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Multidisciplinary Rehabilitation in Musculoskeletal Disorders

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1. Introduction

1.1 Health

Health is a concept with many definitions. The concept also has various meanings in different parts of the world and in different cultures. The definition of health has gone through many changes. Up to the middle of the 20th century, health was defined in terms of the absence of physical illness (Hassmén & Hassmén, 2005). In the mid-1940s the World Health Organization (WHO, 1946) defined the health as follows: *"Health is a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity"*. This idea has been considered by some to be too utopian to be acceptable as a definition of health. The definition would mean that nobody could be regarded as healthy, since nobody experiences complete physical, psychological and social well-being. Over the years WHO has developed its view of the concept of health (Faresjö & Åkerlind, 2008), and in 1986 WHO wrote, *"Health is seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities"*. Thus, health was related to physical, personal and social resources. This means that individuals and groups must be able to identify and realize their desires, satisfy their needs and manage in their environment (Faresjö & Åkerlind, 2008). In primary care there is a concept of health that includes not only medical factors but also psychological and social aspects, and the concept of health refers to the overall conditions for a good quality of life. The concept of life quality covers a person's overall situation, the functioning capacity of the individual, and the ability to manage daily life including a social role, in addition to the absence of stress in working life, meaningful leisure time and general physical and psychological well-being (Faresjö & Åkerlind, 2008).

Historically speaking we have probably never been healthier than we are today, despite reports about increased stress and people being burned out, more allergies and rising obesity in the population. If we have any faith in the trends we have seen for many decades, health will probably slowly but surely improve in terms of rising average life expectancy (SOU, 2009 [National Board of Health and Welfare]; Faresjö & Åkerlind, 2008).

Some differences in health between women and men have their origins in the power structure, as well as cultural and ideological attitudes in society, but there are also biological differences in factors that affect health. The rate of ill health is considerably higher among women, and

self-perceived health is significantly worse. In general, men have greater opportunities in terms of influence and participation, both at workplaces and in society as a whole. Men have a better financial situation overall compared with women. There is an over-representation of women in occupations with high health risks, and women have longer real working hours. In some cases women have fewer opportunities to cultivate healthy living habits; for example two jobs and the fear of being exposed to violence, reduce their opportunities for taking physical exercise (Swedish National Institute of Public Health, 2008:8).

Despite the fact that women live longer than men, health complaints are more common among women than among men. Among both women and men in Sweden, cardiovascular diseases contribute most to premature death, and neuro-psychiatric illnesses (depression), for example, contribute most to impaired health. Reduced psychological well-being and pain are common reasons for people feeling that their general state of health is poor (SOU, 2009 [National Board of Health and Welfare]). Severe pain in the neck and shoulders land in the back is more common among women than men in all ages. Low psychological well-being and pain in the neck and shoulders have increased among women and men since the 1980s, but have decreased in recent years in young people. Psychosocial stress at work has become more common, primarily in workplaces with a majority of women, and women´s working hours have increased, which may have contributed to gender differences (SOU, 2009 [National Board of Health and Welfare]).

Physical activity has a health-promoting effect as well as illness-preventive characteristics (Swedish National Institute of Public Health, 2009:07). An increase in physical activities is among the measures that would have the largest positive effect on public health in Sweden. Regular physical activity has a well-proven influence on a number of conditions of illness such as diabetes, cardiovascular diseases, cancer of the colon and depression. Physical activity also improves the immune system, fitness and muscle strength (Swedish National Institute of Public Health, 2009:07).

1.2 Musculoskeletal disorders

In the Western world musculoskeletal disorders are widespread and a common cause of impaired function and reduced quality of life (Larsson & Nordholm, 1998). They are among the main reasons for consulting primary health care providers and often lead to absence from work. The disorders often start as a non-specific pain condition with pain in the back, neck and shoulder regions (Karjalainen et al., 2003b).

The International Association for the Study of Pain (IASP) defines pain as: ”An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage”. Pain is always subjective. It is unquestionably a sensation in a part or parts of the body, but is also invariably unpleasant and therefore also an emotional experience (Taub et al., 1998). Acute pain is functional and can be considered a mainly physiological response to tissue damage, whereas chronic pain involves psychological and behavioural mechanisms in addition to physiological factors (Verhaak et al., 1998).

Pain from the musculoskeletal system affects most people at some time during their life. The prevalence of musculoskeletal pain in Sweden is 40-65% (Brattberg et al., 1989; Andersson et al., 1993; Gerdle et al., 2004). In most people the pain resolves naturally within a few weeks, but functional disturbances may still be present (Hides et al., 1996; Sterling et al., 2003). Guez et al., (2002) found that 43% of the population reported neck pain and that about half

of them (18% of the population) also reported chronic pain – a frequent cause of disability and reduced quality of life. Chronic low back pain has been reported to occur in about 20-30 % of the population (Picavet & Shouten, 2003; Andersson et al., 1993; Elliott et al., 1999).

