

Physical and Rehabilitation Medicine in  
Patients Suffering from Chronic PainEnrique Varela-Donoso<sup>1\*</sup>, Miguel Suárez-Varela<sup>1</sup>, M<sup>a</sup> Ángeles Atín-Arratibel<sup>2</sup>, M<sup>a</sup>  
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## Introduction

The World Health Organization (WHO) has defined Rehabilitation as “the use of all available means, with the aim of reducing the impact of disability as well as the diseases that cause it, allowing the disabled to reach an optimal level of social integration” [1]. More broadly, the Section for Physical Medicine and Rehabilitation of the European Union of Specialist Physicians (UEMS-PRM Section) defines Physical and Rehabilitation Medicine (PRM) as: “an independent medical specialty, related to physical and cognitive functioning, to activity Behavior), participation (including quality of life), and modification of personal and environmental factors. Being therefore responsible for the prevention, diagnosis, treatment, as well as the management of rehabilitation for disabled people of all age ranges” [2].

One of the symptoms that people consult most often with the medical specialist in PRM, is pain, in any of its forms and facets.

Chronic Pain (CP) is one of the symptoms that most incapacitates subjects who suffer from it, limiting their activity and restricting their social participation. These subjects find in our field of competence a great variety of methods of assessment and diagnosis, as well as of varied therapeutic and follow-up modalities that can permit limitations are reduced significantly. To these modalities we will refer us more in this chapter [3].

In industrialized countries, the cost of the economic consequences of pain (complementary examinations, continuous treatments, absence of work, financial compensation for patients, etc.) is a determining factor in further development of centers for the treatment of this symptom, and therefore of places where, among other things, physical medicine (PM) therapies are provided. It is estimated that one-third of the inhabitants of industrialized countries suffer recurrent or chronic pain, with headaches in any of their modalities (myotensive, migrainous, etc.), followed by low-back pain, sciatica and musculoskeletal conditions in general, the most common causes. These patients may benefit, to a large extent from the treatments of PRM [4].

The benefits of long-term rehabilitation, both for chronic conditions in general and for pain in particular, are multiple, reducing as we have already mentioned, both disability and economic costs and improving the quality of life of subjects who suffer from it. Rehabilitation is an important component of the pain management plan; It should be provided by an expert team lead by a PRM-specialist (Physiatrist), whose main objectives will be to restore functioning, relieve pain and provide the patient with skills to manage when such symptom remains persistent [5].

## Patient Clinical Management with Chronic Pain

The first objective to be achieved in the treatment of patients with chronic pain is to relieve this and improve their quality of life as well as their functional capacity. It continues today not being clear why in some subjects their pain remains chronic, while others can solve it in an acute stage without major difficulties.

In order to face the problem of chronic pain in PRM, it is necessary, on the one hand, to assess the patient adequately, and, on the other, on many occasions, to have a good team of professionals who work in a coordinated way, each according to their competencies and with an appropriate training.

## Interprofessional team working in PRM

Chronic pain is a clearly a multifactorial process and no physician has, on many occasions himself, all the resources necessary to deal with it in a global way; This is so due to its psychological, social, legal, medical and physical dimensions that related to it. As we have already mentioned,

in many cases the opinion and participation of different medical specialists (general practitioner, PRM-specialist, orthopedic surgeon, neurologist, psychiatrist, anesthesiologist, etc) is necessary. In many other occasions, the role of other health professionals is also necessary: nurses, physiotherapists, occupational therapists, prosthetists, clinical psychologists, social workers, etc). All these professionals, working in a coordinated manner and with a wide range of knowledge and qualifications, will also obtain the best functionality and social participation of the patient to which we have referred previously [6]. The work of one or more of these health professionals within the field of PRM will be required depending on the type of patient and its process, and especially in cases where a continuous physical therapy intervention is required (massage therapy, physiotherapy, occupational therapy, etc). Eventually, the PRM physician will apply some of the techniques of physical modalities in the clinic itself, for example when performing a spinal manipulation, local infiltrations, Extracorporeal Shock Waves Therapy (ECSW), dry needling as well as to prescribe, indicate and educate the patient in the performance of physical activity at home by himself. This working team should meet regularly to discuss, establish, monitor, review and update the plan of therapeutic interventions and care of each patient. It is necessary that its members communicate openly and mark the goals to be achieved [6].

