Joint protection : enabling change in musculoskeletal conditions

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3.4.3 Neuromusculoskeletal and movement related learning

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3.4.3.5 Joint Protection: Enabling Change in Musculoskeletal Conditions

Alison Hammond

1. Abstract

Joint protection includes applying ergonomic principles in daily life, altering working methods, using assistive devices and modifying environments. It is taught to people with musculoskeletal conditions (eg rheumatoid arthritis (RA)),

osteoarthritis, as well as soft tissue rheumatisms. Common principles are to: distribute load over several joints; reduce effort by use of assistive devices; pace activities; use orthoses and exercise regularly. Cognitive-behavioral, self-efficacy and motor learning approaches are employed. Trials demonstrate using these approaches is significantly more effective than advice and demonstration alone in changing joint protection behavior, improving function and reducing pain in both early and established RA. When combined with hand exercises there is evidence it improves grip strength in hand OA but there is still conflicting evidence for effectiveness in soft tissue rheumatisms.

2. Introduction

2.1 *"The problem is changing habits of a lifetime." Joint protection principles are easy to learn – the difficulty is changing habits sufficiently to make a difference.*

2.2 **Keywords**: Arthritis, musculoskeletal conditions, assistive devices, energy conservation, ergonomics, joint protection.

2.3 Definition and background

Joint protection is a core component of occupational therapy interventions for musculoskeleletal conditions. Joint protection is an active coping (or self-management) strategy to improve client's perceived control of their condition, psychological and health status, daily activities, role performance and social participation (Hammond 2004).

Joint protection intervention includes educating in (a) altering working methods, (b) use of proper joint and body mechanics through applying ergonomic principles, (c) use of assistive devices and (d) through modifying occupational performances and environments. It is often integrated with

energy conservation, working splints and mobility and strengthening hand exercises.

Joint protection was first developed in the 1960's, based on increased understanding of pathophysiological changes in rheumatoid arthritis (RA) and biomechanics. Principles were extended into other inflammatory arthropathies, osteoarthritis (OA) and soft tissue rheumatisms (Brattstrom 1987; Chamberlain et al 1984; Cordery 1965; Melvin 1989; Sheon 1985). At this time, people were "encouraged" to regularly practice joint protection in the expectation they would apply this to their personal situation. (Cordery 1965; Chamberlain et.al. 1984). The focus was on improving body structures and function and maintaining ability to perform daily activities.

Research in the last 15 years has used structured self-management education and skills training to promote attitudinal, cognitive, and behavioural changes for improving

protection of the joints. These cognitive-behavioural approaches further impact on personal factors (e.g., increased self-efficacy, perceived control of the condition and problem-solving abilities and reduced frustration) and additionally aim to enable clients to change habits and routines in their daily activities, work and leisure.

2.3.1 Purposes

Joint protection is an active self-management strategy aiming to maintain or improve (a) occupational performance in daily life (b) role performance and participation in social life, (c) perceptions of control (d) psychological and health status (Hammond 2004).

The aims of joint protection are:

(1) for people with RA to *reduce*:

(a) load and effort during daily activity performance thus reducing strain on joint structures weakened by the disease

process, (b) pain, (c) irritation of the synovial membrane, (d) localized inflammation and (e) fatigue.

(2) for people with OA to:

(a) reduce loading on articular cartilage and subchondral bone, (b) strengthen muscle support and (c) improve shock absorbing capabilities of joints (Cordery and Rocchi, 1998).

(3) for people with soft tissue disorders (eg de Quervain's disease, carpal tunnel syndrome) to reduce:

(a) Pain, (b) inflammation and (c) strain on soft tissues.

3. Method

3.1 Potential recipients of the intervention

Joint protection is provided to people living with:

- *Inflammatory polyarthropathies*, e.g. RA, seronegative and psoriatic arthritis. These diseases affect three times more women than men, most commonly in the 40-60 age range, but they may start at any age. RA affects

on average one percent of people globally (Kvien, 2004).