Pain in the lumbar region and the neck may not only reduce functional capacity but may also give rise to worries, anxiety and depression (SBU, 2000). Impaired mental functions may result in difficulties in concentrating, fatigue, and pain in muscles and joints, which may lead to a deterioration of movement patterns as well as a restricted capacity for activities (SBU, 2000; SBU, 2003). Functional impairment as a result of back pain can to a certain extent be demonstrated medically, but many studies have shown that functional impairment is governed more by psychosocial factors (Waddell, 1987; Allan & Waddell, 1989). Currently there is strong evidence to show that a large number of psychological factors influence the development and prolongation of acute as well as chronic pain in the lumbar region and neck (SBU, 2000). Cognitive and behavioural factors play a significant role in the transition from acute to chronic pain in the back and neck. Among the most powerful cognitive and behavioural risk factors are pain-related fear, distress and avoidance of activity (Boersma & Linton, 2005). Prolonged pain tends to develop into a combination of physical, psychological and social disabilities (Karjalainen et al., 2003b; Soares et al., 2004; Blyth et al., 2001). Taub (1998) concluded that if pain-associated behaviours limit a patient's function, a chronic pain syndrome may develop.

With regard to people suffering from long-term pain, much attention is focused on the symptoms and what is perceived as being unknown and abnormal in the body. Pain dominates the patient's life and in many cases constitutes an obstacle to daily activities. Fatigue and sleep disruption are common among people suffering from pain (SBU, 2006).

1.3 Rehabilitation

Rehabilitation is a diverse concept, the word itself originating from the Latin terms" re – again", and" habilis – capable" (Borg et al., 2006). The concept of rehabilitation is used in various ways, however, as different discussions and debates, the current view of health in society, the context and the welfare health system influence the contents of rehabilitative activities (SBU, 2006). The definition of rehabilitation proposed by the World Health Organization (WHO), which was put forward in connection with the United Nations (UN) year of handicap in 1982, is as follows: "*The process may include measures intended to compensate for a loss or restriction in functioning capacity (e.g. using technical aids) and other measures intended to facilitate social adaptation or readjustment.*" (SoS, 1993:10 [National Board of Health and Welfare])

Rehabilitation is normally used as a generic term for all measures, be they medical, psychological, social or occupational, intended to help people regain the best possible functional capacity and prospects of leading a normal life (Höök, 2001). In a rehabilitation context, there are many other significant factors in addition to medical aspects. Rehabilitation assumes that the patient participates in the process of rehabilitation in a different way from that which is normal during medical treatment. The concepts of treatment and rehabilitation reflect the difference between the roles of passive and active patients (SBU, 2006). Ekberg (SOU, 2000:78) describes rehabilitation as a process of change characterised by discussion, participation, reflection, and planning of resources. Lundgren &

Molander (2008) see rehabilitation as a process with constant setting of goals, new strategic choices, new measures, evaluation, and setting of new goals.

Rehabilitation activities have developed over the years and have been given fresh meaning as new disciplines have started to work in this area. More and more organisations and professions have become involved in the work of rehabilitation as a result of changing perspectives, increasing knowledge of people's resources, obstacles to activities, and participation (Kertz et al., 1995).

Medical rehabilitation is provided by the health care system. The aim of this rehabilitation is as far as possible to restore, improve or maintain functional abilities of a person suffering from an illness or injury. The goal is to have a health care system based on individuals' needs that will cover the whole population. In practical terms, medical rehabilitation – in addition to traditional health care – may also include physiotherapy, occupational therapy, testing of aids, functional tests, guidance, or other supportive measures (Vahlne Westerhäll et al., 2006).

Labour market authorities are responsible for **occupational rehabilitation**, which helps people to strengthen their value on the labour market, both in order to gain and keep a job. The goal for people with functional impairments seeking work is to find a job on the ordinary labour market, and in practice involves measures such as change of employment, training and counselling (Vahlne Westerhäll et al., 2006).

The concept of **vocational rehabilitation** was introduced with the rehabilitation reform at the beginning of the 1990s. The term refers to rehabilitation measures that aim to facilitate the return to work of people on sick leave. The Swedish Social Insurance Agency and the Swedish Public Employment Service are jointly responsible for vocational rehabilitation. Rehabilitative measures that are considered may be of many types. Mapping of rehabilitation needs, job training and work trials are some examples of measures that may be relevant (Vahlne Westerhäll et al., 2006).

Social rehabilitation is governed by the Social Services Act (2001:453). The responsibility lies with social services in the municipalities, whose overall goal is to create economic and social security, equality of living conditions and active participation in life in society (Vahlne Westerhäll et al., 2006).

The importance of co-ordinating rehabilitation measures provided by different agents within and outside the health care system has been recognised since the beginning of the 1990s. The central person should be the individual needing support, but experience shows that if all agents (health care, social insurance agency, employer, occupational health service) co-operate, the chances of successful rehabilitation will increase (Lindqvist, 1995).

Rehabilitation is the first step in a long-term process for the individual. Intensive rehabilitation for 4-8 weeks simply does not solve problems that may have developed – with or without sick leave – over several years, but should be seen as a starting point in a longer process leading to the individual gaining a different, better approach to life (Lindqvist, 1995).