In the last decades, and from here we have added to this recommendation, the patient and, if appropriate, his family as well. Patient and family have to take part in some way in the decisions of the professional team, being able to help and advise the professionals to establish therapeutic objectives and to determine realistic expectations of progress and improvement; all these things based on the physical, psychological and social characteristics of the patient [7].

### Rehabilitation assessment of patients with chronic pain

Apart from the physical assessment that the PRM physician should perform to the patient with chronic pain, focusing mainly on musculoskeletal and neurological assessment: Joint Range of Motion (ROM), muscle strength and tone, muscle-ligament and texture palpation, various musculoskeletal tests, assessment of osteotendinous reflexes, spasticity or hypotonia, etc. It is also important to quantify both the pain, and especially the disability that the pain causes to the patient and whether or not this affects his/her quality of life. For the latter, the different functional assessment scales are useful, which must be passed to the patient from time to time to better measure their pain, their disability, the mood that this produces, as well as their evolution after the applied therapies [8].

In addition to the so-called Visual Analog Scale (VAS) for pain, there are many functional assessment scales, some of them centered on specific body joints or segments: Harris Scale, Shoulder and Elbow Scale, Constant-Murley Scale, DASH (Disability of Shoulder Arm and Hand Questionnaire), WOMAC scale, Timed Up & Go Test, etc. and more general ones such as SF-32, WHO Quality of Life Test, Functional Independence Measure FIM), etc [9].

In 2001, the WHO developed the International Classification of Functioning, Disability and Health (ICF), which is very useful for physicians and / or professionals who focus more on assessing the patient's quality of life and how he or she can best help the patient. It is a focus of the patient from a rather biopsychosocial perspective

of disability, taking into account also the surrounding environment as well as their needs and expectations of healing and improvement. The main objective of the ICF is to provide a unified and standardized language that serves as a reference point for the description of health and related states [10-12]. In order to be able to adapt the ICF to the different pathological processes that patients can suffer, the ICF-core sets are being created, which allow simplifying their use depending on the type of patient in question. Moreover, a core set for rehabilitation has been recently created and some cultural adaptation of it is now being done by the Physical and Rehabilitation Medicine Section of the UEMS [13].

### Physical Treatment Modalities

Physical modalities of treatment may be useful as coadjuvants in the treatment of acute and subacute and / or chronic pain. Both cryotherapy and heat are interventions that are often applied for the treatment of musculoskeletal pain and are easily accessible to the patient. Other modalities such as Transcutaneous Electrical Nerve-Stimulation (TENS), acupuncture, dry needling, laser therapy, ultrasound therapy and / or therapy by magnetic fields, although they are also widely used in the daily clinic and even some cases at home, its effectiveness may be somewhat more questioned, depending on processes [14].

Pain due to musculoskeletal disorders is often caused by muscle spasms or contractures where the muscle fibers are shortened. The application of heat or cold is the first thing that is usually done to reduce such shortened muscle spasm. Such spasm is usually due to direct trauma or an underlying neurological or bone and joint disorder. Both heat and cold applications produce direct or indirect effects on the neuromuscular plaque. It is thought that the return of the muscle to its normal state prior to the pain situation is one of the mechanisms causing the relief of this in such cases. Even so, it is not entirely clear why muscle spasm is relieved by these two therapeutic procedures [15,16].

