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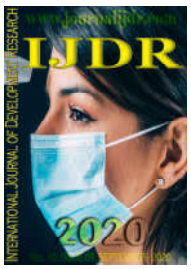

RESEARCH ARTICLE OPEN ACCESS

CHRONIC LOW BACK PAIN, WHAT KIND OF TREATMENT? ISOKINETIC OR PHYSICAL THERAPY?

Saloua Khalfaoui*, Abdellah El Marbouh and El Mustapha El Abbassi

Department of Physical Medicine and Rehabilitation, Military Instruction Hospital Mohammed V-Rabat, Morocco

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****Corresponding author:***
Saloua Khalfaoui,

ABSTRACT

Objective: To confirm or rebut the superiority of isokinetic therapy techniques over physical therapy techniques. **Population and method**: In a prospective randomized study over 40 patients among who 17 women and 23 men suffering from a chronic low back pain with an average age (5-43 years).The population was divided on tow groups; the first half received nine treatment sessions of isokinetic, the second received the same amount of treatment but in physical therapy. A clinical comparison focused on the EVA (pain and handicap), distance hand-floor and buttock-heel, Schober's indication, the isokinetic comparison emphasized on Cybex-NORM™ dynamometer with three angular speeds: 30 °/s, 90°/s and 120°/s in a concentric mode studying the peak torque of spinal and abdominal muscles couple and their ratios. **Results:** The two techniques improved all the clinical and instrumental parameters. The isokinetic superiority deals with EVA lumbar pain and handicap, distance buttock-heel and Sorensen-Biering test, classical rehabilitation over the peak torque of spinal and abdominal muscles couple at low speed and ratios at low and medium speeds. **Conclusion:** In chronic low back pain, isokinetic excels in endurance of spinals muscles whereas classical reeducation excels in improving muscular deficit. A study in the future with evaluation at medium and long term is to be organized for this purpose.

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INTRODUCTION

Chronic low back pain is defined according to the French Rheumatology Society (FRS) as: any low back pain located at the level of the iliac crests or lower, median or lateral, with possibility of irradiation not exceeding the knee but with a predominance of pain lumbo-sacral, for at least three months, almost daily, with no tendency to improve (Calmels 2004). A common pathology affecting both sexes and most age groups, common low back pain is associated with significant morbidity in industrialized countries. It represents the second cause of disability after cardiovascular disease (Donskoff 2011), and is the reason for consultation in approximately 25% of adults over a period of six months (Kent 2005, Pillastrini 2011). Low back pain is behind 70 to 80% of the direct and indirect socio-economic costs of all non-specific low back pain (Broonen 2011). It is in France, responsible for a direct societal cost of 1.4 billion Euros and indirect costs which would be multiplied by 5 to 10 times (Donskoff 2011). In the United States, where low back pain is the first reason for sick leave before the age of 45 (Beaudreuil 2010), the annual cost in terms of lost productivity has been estimated at approximately $ 28 billion (Poiraudeau 2004). Adequate and codified care is the best weapon to combat this chronicity and therefore reduce the cost. The treatment of chronic low back pain (LBP) is varied and multidisciplinary. The use of drug and non-drug treatments is widely discussed in the literature. In this framework of care, the human imagination has not failed to show its genius by inventing rehabilitation techniques according to the concepts of their owners (Williams, Cyriax, Mc Kenzie, and Troisier). In addition to schools of the back and functional restoration of the spine, the therapeutic arsenal has recently been reinforced by intervention on factors predisposing to chronicity such as medico-legal factors (work accidents, financial disputes, etc.), professionals (job dissatisfaction, physical constraints), socioeconomic (low educational level and low level of resources) and psychological (Marty 2010).

But what place for isokinetics?