Gerdle & Elert (1999) define in schematic terms three different rehabilitation levels or processes for chronic pain, based on needs and the number of measures initiated: 1. **Unimodal rehabilitation**, which means that one single measure is implemented, such as physiotherapy, dialogue, etc; 2**. Intermediary rehabilitation**, in which additional measures must be taken. The personnel do not generally work in teams; the work is based more on

regular contacts between the treatment providers involved. These two forms exist in both primary care and specialist care. In the case of vocational/occupational rehabilitation, co-operation with the social insurance agency is organised; 3. **Multimodal rehabilitation** is provided in situations with relatively extensive and complex needs. Here the rehabilitation process involves a number of well-planned and synchronised measures over a long period of time. The process requires that the personnel work in teams. When the team is from primary care, it normally consists of a physiotherapist, doctor and counsellor. In multidisciplinary pain clinics and medical rehabilitation clinics there are more advanced teams, with a doctor, physiotherapist, counsellor, occupational therapist, psychologist and nurse (Gerdle & Elert, 1999; Borg et al., 2006).

In an SBU report (2006) it is stated that the terms "multidisciplinary" and "multiprofessional" are used synonymously in scientific contexts. The term "multimodal" is used in the report with the same meaning, despite the fact that linguistically this indicates the forms of rehabilitation rather than the way in which rehabilitation measures are organised. Lundgren & Molander (2008) state that the term "multidisciplinary" in this context relates to the areas of knowledge on which the rehabilitation is based, and thus emphasise the aspect of theory. Rehabilitation is a multidisciplinary type of care, since it is based on knowledge generated in many different fields of science. The term "multiprofessional" relates to the professionals involved in the rehabilitation work, and underlines the organisational aspect. Rehabilitation is often a multiprofessional type of care, since different professionals work together. The term "multimodal" refers to the different types of medical treatment required to rehabilitate a patient, and thus emphasises the aspect of implementation. Rehabilitation is a multimodal type of care, since the patient's problems are tackled on several fronts simultaneously (Lundgren & Molander, 2008).

1.4 Multidisciplinary rehabilitation

Neck and low back pain is a complex problem. A variety of multidisciplinary treatments have been developed that focus on restoration of functional activity, pain reduction, and return to work. Several systematic reviews have shown that many interventions for neck and back pain are ineffective or insufficiently evaluated (Guzman et al., 2007; Karjalainen et al., 2003a; Krismer & van Tulder, 2007). However, multidisciplinary rehabilitation is effective in increasing physical function and reducing pain in neck and back patients (Airaksinen et al., 2006; Krismer & van Tulder, 2007; Karjalainen et al., 2003b; Guzman et al., 2007). Physical conditioning programs that include a cognitive-behavioural approach plus intensive physical training that embraces aerobic capacity, muscle strength and endurance, and co-ordination are in some way work-related, as they seem to be effective in reducing sickness absence, as compared to conventional care (Schonstein et al., 2003).

Haldorsen et al (2002) have shown that choice of treatment seems to be especially critical for patients who have been found to have a poor prognosis regarding return to work. Extensive multidisciplinary treatment for these patients seems to be superior both from the patient's point of view and from an economic perspective. Jensen et al (2009) have also shown that a full-time workplace-oriented multidisciplinary program is a cost-effective form of rehabilitation for individuals suffering from non-specific neck/back pain. Interventions should optimally be initiated within the first 2 months of sickness absence.

Grahn et al (2004) reported that multidisciplinary rehabilitation improved the quality of life of highly motivated patients most cost-effectively and that latently motivated patients required less intensive rehabilitation and of a longer duration to improve. Motivation could be a predictor of total costs and is a factor that has to be taken into account in the examination procedure.

2. Experience of our studies

Sixty participants, 40 women and 20 men (46.8±SD7.9), with musculoskeletal disorders, mainly neck and back pain, participated in a 7-week multidisciplinary rehabilitation program. Data were obtained at the start and the end of the rehabilitation program and at follow-up examinations 6, 12 and 24 months after completion of the program. A group of 10 full-time sick-listed participants at the end of the 2-year study period were compared with the rest of the participants who were part-time or not at all sick-listed. Of 60 participants attending the rehabilitation program and attending the 2-year follow-up, all but five women and one man participated in the 5-year follow-up. The reasons for drop out were moving out from the catchment area and personal reasons.

2.1 Rehabilitation program

The behavioural medicine-based rehabilitation program was conducted over a period of 7 weeks, 4 hours a day, 5 days a week. The program was adapted to the individual participant, with physical activities in several forms (walking with or without sticks, water gymnastics, back gymnastics and participation in individual training programs), relaxation (different techniques, practised Qi-gong as well as body awareness training), theoretical and practical education (education in training theory, ergonomics, coping with pain, stress handling, discussions concerning life-style questions, questions regarding working life and behavioural changes), and individual guidance. The participants also had regular meetings, once a week, with the team members, to check up, during the 7-week rehabilitation program. Together with a member of the team, each participant developed a rehabilitation plan at the start of the program. There was a follow-up at the end of the program and on different occasions during a 2-year period and 5-years after the program. The participant were offered individual counselling by a psychologist during the rehabilitation program and, if considered necessary, follow-up after the course. They were also offered individual appointments with the other team members if necessary. During the program there was a rehabilitation meeting with the regional social insurance office, employer or employment office to check the participant´s situation regarding return to work.