Physical treatment modalities are to be applied with some caution and not to be kept for long periods, especially if they are passive modalities (massage, ultrasound therapy, hot-packs, etc.). However, an active type treatment (physical exercise, personal-training, etc.) should be provided and recommended to the patient from the beginning of the process, and also to be maintained for longer periods. The patient should initiate a program, where possible, of active-varied treatment based on exercises, muscle stretching, self-application of some modalities of physical treatments, as well as to take into account a number of postural ergonomic measures during his daily life activities. Scientific evidence has demonstrated the efficacy of physical exercise for the treatment of some types of chronic pain, such as low back pain. Even so, there is weak consensus regarding, for example, the kind of exercise most recommended for this process and also for others [17].

We will now review the different modalities of physical therapy to be applied in the field of pain, with special emphasis on chronic pain.

### Cryotherapy

It consists of the application of cold, as a physical agent, for therapeutic purposes [18]. The application of cold has several indications in medicine. On the one hand, avoid slight bleeding,

such as in the case of an acute ankle sprain, on the other hand, produce hypothermia, which would be beneficial in the case of an inflammation; thirdly to reduce spasticity and muscle spasm, which would be beneficial in the case, for example, of acquired brain or spinal cord injury or a myotensive cervicalgia. Finally, it relieves pain in general. The cold can be applied as a solid, liquid or gas modality [19].

Ice is the most common direct solid form of cold application. It is usually done in the form of circular passes through the area to be treated (painful, spastic, etc.), or applied statically over the painful or area of inflammation, through a bag or wrapped in a cloth. In fact when applied cold locally, should never be done with the product directly on the skin, but through a cloth, plastic, etc. This is so to avoid local burns. Its applications should be performed for no more than 20 minutes in a row. 5-10 minutes would be the correct timing, repeating it every 30 minutes or every hour or 2 hours depending on the cases, especially in the most acute cases. We can also immerse the limb in cold water with ice cubes to relieve pain when it is located in the distal area of an extremity (ankle, foot, wrist, or hand).

Cold applied locally after acute musculoskeletal trauma reduces internal bleeding and vasodilation, reduces the inflammatory response, reduces posttraumatic edema, and reduces the perception of pain. The so-called RICE method (Rest, ice, compression, elevation) is commonly performed after any trauma in the first few hours or minutes [20].

Cryotherapy, moreover, has been found to be effective in chronic pain. This can be alleviated by direct or indirect mechanisms. Thus the direct application of cold decreases the temperature in the affected area, and therefore, the sensation of pain and indirectly the cold also affects the free terminations of pain as well as the discharges produced by the neuromuscular plaque, as mentioned above. That way the muscle tone is diminished, which can also cause pain relief. Different studies have demonstrated the efficacy of cryotherapy in the form of cryomasaje (ice massage) in both acute and subacute and chronic musculoskeletal processes. Others have demonstrated the efficacy of the use of cold agents in cases of chronic low back pain.

There is the application of cold in the form of chloroethyl spray. This was popularized by Dr. Janet Travell as a means to treat Myofascial Trigger Points (MFTPs). This author combined the cold together with puncture, digitopression or infiltration such MFTPs, with subsequent stretching of the affected muscle as well as massage of it; thus eliminating those MFTPs and relieving pain. However the exact mechanism of such analgesia is not yet fully known [21].

There are some adverse effects from the use of cryotherapy. The most common of all is hypersensitivity to cold. Nor should we use it in the members of patients with Raynaud's disease or any other peripheral vascular process. This is because of its vasoconstricting effect. It should not be used too much in certain areas where the nerves circulate near the skin, to avoid neuropathies (neck of the fibula, cubital canal in the elbow, etc.). It should not be applied to unhealed wounds or skin lesions. In addition, cryotherapy is a very safe and easy to apply therapeutic modality.

### Thermotherapy (heat therapy)

The application of heat as a physical agent is a very common therapeutic procedure in painful areas. It is generally accepted that

heat is better tolerated by tissues, in the subacute and chronic phases of the processes, rather than in the acute ones. Physiologically, heat increases the extensibility of collagen fibers, increases blood flow in the area, increases metabolism and reduces inflammation when it is not in the acute phase. Other beneficial effects of heat are the decrease in joint stiffness, muscle spasm and pain itself. As we can see, these effects are largely common with those produced by the cold, but by somewhat different mechanisms [18].