In the 1960s, Hislop and Perrine (1967) were among the first to describe the concept of isokinetic devices. Initially limited

to the sport environment, isokineticism gained in the 80s, the environment of functional rehabilitation. The evaluation of the trunk muscles was followed by the evaluation of the knee and shoulder muscles. The absolute necessity of a suitable tool for the evaluation of these low back pain has given this instrumentation a significant place in terms of diagnosis (Lee 1999) and evaluation (Vancelcehaner 1994), due to its reproducibility, its quantification of the force and the biofeedback effect (Calmels 2004). Under the impulse of certain authors like Mayer, isokineticism was integrated into the programs of functional restoration of the spine in North American and North European countries from the mid-80s (Bendix 1998, Mayer 1985), and in France from from the 90s (Vancelcehaner 1994). The rehabilitation environment is teeming with isokinetic devices, some assess flexors and extensors, others rotators, or combined movements for cable systems like the Cybex Liftask or the Moflex (Voisin 1998). There is good reproducibility of measurements for single-axis systems, for the same dynamometer, subject to respecting the installation. Indeed, there are different dynamometers according to the position: sitting position, half sitting or standing (Faure 2001, Genet 2002, Heuleu 1991). According to the literature (ANAES 2001, Calmels 2001, Hazard 1988), there is no evidence of superiority of isokinetic techniques compared to classical rehabilitation in the management of chronic low back pain. The objective of our study is to compare in low back pain patients, classical physiotherapy and isokinetics by using, in addition to clinical parameters, the para-clinical parameters provided by an isokinetic dynamometer Cybex-NORM ™ before and after each method.

MATERIALS AND METHODS

Population: This is a prospective study, comparative between two groups of patients, carried out in the Physical Medicine and Rehabilitation service of the Military Instruction Hospital Mohammed V, Rabat-Morocco during a period of three months. Forty patients including seventeen women and twenty three men with chronic low back pain voluntarily agreed to participate in our study. The age was between 22 and 65 with a body mass index varying between 21.51 and 33.2 kg / m². The duration of low back pain was between 3 and 66 months. Table 1 shows the anthropometric characteristics of the two groups.

The patients, informed about the aim of our study, were randomly divided into two groups:

G1: group of patients having benefited from nine classic rehabilitation sessions.
G2: group of patients having benefited from nine isokinetic rehabilitation sessions.

Inclusion Criteria

- Patient with chronic common low back pain, defined according to the SFR.
- Age greater than twenty years and less than seventy years.
- Tolerance to the isokinetic evaluation test.
- Patient consent.

Exclusion criteria

- Presence of a biological inflammatory syndrome.
- Pregnant woman or Caesarean section less than six months old.
- Cognitive impairment or poor understanding when performing the test.
- Secondary back pain.
- Concept of risk factors or underlying pathologies that contraindicate effort.
- Patient on sick leave due to low back pain.
- Low back pain in connection with a work accident.
- Static deformities or disorders of the spine.

Their professional occupations were diverse (students, soldiers, civil servants, nurses, doctors, engineers…). Among them were retirees who were not sedentary.

Seven patients in group 1 and five in group 2 were taking analgesic treatments during the last two weeks preceding rehabilitation and none wore a brace.

Material and protocol

Clinical evaluation:

Data from the interrogation: Were studied: age, sex, weight and height with calculation of the body mass index, profession, personal (medical and surgical) and family history, toxic habits, Visual Analog Scale (VAS) regarding low back pain, radicular pain and disability.

Physical examination data: Static examination to eliminate static disorders then dynamic examination (Schober and Mac Rae index, hand-to-floor and heel-to-buttock distances, Lasègue sign, Biering-Sorensen test for spinal muscles and shirado-Ito test for abdominals).

Functional Assessment: Use of questionnaires: Quebec for the functional impotence of low back pain; H.A.D (Hospital Anxiety and Depression Scale) for the psychological impact of low back pain and FABQ (Fear Advoidance Belief Questionnaire) for avoidance and apprehension regarding work and physical activity.