2.2 Measurement instruments

Before and after the program and at the follow-up occasions all participants were evaluated with the Degree of sick leave, the Disability Rating Index (DRI) (Salén et al., 1994), the Pain Intensity Rating Index on a visual analogue scale (VAS) (Carlsson, 1983), the Global Self-Efficacy Index (GSI) (Rheumatology Physiotherapy,1998), Hospital Anxiety and Depression Scale (HAD) (Zigmond & Snaith, 1983), the Stress test (Claesson et al., 2003) and mobility tests (DBC-Documentation Based Care, 2008). A group of participants who were still full-time sick-listed at the end of the study period were interviewed and the interviews were analysed by manifest content analysis (Graneheim & Lundman, 2004).

2.2.1 Degree of sick leave

The level of sick leave was reported by the participant before and at the end of the rehabilitation program and 6, 12, 24 months and 5 years after its completion. The alternative sick leave levels (100%, 75%, 50% and 25% of full-time) are decided by the Swedish sickness compensation system.

2.2.2 Disability Rating Index

The participants filled in a questionnaire, the DRI concerning physical disability (Salén et al., 1994). The DRI is constructed as a self-administered form, where the participants mark on a 100-mm visual analogue scale (VAS) in accordance with her/his presumed ability to perform the daily physical activities in question. The anchor points are "without difficulty" = 0 and "not at all" = 100. The questions are arranged in increasing order of physical demand, particularly with reference to low-back pain (Salén et al., 1994).

2.2.3 Pain intensity rating

Pain was rated by the participants, using a visual analogue scale. The rated level of pain concerned the last 24 hours. This VAS consists of a 100-mm long line, anchored by verbal descriptors, to the left "no pain" = 0 and to the right "worst pain possible" = 100. The participant marks on the line where he/she is placed concerning pain intensity. The score is measured from zero to the patient´s mark (Carlsson, 1983).

2.2.4 Global Self Efficacy Index

The GSI was used for evaluation of health-related quality of life (QoL) (Rheumatology Physiotherapy, 1998). The questionnaire is divided into three main topics, namely physical condition, mental condition and sleeping disorders. The scores are summed and the total index ranges from 0 – 10, where 0 represents the best possible health-related QoL and 10 worst imaginable (Rheumatology Physiotherapy, 1998).

2.2.5 Hospital Anxiety and Depression scale

The HAD was also used. This consists of 14 items and has two subscales, one for measuring anxiety and the other for depression (Zigmond & Snaith, 1983). The scoring system ranged from absence of a symptom or presence of positive features (score 0) to maximal presentation of symptoms or the absence of positive features (scores 3). Thus the higher the score, the higher the anxiety and/or the more severe the depression (Zigmond & Snaith, 1983).

2.2.6 Stress test

The stress test is an instrument for assessing the level of self-rated stress behaviour (Claesson et al., 2003). It consists of 20 statements referring to stress behaviour in everyday life situations and is based on two major themes, time urgency/impatience and easily aroused irritation/hostility. The score ranges between 0 and 60 points, higher scores indicating more stressful reactions (Claesson et al., 2003).

2.2.7 Mobility tests

Active cervical mobility was assessed with use of a measurement helmet equipped with a goniometer, the Cervical Measuring System (CMS), which is an improvement of the ad modum Myrin goniometer (Medema Physio AB, Sweden) (Alricsson et al., 2001; Malmström et al., 2003). Active maximal voluntary mobility was measured as flexion, extension, lateral flexion and rotation ROM. The results of each mobility test were recorded in degrees.

Specially designed measuring and training units (DBC, 2008) were used for measuring the active mobility of the throacolumbar spine. The results were obtained in degrees. Active maximal voluntary mobility was measured as flexion, extension, lateral flexion and rotation ROM.

2.3 What did we find?

Sixty persons participated in follow-up occasions during the 2-year study period and 54 participants participated in the 5-year follow-up occasion.

Between the start of the rehabilitation program and the 5-year follow-up the rate of full-time sick leave in the entire group was lowered by 41 per cent ($P<0.0005$) (Fig. 1). Full-time sick leave for women decreased with 46 percent ($P<0.0005$) and for men with 32 per cent ($P<0.001$) from the start of the rehabilitation program until 5-year after completion of the program. More men than women were working full-time after 5 years, while more women were receiving part-time sickness benefit ($P< 0.05$).