- *Osteoarthritis* (OA) affects the hand, hip, knee or several joints of the body simultaneously (ie generalized OA). Nearly twice as many (1.8:1) women than men live with OA and 10% of people over 60 years old are symptomatically affected Dennison and Cooper, 2003),.

- *Upper limb soft tissue disorders*, e.g. (a) *de Quervain's disease.* This is more common in women than men, with peak onset between 30-50 years. (b) *Carpal tunnel syndrome* occurs in 5.8% of women and 0.6% of men with peak onset between 45-54 years (Fam, 2003).

3.2 Epidemiology

The numbers of people potentially benefitting from joint protection can be estimated from percentages of those with activity limitations. Among people living with **RA** about

60% have activity limitations, particularly related to hand function (Young et al, 2000). A community survey by Jordan et al (2000) identified 43% of people over 65 years old "with arthritis" (mainly OA) experienced difficulty with household activities. The number of people living with *soft tissue disorders* who could benefit from joint protection interventions is unknown. These figures suggest many people with musculoskeletal conditions could benefit from joint protection advice.

3.3 Settings

Joint protection is most often provided in rheumatology and occupational therapy departments, to both in- and out-patients, as well as in community settings.

4. Result

4.1 The role of the OT

In providing joint protection, OTs have both *facilitatory and teaching roles*. The OT has knowledge about (a) pathophysiology of musculoskeletal conditions (b) ergonomic and biomechanical principles for protecting joints and (c) cognitive-behavioral methods. This knowledge constitutes the theoretical base for joint protection interventions, which is clinically applied using educational and facilitatory strategies.

4.2 Clinical application

The commonest principles taught to clients are:

- *Joint protection*: respect pain; distribute load over several joints; use the strongest, largest joint to perform an activity; avoid working in positions of potential deformity; reduce effort by using assistive devices and avoiding lifting and carrying; and avoid prolonged periods of working in the same position.

- *Energy conservation*: pacing by balancing rest and work and alternating heavy and light activities; use work simplification; use correct working positions and posture.
- *Orthoses*: use working orthoses appropriately to reduce pain and improve grip function.
- *Exercise:* exercise regularly to maintain range of movement and muscle strength.

The educational and facilitatory strategies used include motivational, cognitive-behavioral, self-efficacy and motor learning approaches. These enable people to overcome barriers to changing behavior and maximize performance of joint protection so that therapeutic aims are achieved . These strategies include:

- *Discussing* health beliefs and attitudes to the disease.
- *Identifying* clients' expectations, worries or concerns, their valued activities and life goals.

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- *Teaching cognitive-behavioral strategies eg* self-monitoring, goal setting and how to develop action plans for practicing techniques at home. Regular review of such home programs with clients is essential.
- *Teaching* using effective educational techniques to enhance recall of joint protection principles and methods, e.g., simplification, use of advance organizers, explicit categorization.
- *Teaching* joint protection techniques using effective skills training methods (eg practising simple then more complex activities using joint protection, feedback and mental rehearsal).

Enabling modeling, i.e., teaching in small groups, encouraging members to observe each other. Seeing others perform successfully increases self-efficacy and problem-solving ability (Hammond, 2003).

Joint protection can be taught using: a) self-help booklets; b) individual or; c) group education.

4.3 How the intervention militates against impairments, activity limitations and for participation restrictions

Joint protection reduces pain, the likelihood of deformities developing and maintains activity and participation (Hammond and Freeman, 2001; 2004).

4.4 Evidence-based practice

A survey of UK practice identified that joint protection education typically lasts for 1.5 hours over two treatment sessions and does not use behavioral approaches. Usual content is: (a) education about RA, (b) how joints are affected (c) joint protection principles (d) demonstrations with short (eg 15-30 minutes) practice of hand joint protection methods commonly used in cooking and housework activities (eg making a cup of tea), (e) and discussion of solutions to specific problems, supported by a self-help booklet (Hammond et al 1997). This is still typical practice.