Instrumental Evaluation: The isokinetic dynamometer used was of the Cybex-NORM ™ type (Lumex Inc. Ronkoma, NY, United States), associated with a computerized data recording system. After theoretical and demonstrative explanations of the principle and the development of the evaluation test, the patients warmed up for ten minutes on an ergocyclometer. The subject is installed on the camera while standing. The height of the dynamometer axis corresponds to the horizontal axis passing through L5-S1. In the sagittal plane, this axis passes to the 1/3 posterior and 2/3 anterior union of the line joining the two anterior and posterior superior iliac spines. The lower limbs are stabilized by points of support and wedges fixing the feet, the tibial and femoral segments. The pelvis is strapped. A thoracic support bar placed at the height of the shoulder glands, strapped on the subject, is secured to the lever of the dynamometer. The movement to be performed was an anti-bending movement of the trunk with an active amplitude of 70 °, followed by a straightening at 0 °.

Familiarization with the isokinetic system (learning phenomenon) was done by performing three flexion-extension movements of the test before each speed of the test, by submaximal contractions in flexion-extension of the trunk in order to improve reproducibility.

The evaluation was carried out in concentric-concentric mode, first by the average speed (90 ° / s) then the slow speed (30 ° / s) and finally, the fast speed (120 ° / s). A period of one minute separated each series of movements. For better performance, verbal stimulation and the test were carried out out of the sight of other patients. Each test included a series of flexion and extension movements of the trunk, resulting in three return movements at medium speed (90 ° / s), six at slow speed (30 ° / s) and fifteen movements at high speed (120 ° / s), without stopping between the flexion and extension movement. Table 2 determines the exercises of the evaluation test.

Rehabilitation Protocol

G1: the patients benefited from nine sessions each; three sessions per week. The classic physiotherapy sessions were carried out by the same physiotherapist during all the sessions for the same patient. Each session consists of fifteen minutes of warm-up on a treadmill or a cycloergometer, followed by thirty minutes of stretching and mobilization of the spine in different positions: sitting, supine and prone, then fifteen minutes of isotonic and isometric muscle strengthening bearing especially on the flexors, the extensors of the spine and the quadriceps, without forgetting the stretching of the hamstrings.
G2: isokinetic sessions are carried out by the same attending physician. Table 3 summarizes the sequence of sessions for each week.

Data collected for analysis

- Maximum torque peak (Nm): maximum moment of force (MFM) or maximum force torque of flexors and trunk extenders at three speeds, it graphically corresponds to the top of the curve.
- Ratio (%): ratio between the peak of flexor torque and that of the lumbar spine extensors at three speeds: Ratio (F / E).
- Average power (W): work done per unit of time
- Total work (J): integral moments of force throughout the movement, it is represented graphically by the area below the curve.
- Fatigue index: performed when working at high speed (120 ° / s).

Work and power are not exploited in this work.

Statistical analysis: The results are presented in the form of mean ± standard deviation for all the variables studied and compared. To compare the means of the two treatments, the student test of comparing two means for independent samples was used. The software used is SPSS version 17 with double reading to avoid typing errors. A significance threshold lower than 0.05 was used.

RESULTS

During the sessions, there was no worsening of low back pain. The patients perfectly tolerated the program offered to them. In G1 (classic rehabilitation): clinical improvement in low back pain, radicular EVA and handicap EVA, Schober's index, hand-to-ground distance, Lasègue, Ito-Shirado test , Quebec, HAD and FABQ; on the instrumental level, improvement of the torque peaks of flexors and extensors at all speeds of these muscles and of the fatigue index at 120 ° / s. The F / E ratios at the three speeds decreased and approached 1, with no statistically significant difference with p at 0.25, 0.31, 0.18 respectively at 30 ° / s, 90 ° / s, 120 ° / s. In G2 (isokineticism): clinical improvement in lumbar pain, radicular EVA and handicap EVA, Schober's index, hand-to-ground distance, Lasègue, Ito-Shirado test, Quebec, HAD and FABQ; on the instrumental level, improvement of the flexor and extensor torque peaks at 90 ° / s and 120 ° / s, and the fatigue index at 120 ° / s of these muscles. In addition, the F / E ratios at the three speeds underwent a less clear increase and without statistically significant difference with p at 0.05, 0.31, 0.11 respectively at 30 ° / s, 90 ° / s, 120 ° / s.