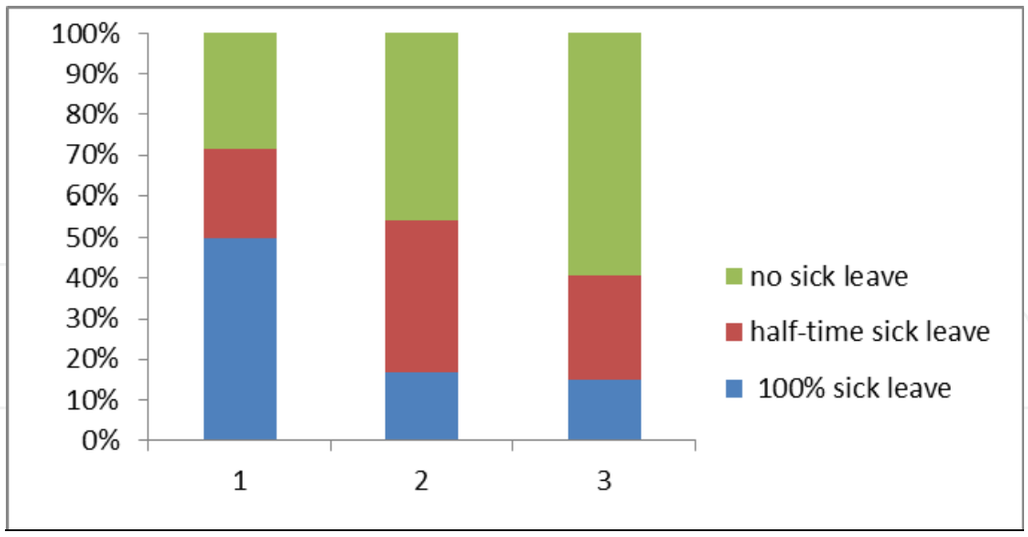

Fig. 1. The distribution (%) of sick leave during the 5-year follow-up period. 1 = before the rehabilitation program, 2 = at the 2-year follow-up period, 3 = at the 5-year follow-up period ($P<0.0005$).

In the studies it was found that the rate of sick leave did not change during the rehabilitation program in either the women or the men, but that it gradually decreased both in the women and the men during the follow-up period of five years (Fig. 1).

The interpretation of observed rates of return to work after participation in rehabilitation programs has varied considerable between different studies. Some authors have regarded a return to work rate of six per cent as a good result, while others have had the opinion that a level of at least 80 per cent should be reached to be considered as satisfactory (Norrefalk et al., 2005). In the present investigation the rate of full-time sick leave decreased by 46 per cent in women and 32 per cent in men. These results differ from those in other studies (McGeary et al., 2003; Storro et al., 2004; Ahlgren & Hammarström, 1999), which have indicated that women have more difficulty in returning to the labour market after sick-listing than men. On the other hand Jensen et al (2005) found that after multidisciplinary treatment with emphasis on behavioural changes women suffering from pain in the neck and back reduced their numbers of sick days substantially, compared to men.

In the present studies there was a larger proportion of women than of men on part-time sick leave, both before and after the rehabilitation program, as well as after the follow-up period. The finding that part-time sick-listing is more common among women than among men is in accordance with the general sex distribution of sick-listing in Sweden (RFV, 2003 [Swedish National Social Insurance Board]). Jensen et al (2005) and Karlsson et al (2006) have suggested as an explanation for this that men are less prone to stay on sick leave part-time. The reluctance to be at work only part-time could lead to a preference among men either to stay on full-time sick leave or to seek full-time disability pension. In the present investigation there were participants who underwent the rehabilitation program with a preventive purpose. They had a history of short-term sick leave and had difficulties in managing their jobs. These participants were not sick-listed when they started the rehabilitation program. It is remarkable that half of the men took part in the rehabilitation program with a preventive purpose, compared to one out of four of the women. This supports results of earlier studies that have shown that women and men are viewed and treated differently. There is a difference not only in how they are referred for various examinations and treatments, but also in the way the treatment is managed (Ahlgren & Hammarström, 1999; Hamberg et al., 2002; Ahlgren & Hammarström; 2000; Wahlström & Alexandersson, 2004; Vahlne Westerhäll et al., 2006).

A decrease in pain rating according to VAS was found in the total study group at the 5-year follow-up compared with the scores before the rehabilitation program ($P<0.001$) (Fig. 2).

Pain ratings by women did not change significantly from the study start to the 5-year follow-up, in contrast to men, who decreased ($P<0.001$) their pain ratings during the study period. The women scored higher at VAS than men both at the start of the program and at the 5-year follow-up.

As based on the DRI questionnaire, self-experienced physical disability decreased ($P<0.01$) in the entire group from the start of the rehabilitation program until the 2-year follow-up (Fig. 2). Between the 2- and the 5-year follow-up the reduction of physical disability was maintained.

The total study group reported a decrease in anxiety ($P<0.0005$) between baseline and the 2-year follow-up and the reduction was maintained 5-years after its completion (Fig. 3).

Both sexes reported decreased anxiety (women $P<0.001$; men $P<0.01$, respectively). At the start of the program women scored higher regarding anxiety than men. At the 5-year follow-up both sexes scored the same regarding anxiety.