Trials investigating joint protection education. A randomized controlled trial (n=55; 6 month follow-up) of one hour of individual education, similar to the "typical" content described above, compared to no intervention improved clients' knowledge of joint protection methods (Barry et al 1994). Similarly, a pre-test post-test trial of a group programme (n=21; 3 month follow-up) providing this "typical" intervention for 2.5 hours as part of an 8 hour arthritis education programme also identified improved knowledge of joint protection but no significant changes in jointprotection behavior occurred. Barriers to changing behavior were identified through interview as: (a) being unable to recall methods sufficiently during daily activity performance (b) considering these as not applicable as "my hands are not that bad yet" or using techniques "on bad days only"; (c) difficulty getting used to the different actions and

(d) difficulty changing the habits of a lifetime (Hammond and Lincoln, 1999).

Many early trials had small sample sizes but indicated that, in established RA, structured group programs emphasizing active learning, problem solving, behavioural approaches, frequent practice and home programs significantly improved: balance of rest and activity (non-randomised trial; n = 25; Furst et al, 1987); use of assistive devices (pre-test post test trial, n = 53) Nordenskiold (1994); and functional ability (pre-test post test trial, n = 21, Nordenskiold et al, 1998).

More recent trials have been larger and methodologically sounder. A randomized trial with people with early RA (average 18 months disease duration, age 50 years, n =127) compared a behavioral joint protection programme with a standard arthritis education programme (including 2.5 hours of “typical” joint protection education). At 12 months, those

in the behavioral group had significantly improved use of joint protection, less hand and general pain, improved functional ability, less early morning stiffness and fewer flare-ups in comparison to the standard education group (Hammond and Freeman, 2001). At four year follow-up, the behavioral group continued to have significantly greater use of joint protection, less early morning stiffness, better ADL scores and fewer hand deformities than the standard education group, who had had continued to deteriorate (Hammond and Freeman, 2004).

The joint protection programme was also tested in people with very early RA (average 4.5 months disease duration; age 51 years; n = 54) with little pain or functional difficulty. At six month follow-up no significant differences between groups or over time occurred (Freeman and Hammond, 2002).

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Trials investigating the effects of joint protection combined with exercise. A randomized controlled trial with people with moderate-severe RA (average 15 years disease duration, age 53 years; n = 85) receiving a behavioral joint protection and exercise programme also identified significant improvements at eight month follow-up in pain, functional and physical ability in comparison to those receiving usual care (Masiero et al, 2007). Both groups were receiving anti-TNFα drugs (eg Infliximab, Etanercept) indicating benefits from joint protection occur even with such biologic drugs.

A randomized controlled trial in people with hand OA (average age 60 years, n=40) identified significant improvements at three months in grip strength and self-perceived hand function, although not pain or functional ability, in comparison to a control group receiving education about OA (Stamm et al, 2002). There is conflicting evidence

for effectiveness of ergonomic interventions in soft tissue rheumatisms (Verhagen et al, 2006).

5. Discussion

These studies highlight three issues. (a) How joint protection education is provided makes a significant difference to whether patients gain benefits or not. The use of educational, cognitive and behavioral approaches is significantly more effective. (b) Providing information does not seemingly provide people with the "tools" to make changes in future when the need arises, as the standard intervention group provided with "typical" joint protection advice continued to deteriorate without making changes longer-term in response. (c) People need to perceive the relevance of using joint protection – it can be too early if people have few or no problems. The conclusion is that joint protection intervention is effective if taught effectively.

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To date, research has focused on developing effective group joint protection programs in RA. However, individual education is more often provided and thus individual behavioral programs need developing and evaluating in RA. Hand OA research has to date combined joint protection and exercise. It is thus unclear whether joint protection is effective if provided without hand exercises. Long-term benefits in hand OA are unknown. Joint protection in lower limb RA and OA has been little evaluated. In soft tissue rheumatism randomized trials are needed using clearly defined conditions and interventions. Cost-effectiveness of joint protection has not been evaluated.

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