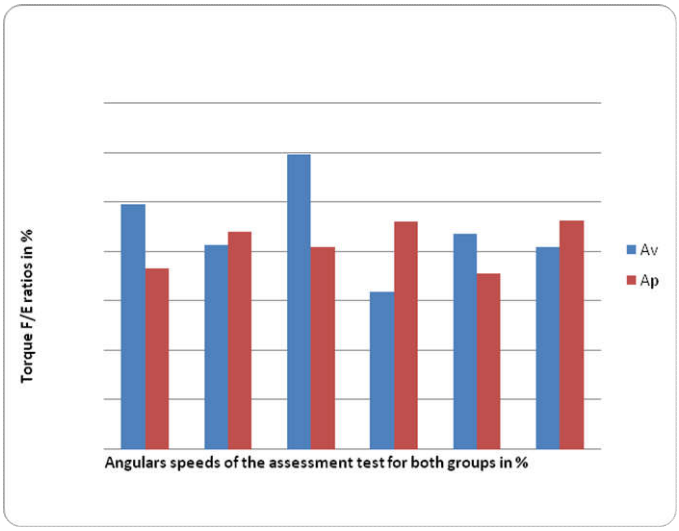

Fig. 1. Graphical representation of F / E ratios before (Av) and after (Ap) rehabilitation in the two groups of patients

Table 1. Anthropometric data of the two groups (n = 40)

	Age (years)	Sex	BMI (kg/m²)	Duration of low back pain (months)
Group 1, n=20	42,35+/-5,8	15 Men 5 Women	27,01+/-1,38	18,65+/-6,75
Group 2, n=20	40,10+/-5,52	8 Men 12 Women	26,87+/-1,38	24,80+/-9,29

Data expressed as an average ± standard deviation.
BMI: body mass index.

Table 2. Determination of the exercises of the evaluation test

Angular speeds	90°/s	30°/s	120°/s
Rehearsals	6	3	15
Rest	1 min	1 min	

Tables 4, 5 and 6 show the evolution of the different parameters used for this comparison. The comparison between the two methods did not find any difference in terms of improving the root pain VAS, the Schober index, the hand-to-ground distance, the Lasègue, the Ito-Shirado test, Quebec , the HAD and the FABQ, and on the instrumental level of the flexor and extensor torque peaks at 90 ° / s and 120 ° / s, the ratio at 120 ° / s and the fatigue index at 120 ° / s.

The superiority of isokinetic rehabilitation interests:

- EVA low back pain: very significantly p = 0.004.
- EVA handicap p = 0.05.
- Heel-buttock distance: significantly p = 0.022.
- Sorensen test of little significance p = 0.044.

Table 3. Isokinetic exercise protocol

Week one: Six exercises							
Angulars speeds	120°/s	105°/s	90°/s	90°/s	105°/s	120°/s	
Rehearsals	8	7	4	4	7	8	
Rest	1 min	1 min	1 min	1 min	1 min		
Week two: Eight exercises							
Angulars speeds	90°/s	75°/s	60°/s	30°/s	30°/s	60°/s	75°/s	90°/s
Rehearsals	7	6	5	2	2	5	6	7
Rest	1 min	1 min	1 min	1 min	1 min	1 min	1 min	
Week tree : Ten exercices								
Angulars speeds	90°/s	75°/s	60°/s	30°/s	30°/s	60°/s	75°/s	90°/s
Rehearsals	7	6	5	2	2	5	6	7
Rest	1 min	1 min	1 min	1 min	1 min	1 min	1 min	

Table 4. Evolution of clinical parameters

	G1	G2	Standard deviation	P
Evolution of VAS lower back pain	-2.75	-3.75	0.386	**
Evolution of VAS radicular pain	-2.45	-3.05	0.566	NS
Evolution of disability VAS	-2.85	-3.85	0.495	*
Evolution of the Schöber index	6.60	6.40	1.567	NS
Evolution of hand-ground distance	-6.85	-7.68	1.998	NS
Evolution of the heel-buttock distance	-1.30	-2.75	0.607	*
Evolution of Lasègue	21.25	29.50	6.132	NS
Evolution of the Shirado-Ito test	12.5	14.35	8.160	NS
Evolution of the Sorensen-Biering test	8.65	15.25	3.171	*
Evolution of Québec	-32.70	-31.30	4.043	NS
Evolution of HAD	-13.90	-15.20	2.243	NS
Evolution of the concept of avoidance and apprehension at work	-16.05	-19.95	2.602	NS
Evolution of the concept of avoidance-apprehension in physical activity	-11.80	-9.5	1.684	NS

