the conclusions drawn from several RCTs and Cochrane Reviews. It is hardly surprising, therefore, to note that patients with RA constitute the high-end spectrum of complementary and alternative practice therapies, given the nature of the disease as particularly chronic and persistent (43). A diverse range of modalities comprising the 'multi-disciplinary rheumatology team', as various health professionals prefer to label it, include exercise therapy, physical modalities, orthoses and assistive devices, self-management, and dietary interventions. Recent years have witnessed the publication of a sizeable number of reviews focused on a broad spectrum of non-pharmacological interventions in RA (53, 54).

Contemporary interventions that supplement pharmacological and surgical interventions include conventional therapies such as PT and occupational therapy; rehabilitation and self-management programmes are also put to use (43). Evidence strongly suggests that joint-specific, dynamic exercises may lead to significant amplification in strength and physical function (55). The beneficial effects of self-management and functional ability through occupational therapy have been shown in recent meta-analyses (56, 57). Similarly, employment of hydrotherapy in RA cases has also reported positive results (58, 59). There have been insufficient studies on the effectiveness of specific diets in managing RA efficacy. Diet modification has been noted by several RCTs; for example, it has been noted that the vegetarian diet group exhibited considerably better effects on pain and

disease activity across most of clinical variables (36, 60, 61). However, long-term compliance and nutritional deficiencies reduced the acceptability of many dietary interventions (Table 1).

The self-management programme is reported to impart psychological courage and the ability to face the lifelong challenge of RA, and it increases the acceptability of medical treatment (62). Management should address both the physical and mental aspects of life (63). Furthermore, the self-management programme provides a major support to the patient (49). It also provides a better awareness of the ailment and thereby enhances the confidence to self-manage health problems with greater courage (15, 64). It also encourages better compliance of the drug management programme, regular assessment and monitoring of the disease and drug-related effects, knowledge of the progress of the disease, and goal-setting for the treatment and achievement of targets at set times (65).

The first aim of a combined strategy with supervised, sustained standard of care, medical management and self-management programme is to obtain an early remission of the disease. The next target is to bring the body to a fully functional status and to resume work with great physical and mental involvement, and all this may also require vocational rehabilitation (65). The RA self-management intervention programmes help people to maximize their abilities; reduce pain, functional limitations, disability, and depression; and increase self-care behaviours (48). A self-management intervention programme to provide the knowledge, skills and confidence to manage RA was devised (66).

The very few rheumatologists available in developing countries do not have the time and the inclination for community and PE. Education should be left to the allied rheumatology health professionals, if available (67). A professional multi-disciplinary approach to educate patients with RA leads to a significant and sustained improvement in the clinical outcome, and it is an approach that should be established as part of conventional therapy (25). The members of a multi-disciplinary team should take particular care to ensure that a common approach to PE is arrived so that the patients receive a consistent health message (68).

In the literature review, studies have shown that a short period of initial, intensive, non-pharmacological therapy (mostly cognitive behaviour change and supervised exercises) is followed by long-term gains in the form of better improvement in RA symptoms and control and better health measures (Tables 1, 2, 3, 5).

A number of multi-modular programmes for patients with RA or other forms of arthritis have made similar observations in different groups of subjects (Tables 2, 3, and 5). Physical therapy and exercise showed significant reduction in fatigue and significant improvement in joint protection, communication with physicians and dietary habits. A number of multi-modular intervention programmes (Tables 2, 3, and 5) made similar observations in different groups of subjects in patients with RA or other forms of arthritis.

The literature on the effectiveness of non-pharmacological treatment modalities in RA supports the effectiveness of dynamic exercise and cognitive behavioural interventions, and to a lesser extent, joint protection programmes and foot orthoses, and dietary manipulation. Decreased physical activity levels in patients with RA combined with the symptoms of the disease, for example, pain and fatigue, corroborate to formulate a vicious circle that contributes directly to a detrimental effect on other aspects of skeletal muscle health (69). Patients with RA consistently reported a 70% reduction in strength in comparison to healthy counterparts (70). A 2-year strengthening programme resulted in significant improvements in subjective patient assessments of disability by the Health Assessment Questionnaire (HAQ) (71). Decreased habitual physical activity in patients with RA is generally attributed to joint pain, restricted mobility, fatigue, reduced muscle mass, strength, and endurance (72). A corroboration of aerobic and strength exercise training constitutes an ideal exercise programme for the treatment of patients with RA (73).

Exercise is an important component of several self-management programmes, and several studies are reviewed and described in the above section on self-management progress. Research has validated the beneficial role of exercise in yielding specific health benefits in persons with RA. As demonstrated by previous research, exercise is fundamentally beneficial for patients with RA when comparing the effectiveness of high- and low-intensity exercise training in stable RA. The intervention programme on the improvement of life quality in patients with RA is multifaceted, and there are other modes of non-pharmacological treatment of RA, such as occupational therapy. To the best of our knowledge it is not possible to have RCT study based on decreasing pain with big sample size, especially in only RA until the date in these fields is included.

Patients with RA are often treated aggressively with disease-modifying, anti-rheumatic drugs (DMARDs) (eg, methotrexate, hydroxychloroquin, *etc*) along with

steroids, in addition to analgesics and other anti-inflammatory drugs and supportive therapy (4). Such a therapy is fraught with drug-related side effects and toxicity and moreover as patients with RA need long-term treatment (9, 10, 13). There is a need to quickly control the disease and judiciously reduce the medicines to the minimum to sustain control. This is not an easy task and, in real life, it continues to be a major therapeutic challenge. In the last decade or so, biologic DMARDs have emerged as very potent medications, but they are extremely expensive and have the potential risk of several side effects, including proneness to tuberculosis and life-threatening infections (4, 13). Gentler treatment modalities are required to augment the therapeutic efficacy of anti-RA medications. A non-pharmacological treatment could fill up this void and also improve the side effect profile during this period.

CONCLUSION

Epidemiology has taken on new roles in the management of healthcare services. The literature on the effectiveness of non-pharmacological treatment modalities in RA supports the use of dynamic exercise and cognitive behavioural interventions, and to a lesser extent, joint protection programmes and foot orthoses, and dietary manipulation. The effectiveness of multidisciplinary team care in countering established RA is well recognized. It was established that despite excellent advances in management care, patients suffering from RA continued to develop functional limitations, such as deformities. Contemporary computation of the provision and reimbursement of healthcare is based on existing evidence. Policy direction, formulations and purchases are regulated by the requirement and supply of data on the effective parameters of interventions. On a similar note, researchers, healthcare professionals and patients also subscribe to the informational paradigm to identify and define research parameters, and improve upon existing clinical practices and self-management stratification. Self-management arthritis programmes, though found useful by several studies, described above are uncommon in routine clinical practice. Therefore, it is prudent to consider non-pharmacological methods, adjunct to standard care with drugs. At this stage, it may be advisable for patients to also opt for an adjunct, non-drug treatment, like the patients who receives counselling alongside standard care (53). These findings have implications for health policy and allocation of funding for both healthcare and research.

Ethnicity, presumably, may play a major role in the extent of coping with pain and arthritis. Non-pharmacological means to improve the management of RA, as an adjunct therapy to standard care holds a socio-economic appeal for the community. Our results can be exploited further by constructing preventive, instructional, non-pharmaceutical strategies to treat RA that is suited to the community.

Limitation of the literature review

Some databases might not have been covered due to a lack of access to them. Therefore, it is not claimed that this review covers all relevant articles. In some instances, original research articles were cited without a clear account of how the articles were found. At times, personal experience and conventional wisdom are included which may be difficult to distinguish.

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