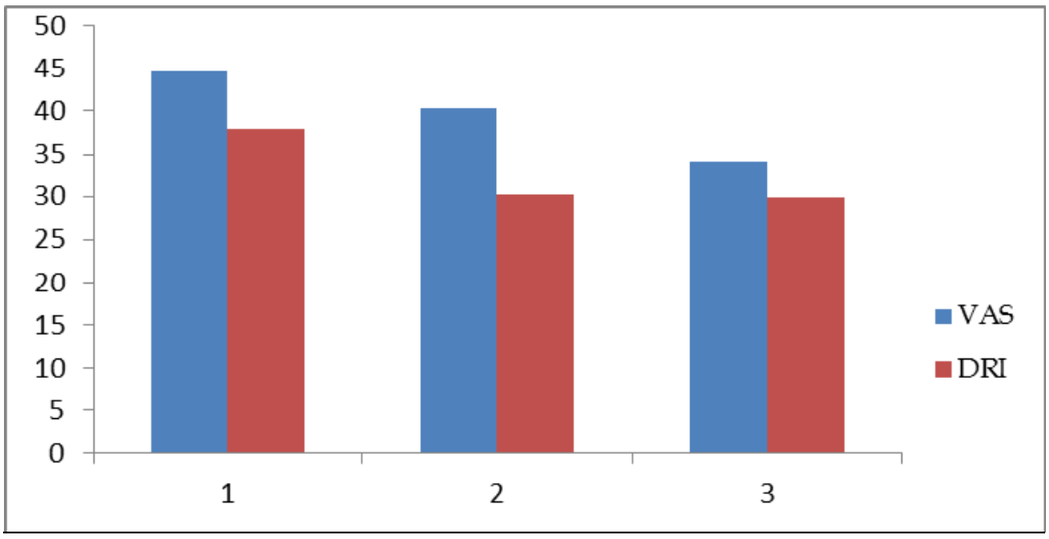

Fig. 2. Pain rating (VAS) and physical disability (DRI) development during the 5-year follow-up period. 1 = before the rehabilitation program, 2 = at the 2-year follow-up, 3 = at the 5-year follow-up period. VAS (P<0.001 and DRI (P<0.01).

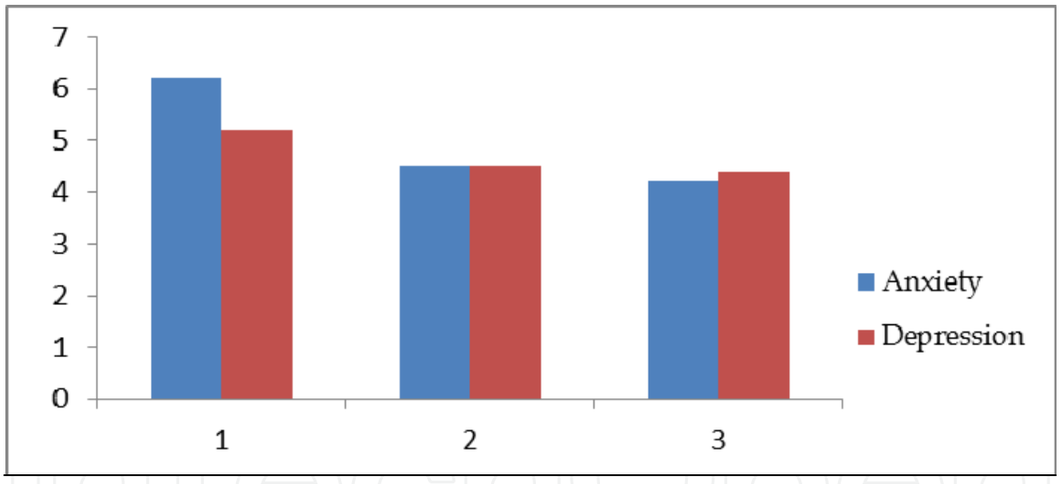

Fig. 3. Anxiety and depression (HAD) development during 5-year follow-up. 1= before the rehabilitation program, 2 = at the 2-year follow-up, 3 = at the 5-year follow-up period. Anxiety (P<0.0005) and depression (P<0.01).

Depression decreased (P<0.01) from the start of the program to the 2-year follow-up and was maintained at the 5-year follow-up (Fig. 3). Women reported decreased depression (P<0.001). In contrast to men this decrease regarding depression was maintained at the 5-year follow-up.

Self-experienced stress decreased in the total study group (P<0.0005) from the start of the program to the 2-year follow-up (Fig. 4). There was a gradual decrease in stress in both women (P<0.0005) and men (P<0.001) at 2-year follow-up, followed by stagnation at 5-year follow-up.

In the participants who were on full-time sick leave from the start of the program to the 2-year follow-up the scores for self-experienced physical disability and the pain ratings were initially high and showed no decrease during the period up to the 2-year follow-up. In the participants who had part-time sick leave or no sick leave, the physical disability and pain ratings were initially lower than in full-time sick-listed and gradually decreased ($P<0.01$ and $P<0.05$, respectively) throughout the 2-year follow-up period.

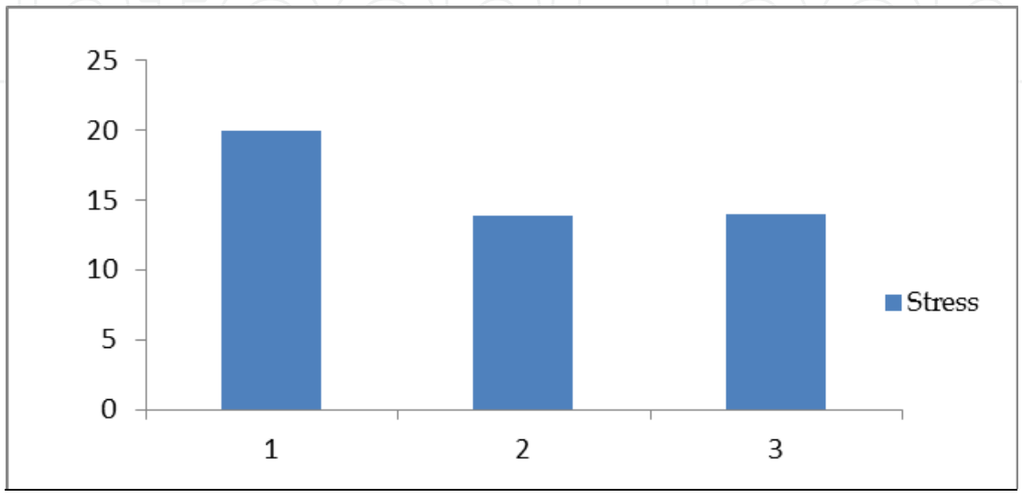

Fig. 4. Stress test development during 5-year follow-up. 1 = before the rehabilitation program, 2 = at the 2-year follow-up, 3 = at the 5-year follow-up period. Stress test ($P<0.0005$).