Table 5. Evolution of the instrumental parameters of the flexors and extensors of the trunk

Flexors	G1	G2	Standart deviation	P
Evolution of the torque peak at 90°/s	56.2	59.2	21.05	NS
Evolution of the torque peak at 30°/s	26.45	-11.3	17.01	*
Evolution of the torque peak at 120°/s	41.4	31.05	18.07	NS
Evolution of the torque peak at 120°/s	1.45	18.8	14.97	NS
Expanders				
Evolution of the torque peak at 90°/s	22.65	7.85	8.76	NS
Evolution of the torque peak at 30°/s	20.9	-6.35	7.18	***
Evolution of the torque peak at 120°/s	19.25	1.7	9.98	NS
Evolution of the torque peak at 120°/s	6.85	17.9	22.64	NS

Table 6. Comparison of the evolution of the ratios (F / E) between the two methods

Angular speed	G1	G2	Standart deviation	P
90°/s	-93.8	71.05	62.12	*
30°/s	-64.15	18.112	26.6	**
120°/s	-39.85	26.1	49.71	NS

In contrast, superiority by conventional physiotherapy focused on the torque peak of flexors and extensors at 30 ° / s, slightly weak for the first (p = 0.032) and significant for the second (p = 0.0005) and on the ratios at the two speeds 30 ° / sp = 0.006 and 90 ° / sp = 0.01.

DISCUSSION

Despite the large number of publications on low back pain rehabilitation, it is still not yet possible to say which is the best active rehabilitation method between isokinetic, isotonic and isometric techniques, or even between exclusive active work and passive techniques, nor even between isokinetic technique and classical rehabilitation (Donskoff 2011). Programs for the management of chronic low back pain are heterogeneous (Donskoff 2011). Their success depends on a strong bond established with biomedical and personality factors, the evaluation of which remains difficult despite the different scales available (Donskoff 2011). Randomized comparative studies are multiplying to answer this question, our work falls within this framework. No study currently shows a superior or specific benefit of isokineticism compared to other techniques of muscular strengthening or physical training (Calmels 2004). Through the results of our work, the two rehabilitation techniques improved almost all the clinical parameters without significant difference. The superiority of isokineticism (ISO) related to the endurance of the spinal muscles and this in a not very significant way and the EVA lumbar pain-handicap and heel-buttock distance; on the other hand, classical reeducation (RC) did improve the torque peak of the flexors and especially that of the extensors at 30 ° / s and this significantly for the latter, this is illustrated by the F / E ratio which approached 1. Indeed, the ratio between the flexors and the extensors is normally between 0.7 and 0.8 in the healthy subject (Gremion 1996, Vancelcehaner 1993). Before rehabilitation, the isokinetic evaluation showed an inverted F / E ratio in our entire population. Generally in low back pain subjects, the extensor muscles are the most affected, with significant differences compared to healthy subjects. The force of the extensors decreases so that the ratio increases and can even be

reversed, that is to say that the force of the flexors exceeds that of the extensors (ratio> 1) (Vancelcehaner 1993, Meier 1992) Since the muscular strength of the extensors of the spine, to a lesser degree of the flexors, is reduced in low back pain, CR showed its superiority compared to isokineticism by treating this deficit as well of the extensors as that of the flexors at low speed is an asset for this type of rehabilitation. In this group, it would be necessary to evoke the mechanism of motor dehinibition. Indeed, the presence of erroneous cognitions (for example, physical activity is in itself a cause of low back pain, even an aggravating factor), inappropriate avoidance attitudes for fear of pain and kinesiophobia are among the barriers to performing exercises. Despite the glaring deficit of the extensors, marked by the inversion of the report to the evaluation before the start of the exercises, the CR by the eviction of this kinesiophobia, improved the torque peaks of these muscles more than on their antagonists. In addition to this motor dehinibition mechanism, the affection of flexion-extension movements at slow speed close to that where the torque peak is better improved (i.e. 30 ° / s).