It appears that heat exerts a direct or indirect effect on the neuromuscular plaque. Local applications of heat produce a decrease in the excitability of such plaque. Likewise, there has been an increase in the pain threshold after the local application of thermotherapy. The modalities of thermal application can be divided into superficial and deep. Among the first are the application of mud or peloides, infrareds or hot water. The hot water can in turn be applied either directly by pressure jets or warm baths, or by the application of compresses. Among the modalities of deep thermotherapy is short-wave diathermy, microwave or ultrasound ([22]-Hall).

The application of heat is usually performed in muscular contractures, accompanied by stretching of the local musculature. postacute or chronic joint inflammation, benefits from the application of superficial heat, thus reducing pain and increasing the joint range of motion. This has also been seen in different kind of enthesitis and peri-arthritis (lateral tennis elbow, painful shoulder, etc.) [23].

Contraindications of superficial heat include: hypersensitivity, blood or lymphatic circulatory alterations in the area, wounds and infections of the skin as well as regional hypo-anesthesia. Nor should it be applied to area of oedema (lymphedema, phleboedema, etc.). As for deep thermotherapy, the relative contraindications are the same as superficial, adding active malignant disease, certain metallic implants, as well as pregnancy if the agent is applied to or near the pelvic-abdominal area [23,24].

### Transcutaneous electrical nerve stimulation (TENS)

The application of electrical current as a therapeutic physical agent has been carried out for many years as a therapeutic means to alleviate different processes and symptoms: pain, paresis, muscular atrophy, etc. However, this procedure became of great importance since the theory of the Gate Control of Melzack and Wall [25]. This theory of gate control establishes a possible explanation for the analgesic effect of electricity. Thus, through the use of electrical nerve stimulation applied through the skin (TENS), thick afferent fibers would be activated that would inhibit the transmission of local pain impulses by such application. However the exact physiological mechanism remains unknown at present.

TENS is used to relieve chronic pain, although the results are not as promising as in the case of acute pain. The more rigorous studies suggest that the benefit obtained by TENS in pain is not superior to that obtained by placebo in chronic low back pain. Pain due to complex regional pain syndrome (Sudeck), phantom limb and / or peripheral neuropathy have been controlled using TENS.

However, the major analgesic effect seen with TENS has been in selective acute pain, as in the case of postoperative pain [26].

There are few side effects of TENS. The most important of these is the existence of skin irritations produced by the passage of current

through the electrode. It is also not advisable to use TENS in patients with pacemakers, because of the possibility of interfering with their functioning [27].

### Acupuncture and dry needling

As a physical modality, acupuncture involves the treatment of different processes by inserting needles into the body surface, and sometimes also into the mucous membranes. It is a practice carried out since antiquity in China and other Eastern countries. This therapeutic modality is still applied today, both in the East and in the West, due to its observed beneficial clinical effects. These effects, however, have not yet been fully scientifically demonstrated. Occasionally, electric current can be applied through the needles, using electrodes of clamp, constituting what is called electrical-acupuncture [28].

One of the fields in which acupuncture has been able to prove its effectiveness is precisely in the field of painful processes [29].

From a scientific point of view, acupuncture seems to have a neuromodulatory effect on pain, according to two accepted theories. On the one hand, the insertion of the needles would stimulate afferent sensory fibers and thus the perception of pain would be suppressed through the gate control theory that we have already referred. A second theory explains this by producing endogenous opioid peptides (endorphins, enkephalins, etc.) that would produce analgesia at central level and whose production would be favored by the stimulation of nerve receptors of the skin [30].