In contrast to part-time sick-listed participants, full-time sick-listed experienced no change in the physical disability (DRI) or pain rating (VAS) from the start of the program to the 2-year follow-up. Both groups reported an increase in QoL: full-time sick-listed had a GSI score of 3.44 before the start of the rehabilitation and 2.78 at the 2-year follow-up ($P<0.01$), while in part-time sick-listed this score was 4.22 before the start of the rehabilitation and 2.99 ($P<0.0005$) at the 2-year follow-up.

There were no changes in flexion-extension, rotation and lateral flexion ROM of the cervical spine during the two years in full-time sick-listed, in contrast to the improvement in part-time or no sick-listed. The values for ROM were consistently lower in full-time sick-listed than in part-time or no sick-listed. Part-time or no sick-listed showed increased ROM in flexion-extension ($P<0.0005$), rotation ($P<0.0005$) and lateral flexion ($P<0.01$) during the rehabilitation period and this increase was maintained at the 2-year follow-up.

In the thoracolumbar spine full-time sick-listed participants showed a lower active ROM than part-time or no sick-listed both at the start of the program and at the 2-year follow-up. Full-time sick-listed increased ROM in thoracolumbar spine flexion-extension ($P<0.05$) from the start of the program to the 2-year follow-up, but there was no change in ROM in rotation and lateral flexion during the 2-year follow-up period. Part-time or no sick-listed showed an increase in ROM in thoracolumbar spine flexion-extension ($P<0.0005$), rotation ($P<0.0005$) and lateral flexion ($P<0.0005$), and this was maintained at the 2-year follow-up.

There was no correlation between the improvement of ROM and of physical disability, pain and QoL, respectively, in the total study group.

Full-time sick-listed experienced no change in anxiety or depression from the start of the program to the 2-year follow-up, in contrast to part-time or no sick-listed participants, in which anxiety ($P<0.0005$) and depression ($P<0.01$) decreased during the corresponding period. Decreased stress was found in both groups at the 2-year follow-up. In full-time sick-listed there was a decrease in stress after the rehabilitation program, followed by an increased stress score at 6 months, with subsequent decreases at the 12- and 24-month follow-ups. In part-time or no sick-listed the stress gradually decreased and this reduction was maintained up to the 2-year follow-up ($P<0.0005$).

Most participants improved after undergoing the rehabilitation program. Improvement occurred in terms of reduced disability, pain, anxiety and depression, a decreased stress level, an increased quality of life and increased active ROM in the cervical and the thoracolumbar spine. This was particularly true in people who were not sick-listed or only sick-listed part-time during the rehabilitation and at a 2-year follow-up and the results were maintained up until the 5-year follow-up. At a 5-year follow-up, after a multimodal program, Westman et al (2006) found a decrease in sick leave, improved QoL and reduced pain. Improvements in perceived health and psychosomatic symptoms were also maintained at their 5-year follow-up. It is difficult to compare not only rehabilitation programs but also measurement instruments used in different programs, but their program was similar to ours. The persons in their program participated 3.5 h per day 5 days a week for 8 weeks and with eight to ten persons in each group. The program consisted of physical activity in several forms, relaxation, theoretical and practical education and individual guidance. Several other outcome studies and reviews of multidisciplinary treatments, with a functional restoration approach similar to ours, have shown strong support for the efficacy of the treatments regarding return to work, psychosocial variables, QoL and pain reduction (Norrefalk et al., 2007; Schonstein et al., 2003; Grahn et al., 1998; Gahn et al., 2000).

Compared with the men, the women reported lower QoL and more anxiety, depression and stress both before the rehabilitation program and during the 2-year follow-up. These differences may be explained by the fact that women were referred for the program at a later stage than the men. Sick leave was more common among the women at the start of the rehabilitation program than among the men, while the men participated with a preventive purpose. On the other hand, several studies have shown that women in general have a somewhat lower self-estimated QoL, greater anxiety and depression and higher stress level than men (Hensing et al., 2006; Tabenkin et al., 2004; McGeary et al., 2003; Storro et al., 2004; Gatchel et al., 1995).

Physical function, pain rating and QoL showed no correlation with any of the cervical or thoracolumbar ranges of motion (ROM) at the start of the rehabilitation, and the improvement in ROM after rehabilitation was not correlated with improvement in physical ability, pain rating, or QoL. Some form of active exercise can produce changes in corresponding physical parameters, but exercises generally bear little relationship to improvement in activity levels or return to work (Waddell & Burton, 2005; van Tulder & Koes, 2002). The goal of active exercise is to overcome activity limitations and restore activity levels (Waddell & Burton, 2005). Kuukkanen & Mälkiä (2000) showed that mobility

did not play an important role in coping with chronic low back pain in subjects whose functional limitations were not severe.