In chronic low back pain, muscular insufficiency manifests itself as much by a lack of endurance as by a deficit of strength (Poiraudeau 2001). Muscular endurance is another parameter that, in most of the literature, appears to be the essential factor in preventing low back pain (Nordin 1990). Endurance uses slow or tonic fibers I (adapted to aerobic efforts of low power but high endurance). The proportion of type I fibers is around 60% in the extensor muscles of the trunk, this percentage increases with age (Meier 1992). The low back pain patient seems to have atrophy of both type I and type II fibers, but more marked on type IIb fibers (Meier 1992). This reduced endurance of the extensor muscles (Schmidt 2004) is a parameter on which the ISO shows its superiority, in this case the I fibers. In our study, the two methods improved the concept of work-physical activity avoidance-avoidance (FABQ) without superiority to one over the other. Schmidt et al. the question arose whether isokinetics is the method of choice for combating kinesiophobia (Lee 1995). The work presented by Calmels et al. suggests that there is no difference between the use of isokinetic techniques and passive and active management by the physiotherapist in terms of motor inhibition, at the initial phase of management (Calmels 2004). The ISO, by improving the low back pain-disability EVA and by the spectacular and impressive aspect of these machines, has certainly contributed to the modification of the behavior of the low back pain sufferer. This motor inhibition that can be evoked in this second group makes ISO superior to CR in terms of endurance. Indeed, the low speed test reflects pure strength; rather, the high speed reveals the quality of joint play, or the degree of inhibition (linked for example to pain) (Herlant 1989). However, the reduction in pain is not a predictive factor for resumption of professional activity (Poiraudeau 2007).

Isokinetic systems have the ability to use high speeds close to functional speeds. The speeds chosen to test the lumbar muscles vary between 30 and 180 ° / s. We have adopted an evaluation test protocol based on average speeds, slow then fast, which allows better adaptation of the patient with the device. In our study, motor dehinibition is especially marked in the flexion movement more than in extension, which could explain the increase in torque peaks of the flexors more significantly than those of the extensors, resulting in higher ratios to three speeds in patients subjected to this type of isokinetic rehabilitation. This is only a short-term assessment, the improvement in pain EVA, would it promote in the long term the maximum moment of force of the spines and thus normalization of the ratio. However, the improvement in torque peaks in the spinal and abdominal muscles is not correlated with the persistence or disappearance of low back pain (yahia 2011). Since the period of action of most rehabilitation treatments is several weeks, for some, the short-term evaluation of chronic low back pain patients seems unnecessary (Nies 1991), for others, the expected benefit begins in the medium term (Revel 2005). The clinical evaluation of the trunk is more difficult than that of the limbs, the structures concerned are deeper, the study of stability is more delicate, the muscular atrophy is not visible and there is no possibility of comparison with a contralateral side (Vancelcehaner 1993). These results must be considered with certain limits, indeed, one does not evaluate that the muscles of the spine, others come into play. In extension, one finds the extensors of the trunk (para vertebral, multifidus) and the muscles of the member lower (glutes, hamstrings, quadriceps and sural triceps); in flexion, the muscles of the shoulder girdle, the abdomen, internal and external obliques and ilio-psoas, (Vancelcehaner 1993, Vezirian 1996). In addition, the degree of motivation of the patient is an important limit because it is he who will determine the performance achieved.