Dry Needling (DN) was defined by doctors Janet G. Travell and David G. Simons as an alternative to myofascial trigger point infiltration therapy (MFTPs), which was one of the therapeutic actions that these and other doctors at that time were dedicated (40f-50th decades of 20th Century). These authors came to observe and opined that it was the effect of introducing the needle, rather than the infiltrated liquid itself (local anesthetic, sodium chloride, etc.), which deactivated these MFTPs. As Dr. Janet Travell said: "that dry needling we applied, also worked for us." [31]. Thus, DN consists of inserting needles into the pain points (fundamentally MFTPs), and, through a series of maneuvers, deactivate them reflexively. After the puncture and deactivation maneuver, the procedure can be completed, applying in turn: stretching of the punctured muscle, eccentric muscular work, local cryotherapy and / or descontractante massage.

Acupuncture has been used in a variety of painful processes. Since insertion of the needle is considered an invasive therapy procedure, it should only be applied by qualified and properly trained health professionals.

There is limited evidence on the benefits of acupuncture versus acupuncture-placebo or sham-acupuncture for short-term chronic low back pain. However, there is not much evidence of its superiority to NSAIDs. For now, more studies of better quality and design are needed to qualify and guide the effects of this practice and thus better guide its use in the daily clinic [32].

Some relative contraindications for the application of acupuncture and / or DN would be: Local skin infections, patients with bleeding disorders or who are intaking anticoagulants, possibility of pneumothorax when certain areas of the thorax are punctured, pregnant women, at least in the first three months of pregnancy due

to the possibility of triggering uterine contractions, as well as the presence of lymphedema and / or phlebedema local to the area of puncture [33].

### Therapeutic physical exercise

It represents the core of all modalities of physical treatments, having been shown as the most effective for any painful process [34].

We have already mentioned (see page 16) that during the acute phases of the musculo-skeletal processes, the muscle is frequently shortened as a protective reaction to pain. At that time the most typical treatment is the rest and / or immobilization of the painful area, combined with cryotherapy and local compression in the case of a limb. Once this acute phase is giving way, joint mobility must be restored progressively. If the range of joint motion cannot be completely restored, then the muscles in that area may be shortened in a prolonged manner and as a consequence, the pain may become chronic or there may be additional pain that is more intense and more prolonged and more resistant to therapies, every time.

Long-term muscular shortening produces, in addition to pain, a contracture of the periarticular soft tissues; for that reason, in the chronic phase of pain, instead of rest, the most appropriate treatment gradually combines therapy sessions with muscle stretching, joint mobilization and stabilization as well as treatment to improve proprioception. All this together with the adjuvant methods such as heat, cold, electric current analgesic, acupuncture and others such as massage, joint manipulation, etc. It is also advisable to educate the patient to correct his daily life posture, as well as to practice physical exercise on his own in a correct way, in order to maintain the beneficial effects of physical exercise in the long term [35].

Therapeutic exercise consists of exercises that can range from passive-assisted to passive-assisted mobilizations, and, finally, major or minor counter-resistance; all along with stretching and / or self-balancing exercises. Regarding some processes that cause chronic pain such as low back pain, there is some controversy about what type of physical exercise would be the most appropriate. Most of the studies analyzed included muscle stretching. There is also a current of opinion according to which the exercises tending to maintain long-term lumbo-pelvic stability can reduce pain due to a lumbar discal-arthritis pathology [36].

The important lumbo-pelvic stability referred to is thought to be the consequence of three components: the osteo-ligamentous tissue of the spine, the muscles that move and stabilize it, as well as the nerves that coordinate the muscular action. The muscles are the major stabilizers of the entire lumbo-pelvic area, especially: the multifidus, the transverse abdominal, the diaphragm and those that form the pelvic floor. For this reason it is necessary to work them properly. Multifidus are muscles rich in neuromuscular plaques and act on the one hand by stabilizing each vertebral segment (two vertebrae along with their disc) and on the other hand by providing proprioceptive sensitivity for spinal movements. These muscles may be atrophic in subjects with chronic low back pain. In addition, other muscles such as the transversus abdomini act by reinforcing the so-called abdominal belt that also acts by stabilizing the spine. However some studies have suggested that the activation of this muscle would be delayed in patients with low back pain. These exercises to work on lumbopelvic stability have been investigated through different studies



with promising results [37]. This has been seen [38] in patients affected by spondylosis and spondylolisthesis. Similar effects have also been seen with therapies using conventional physical exercises [39].