In the present investigation it was shown that there was a subgroup, consisting of participants on full-time sick leave, who did not benefit from the program in terms of lowering their rate of sick-listing. This subgroup had a high self-experienced physical disability score and a high pain rating score at the start of the program and there was no change during the follow-up period. These participants even reported somewhat higher scores for disability and pain at the 2-year follow-up measurement than before the start of the program. Pain rating is a subjective experience which varies between individuals and between the same individual from one time to another (Briggs & Closs, 1999). Collins et al (1997) showed that acute pain patients had a score of 30 mm on a 100 mm VAS, which corresponded with moderate pain, or a score of 54 mm or more which corresponded with severe pain. In the present investigation participants on full time sick leave had a VAS-score of 57 mm at the start of the program and 62 mm at the 2-year follow-up. There were no changes in anxiety and depression during the follow-up period in these participants, but their stress level decreased. Westman et al (2006) similarly showed that persons working at the time of the 5-year follow-up differed significantly regarding almost all variables investigated, from those not working, in direction indicating that working people generally enjoyed better health.

The participants who were sick-listed full-time in the present investigation did not benefit from the rehabilitation program. Their sick-listing did not change during the 5-year study period and neither did the disability score or the pain rating score alter. This sub-group was interviewed. From the analysis six sub-categories and three categories emerged, which described the participants´ experiences of barriers to and possibilities of returning to work, and indicated what strategies they used to cope with everyday life. The participants stated that the main barriers to returning to work were pain and somatic symptoms, fatigue, and not being able to fulfil the work requirements. According to the participants the barriers to returning to work included different physical symptoms as well as fatigue, especially mental fatigue. They did not feel wanted, as they were unable to manage the requirements of the employer and social insurance office, and also because of the uncertainty about the extent of their working capacity.

This research was conducted in a sparsely populated area in northern Sweden where the labour market is very restricted, with a lack of flexibility in working conditions and few opportunities to transfer to another job or to change the content of the work. Most of the participants believed that they would be able to return to some kind of work, if not full-time at least to a certain degree. Many of them claimed that they did not feel wanted on the labour market. They could not cope with the requirements set by employers and were unable to manage the work they had done before sick-listing, because of pain and other physical barriers. It was impossible to find modified work, transfer to another job, or return to an earlier job, situations which in some cases resulted in being given notice of dismissal. Workplaces tend to accept only healthy individuals with a full production capacity (Waddell & Burton, 2005; Magnussen et al., 2007). This perhaps demonstrates that people with physical symptoms and disability need workplaces better adapted to their residual working ability. This requires an understanding and supportive attitude on the part of the employer, the social insurance agency and the society in general.

3. Conclusion

- The rehabilitation program seemed to have had an effect on the participants ability to cope with symptoms long after the end of the rehabilitation program. Most participants had returned to work, and reported less pain. The improvements made in physical disability and mental health prior to the 2-year follow-up were maintained at the 5-year follow-up.
- A sub-group of ten participants were still on full-time sick leave 5 years after the completion of the rehabilitation program. They had a high self-experienced physical disability score and a high pain rating score at the start of the program and these did not change during rehabilitation and the follow-up period. Anxiety, depression and stress were rated at a lower base line and changed more favourably in participants with part-time or no sick leave than in those with full-time sick leave during and after the rehabilitation.
- Participants with full-time sick leave before and after the rehabilitation program and during the follow-up period showed no improvement in their active range of motion in the cervical and thoracolumbar spine during the rehabilitation or in the 2 years of follow-up, in contrast to the finding in those who had only been sick-listed part-time or not at all.
- In contrast to our expectations, physical function, pain rating and QoL showed no substantial correlation with any of the cervical or thoracolumbar ROM at the start of rehabilitation, and the improvement in ROM observed after the rehabilitation program was not correlated with improvement of physical ability, pain rating, or QoL.
- The interviews with the subgroup showed that people with physical symptoms and disability require workplaces better adapted to their residual working ability.
- This requires an understanding and supportive attitude on the part of the employer, the social insurance agency and the society in general.

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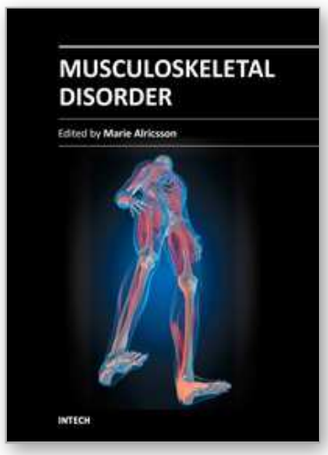

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Work-related musculoskeletal disorders are a significant problem throughout the world. The work environment has undergone rapid changes in recent years. With increasing number of workers being tied to man, machine systems, susceptibility to constrained postures, visual strain and mental and physical stresses have increased. This book is a collaboration among many clinicians and researchers and a small step in addressing these issues by discussing various aspects of musculoskeletal disorders from different professions, researchers and countries.

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