In chronic low back pain, the deficit of the trunk muscles is associated with that of the flexors and extensors of the knee during the isokinetic evaluation without forgetting the lumbar impact on the sub-pelvic level (Yahia 2011, bibre 1997, Hultman 1993, Gremion 1991). The lumbar impact on the sub-pelvic level is obvious. In fact, to alleviate low back pain, the patient puts his knees in flessum, all of this is related to the postural control deficit objectified in chronic low back pain compared to control subjects, manifested by the posterior projection of the pressure center in the anteroposterior axis (Urzica 2007). Unlike medical treatments where dosages and protocols are almost well codified, in physical treatment, we are always looking for optimal conditions for performing the exercises. In the context of the rehabilitative care of LCC, we are confronted in the literature with an unlimited number of concepts and ideas; in addition to the medical treatment of pain, some opt for reeducation in lordosis, others in kyphosis, O. Troisier speaks of the intermediate position (Henchoz 2008). The emergence of back schools, the functional restoration of the spine and the management of psychic disorders such as anxiety and depression have changed the thinking of any clinician before the CCL (Chaory 2004). Despite the advent of isokinetics giving objective and reliable information on muscle strength (Nies 1991, Bygett 2001), we are still looking for idealistic protocols: number of sessions, strengthening in concentric to eccentric, rhythm, patient position, etc. In our study the total number of repetitions is estimated at 27, this is close to what is described in the literature (Bygett 2001, Cartas 1993). However, isokinetic contraction is far from the conditions of physiological use of muscles (daily gestures subject to variations in acceleration); most isokinetic studies of the spine are done concentrically, except the spinal muscles work eccentrically (Hupli 1997). Isometric tests, although easily performed and providing rapid information on the muscle groups evaluated, are not the ideal solution for regular muscle evaluation of the patient (Shmidt 2004). Whatever the mode of muscle contraction envisaged or the rehabilitation protocol used (ISO or RC), muscle training often has a positive effect on the results of muscle strength

measurements and clinical or functional data (Rissanen 1995). For Van Tulder et al., There is no superiority of one mode of physical exercise over another, whether it is performed in flexion or extension, or even between weight training exercises and stretching exercises (Van Tulder 2000). In the LCC, the ISO is a means promoting the endurance of the spinal muscles, through the latter, the prevention of recurrences is essential. However, getting a device as expensive as ISO is far from impossible. The advantage of CR is that it is accessible to everyone. However, CR should be supplemented by home exercises to continue the effect. However, it has been shown that patients partially or not perform the prescribed exercises when left to their own devices (Broonen 2011). One of the reasons is the poor ability to move from intentions to actions. This passage to the act corresponds to a psychological construct distinct from motivation, and is called volition. This volition could be a determining factor in the success of the rehabilitation of low back pain patients. Indeed, patient compliance to regularly perform the exercises taught at home is a strong element of treatment (Delitto 1991). Ultimately, in the LCC, isokinetics is a method which does not replace other conventional rehabilitation techniques (manual or instrumental) but which constitutes a complementary means among all the available rehabilitation techniques. It makes it possible to objectify anomalies that the clinic alone did not allow to predict. In rehabilitation, combining the two techniques allows a dehinibition of patients, such inhibition constitutes a significant obstacle to the management of CLL in terms of endurance and muscle deficit. Continuing physical exercise is an effective way to avoid recurrences and not get tired. Simple patient education, combined with advice on resuming activities, has been shown to be more effective than conventional treatments (Valat 2007).

Conclusion

The problem of chronic low back pain is complex because it is multifactorial in nature. According to some, there is no difference between ISO and classical rehabilitation, our present study is in the direction of complementarity. Ultimately, despite the modest number of patients and sessions, the short-term clinical and instrumental evaluation favors the complementarity of the two techniques. Indeed, the classic rehabilitation strengthens the muscles of the trunk at slow speeds as it contributes to the improvement of the peak ratios of couples, while isokineticism has a more effect on kinesiophobia and consequently the endurance of the spinal muscles (speed faster) with more efficiency on flexors than short-term expanders. The ISO allows a better evaluative approach but does not pretend to solve all the questions asked on the LCC, further studies remain to be carried out to try to answer the many questions that remain unanswered. Adopt standardized testing protocols, in order to establish ranges of values by sex, age groups, morphological characteristics, activity levels, the ideal use program; content and rhythm of the sessions, and finally what place for eccentric reinforcement (effectiveness and tolerance). The management of chronic low back pain would be more beneficial by combining the two therapies. A long-term evaluation is to be carried out.

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Conflict of interest: No.

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