Lastly, it should be noted that the therapeutic exercise carried out by the patient in order to maintain the joint range of motion and muscle trofism of the affected structure or to improve it, is one of the first-level recommendations of some clinical practice guidelines for chronic pain [37-39].

### Manual medicine

It consists in the use of various techniques by which the physician evaluates, diagnoses, prevents and treats a large number of processes, through the main use of his skilled and trained hands. There are several European schools of Manual Medicine (Cyriax, Maigne, Janda, Lewitt), based on previous experiences of Still and Palmer (Osteopathic and chiropractic schools respectively). No ways these methods are grouped in the field of medicine under the generic name of Manual Medicine (MM) or Orthopedic, Osteopathic and Manual Medicine [40-46]. The MM techniques can be grouped in: Structural techniques, soft tissue techniques (massage) and other techniques (Muscle energy techniques, joint pumping, etc).

Structural techniques include impulse joint manipulations (pelvic, vertebral, peripheral joints, etc.), which basically consist of passive-forced movements of High Velocity And Low Amplitude (HVLA) that carry the articular elements slightly beyond their physiological joint range, producing what is known as a phenomenon of "joint cavitation", which is sometimes manifested by an audible click. Joint manipulations require for its realization an adequate diagnosis, together with an adequate indication and a correct praxis. They are useful mainly in musculoskeletal pains produced by minor disturbances (spine, shoulder, ankle, etc.), which occur in various processes such as mechanical spondylalgia, chronic ankle sprains, shoulder adhesive capsulitis and subacromial pain syndromes, epicondylalgias, etc. These maneuvers are generally contraindicated, according to the topography, in the presence of several situations, such as the existence of recent fractures and / or joint dislocations, bone tumors, local bone infections, arthritis and / or joints with effusion. Also in case of vertebro-basilar insufficiency in the case of cervical area, etc. Caution should also be exercised if the patient presents certain mental processes: depression, neurosis, etc., as well as in elderly and / or subjects with radiological evidence of important osteoarthritis problems. It is also not recommended to perform them during the first 3 months of pregnancy because of the risk of triggering uterine contractions. All this and other limitations must be previously assessed [47,48].

Other techniques of manual medicine as a treatment of chronic pain that we only name are: soft tissue techniques, such as therapeutic massage, mainly of the type descontractante, made by kneading, pressure and myofascial stretching, as well as muscular energy techniques, Inhibitory techniques, osteopathic functional techniques, and non-impulse joint techniques. As we have already said, the correct application of some of them and especially in what concerns the articular manipulations, requires a correct diagnosis, an adequate indication as well as adequate training, legal training and a good praxis [47].

### Hydrotherapy-balneotherapy (aquatic therapy)

This is the use of water as physical agent. We use water physical properties: temperature thrust force or float principle, hydrostatic pressure and hydrodynamic resistance. The application of water to the body can be partial, by immersion of a part of the same or by the application of showers or jets, or by total immersion of the whole body, with or without the simultaneous carrying out of physical exercise in immersion [49].

Usually, aquatic therapy procedures are usually hot procedures, although sometimes these can be combined with others at cold temperatures as is the case with the application of contrast baths.

The thermal effect of water is the most used in aquatic modalities. The temperature of the water can vary in the case of heat from 35-36°C in temperate processes to 40-46°C in very hot water. Cold procedures can range from very cold to 1-13°C to warm to 18-30°C. Temperate procedures are generally sedative and hot and very hot ones are sedative, relaxing and analgesic. The cold procedures on the other hand are stimulants and tonics, so they are not very used in cases of chronic pain [50].

It is known that bodies submerged in a fluid experiences a vertical thrust equal to the weight of the liquid that it displaces. This is based on the principle of Archimedes or flotation. Therefore, anybody submerged in the water decreases its weight in a way relative to the level of immersion. In this sense the immersion of the organism in water will provide, among other things:

- discharge thereof with the possibility of performing, for example, an early loading on lower limbs when it cannot be performed at 100% of the weight or produces pain.

- Attend to the passive or active mobilization of all or a part of the same when it is equally painful

In this way, the treatment in immersion will contribute to decrease the pain that it produces especially in musculoskeletal and neurological processes [51].

Hydrostatic pressure is the pressure exerted by a liquid on a body submerged in the interior. This pressure is equal to the weight of the liquid column above that body and directly proportional to the depth of the dive and the density of the liquid. In this sense we can use this physical property of water when trying to drain a limb oedema, favoring blood and / or lymphatic flow. In fact, there are processes that occur with chronic edema, which often produce chronic pain and may benefit (complex regional pain syndrome, arthritic edema, etc.).

On the other hand, the hydrodynamic resistance (resistance that water exerts to the movement of a body inside it), is a physical property that is related to a constant (in relation to the viscosity, density, cohesion and adhesion of the liquid), as well as the surface to be moved and the speed of said movement. In that way, a slow movement in the water will not find appreciable resistance and the patient who experiences pain will be able to do it without major problem. On the other hand, a quick movement will find resistance and could cause pain, although on the contrary it will allow a more resisted muscular work which will be useful in certain circumstances, for example when there are muscular atrophies. We can also increase

this resistance in certain cases and thus tone the subject more, increasing the surface of the body in motion, for example, by using fins, floats, etc.) [52].

### Orthopedic and Assistive Technologies

Orthopedic procedures are not widely used in the field of chronic pain, except the technologies for care (technical aids) that somehow help the patient to reduce the weight and impact on painful areas. We refer mainly to the use of wheelchairs in the case of older people with major disability caused by chronic pain in the lower limbs or patients suffering from chronic fatigue. Also canes or walkers for cases of knee and hip osteoarthritis, etc. In which it is required to download body weight [53].

Joint immobilization devices such as postural splints, girdles or corsets are not widely used. The truth is that in the case of chronic pain of any etiology, it is more important the smooth and progressive articular mobilization, instead of its immobilization; the latter the more it will lead to a greater degree of joint retraction, which together with the muscular atrophy that immobilization would produce, would eventually lead to greater pain, thus further chronifying the pathological process. A separate mention requires the use of nocturnal postural splints for cases of chronic neuropathic pain due to involvement of the median nerve in the carpal canal. In such cases we can recommend to the patient the use of these postural wrist splints to relieve nocturnal pressure on the nerve. Similar splints may also be useful for the problems of trapezius-metacarpal arthrosis in the hand, provided they are used mainly at night and are accompanied by other measures (self-massage, joint mobilization, wrist effort gestures avoidance, etc.), as discussed in the following point.

Girdles, orthopedic corsets, cervical collars, etc., will only be used in low back pain, dorsalgia and chronic neck pain when the pain worsens, and always for brief periods of time (about 4-5 days at most). Several authors have observed that the lumbar immobilization for long periods, increases, producing muscular atrophy of the abdominals, spinal and cervical.

In cases of major osteoporosis, thermoformable plastic corsets (sometimes plaster, although worse manageable and uncomfortable for the subject) may be used in order to avoid vertebral collapses or, if they have already occurred [54].

### Prevention and Treatment through Practical Advice on Posture Correction and Activities of Daily Life

#### Patient education

The inclusion of the patient or his / her caregivers, permitting them to participate in the information and education on how to prevent and alleviate chronic pain, is one of the fundamental pillars in the fight against this problem. For this we use recommendations to the patient about the modification of gestures and activities in their daily life that tend to prevent, alleviate and / or improve as possible their usual pain [55].

Since lumbar pain is nowadays one of the most frequent, the so-called "Back School" began in Sweden in 1969 and has since continued to be used in many of its variants. It seems clear today that the advice given to the patient through personal interviews, brochures videos, etc. are an important tool in achieving better results in the treatment, for example, of low back pain [56]. In addition, back schools have had

more evidence regarding outcome in terms of chronic low back pain, above the acute and postacute [57]. Practical advice covers a wide range of appropriate postures, as well as avoiding habitual gestures that may worsen painful processes and, of course, will depend on the anatomical location of the pain as well as the structures involved in it.

In the case of dorsal and low back pain in general it is advisable for the patient to try to sit properly, that is, to sit in seats not very low and with arms, to add a cushion in the lumbar region that supports in the prickles lumbar, to approach well to the working table in order to have his back supported at all times. From time to time (each 30 minutes), rise from the seat and perform a light axial trunk stretch. It is convenient in daily life that the patient refrain from carrying excessive weights, as well as dragging shopping carts or suitcases (carrying better pushed) and carrying bags in the hands, distribute the weight well between both upper limbs.

In the case of shoulder pain, which is usually due to subacromial syndrome, rotator cuff tendinosis, adhesive capsulitis, etc., we would recommend to the patient the usual way of doing Codman pendulum exercises with the shoulder in a slight forward thrust of the gravity and taking at the same time, with the homolateral hand, a weight of 2-5 kg. In this way it would tend to favor the opening of the subacromial space tending to relieve the discomfort of the shoulder. Likewise we would indicate to the patient to avoid the gestures of raising the affected shoulder above 90°, to avoid in general the gestures that produce shoulder pain, as well as the loads of weight. It would also be advisable to advise him to avoid sleeping on that side and, if he has to do so, then to place a cushion or pillow under the axillary recess of the homolateral body [7].

In the case of painful elbow, due to epicondylalgia (lateral and / or medial), we would recommend the usual self-stretching of epicondyle and epitroclear muscles. Avoid taking weight with the elbow affection in flexion and apply a descontracturante automasaje, usually, by the extensor and flexor musculature of the forearm, to relieve the tension of these muscles [58].

In the case of wrist and hand processes, we would advise the patient to avoid efforts that involve excessive force with his wrist, hand and fingers (open cans, sew; wring away scourers by wrapping them and pressing with hands, etc.). Also we would recommend to the patient to perform exercises of fine mobility with wrists, hands and fingers of habitual way and to apply some self massage by the interdigital zones of hands, from time to time [59].

In knee problems such as osteoarthritis, chondropathies, femoro-patellar syndrome, etc., we recommend the subject to perform knee rests in extension, placing a small cushion under the popliteal area, along with frequent quadriceps and ischiotibial isometric contraction exercises. The patient will try to walk on level ground, avoiding very irregular terrains. Likewise, he would abstain as much as possible from up and down stairs. In case of having to climb stairs and that it is painful on any of the knees (this is valid for any part of the lower limb), we will recommend to the patient to climb the steps always with the healthy member first and when lowering do the same but with the limb painful. It will abstain in addition to performing physical activity or career type sports or jumps and in general those that involve excessive load for the knees (tennis, padel, etc). We will recommend for swimming crawl styles and back where when beating legs will perform exercises more suitable for his knees [60].

## Conclusion

PRM leads with disability and chronic pain is a frequent cause of it. There are many physical modalities available to address the problem of patients suffering from chronic pain. But as is mandatory, before using them, to observe and evaluate the patient carefully, quantifying both his pain and the disability that this problem causes. It is also convenient to prevent such chronic pain, treating this in the acute and postacute previous phases, not allowing it to be perpetuated. It is always better to manage the patient from a biopsychosocial point of view. When choosing the therapies to apply, we must select the most effective and efficient, according to scientific evidence and take into account that both the patient and the family or caregivers have to take part in some of the decisions that both the medical specialist and even the multi/interprofessional rehabilitation team must take to better develop the PRM process. An important part of the rehabilitation process is the practical advice given to the patient about ergonomic measures and attitudes of daily life, sport and leisure, tending to alleviate their pain and disability as well as teaching them to better cope.

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