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Isokinetic knee joint test in "gonalgia sine materia"

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SUMMARY

Fifty-four subjects, aged between 20 and 35 years, divided into two subgroups, respectively 30 healthy subjects (17 males and 13 females) and 24 subjects with "gonalgia sine materia" (13 males and 11 females) underwent isokinetic exercise test in order to compare their dominant limb with the not dominant one as regard as the strength of extensor and flexor muscles of the knee.

No statistically significant difference was found in any of the studied parameters in the comparison between the dominant limb and the not dominant one, both within the subgroup of healthy subjects and within the subgroup of subjects with "gonalgia sine materia".

Authors conclude that psychological features may play a preeminent role in the genesis, as well as in the maintenance of "gonalgia sine materia", thus confirming previous data available in medical literature.

INTRODUCTION

The isokinetic exercise testing can be used in healthy subjects in order to evaluate basic muscular strength and to assess its increase related to physical training in sports subjects (Lue Y.J. et Al., 2000).

In carriers of pathology the isokinetic exercise testing is used not only with rehabilitative aims but also to evaluate patient's basic conditions, the degree of recover gained and inasmuch the efficacy of the treatment (Pocholle M., Codine PH., 1992).

Different Authors have documented the efficacy of the isokinetic exercise testing in the evaluation of the recover of muscular strength after knee surgery, e.g. ligaments reconstruction interventions (Yoon T., Hwang J., 2000), in the monitoring of the recover period to physical training after an injury (Cannel L.J. et Al.; 2001, Kea J. et Al., 2001), in the assessment of muscular strength in patients undergoing rehabilitation and carrying various types of pathologies, among them multiple sclerosis

(Nuyens G. et Al., 2001), poliomyelitis (Willen C. et Al., 2001) or paraplegia (Bernard P.L, Codine PH., 1997).

The aim of our study was to compare the strength of flexor and extensor muscles of the knee of the dominant lower limb with that of not dominant lower limb in a group of healthy subjects, and to compare the strength of the pathological lower limb with that of not pathological limb in a group of individuals with "gonalgia sine materia" in isokinetic mode. "Gonalgia sine materia" (knee pain without organic alterations) is defined as a knee painful condition in which no pathological modification is identifiable with standard instrumental tests (Brandt K.D. et Al., 2000).

SUBJECTS AND METHODS

Fifty-four subjects with age ranging from 20 to 35 years, divided into two subgroups, respectively of 30 (17 males and 13 females) individuals free of pathology of the lower limb, and of 24 individuals (13 males and 11 females), with "gonalgia sine materia", underwent an isokinetic exercise testing in order to compare the strength of extensor and flexor muscles of the knee of their dominant limb with the not dominant one.

Before the test, the subject performed a 5' length warm-up phase (cyclette 30 Watt). The isokinetic system Lido Active was used for the test performance (Bond M., 1988; Brown L.E., 1992). The parameter evaluated was the knee maximum joint momentum, mediated on 5 consecutive trials, each of an extension from 90° to 0°, followed by a flexion from 0° to 90°, in isokinetic mode.

The test began with the evaluation of the dominant lower limb and foresaw the performance of a series of five maximal repetitions at the speed of 120°/sec, 180°/sec and 240°/sec. A 2' stay period followed each series of repetitions (Davies G.J.et Al., 1980). Afterward, the contralateral (not dominant) lower limb was tested. A defatigation phase – by means of the cyclette or the stretching exercises - followed the end of the test itself (Davies G.J. et Al., 1980).

Statistical analysis was performed calculating the mean values and their standard deviation for the groups of dominant and not dominant lower limbs, at different speeds, discriminating between flexion and extension. Student "T" test was used to compare joint momenta between dominant and not dominant lower limbs in healthy subjects, and between healthy and pathological lower limbs.

RESULTS

Results are summarized in Table 1, as regard as the healthy subjects, and in Table 2, as regard as the subjects with "gonalgia sine materia".

No statistically significant difference was found in any of the studied parameters in the comparison between the dominant limb and the not dominant one, both

TABLE 1

		Dominant Limb	Not Dominant Limb
Healthy Male subjects (n° 17)			
120°/sec	Extension	166.71 + 29.00	170.53 ± 28.61
	Flexion	106.18 ± 27.85	98.53 ± 22.0
180°/sec	Extension	146.82 ± 24.72	150.94 ± 24.73
	Flexion	94.24 ± 26.48	92.88 ± 23.25
240°/sec	Extension	134.18 ± 23.59	136.00 ± 24.60
	Flexion	83.76 ± 24.05	80.47 ± 20.01
Healthy Female subjects (n° 13)			
120°/sec	Extension	110.23 ± 17.57	106.69 ± 18.63
	Flexion	63.69 ± 9.50	55.85 ± 8.45
180°/sec	Extension	97.23 ± 16.22	94.54 ± 18.02
	Flexion	56.92 ± 8.37	51.62 ± 7.60
240°/sec	Extension	86.62 ± 17.54	84.08 ± 14.76
	Flexion	51.77 ± 5.70	48.92 ± 6.82

TABLE 2

		Dominant Limb	Not Dominant Limb
Male subjects with "gonalgia sine materia" (n°13)			
120°/sec	Extension	152.77 ± 30.27	138.54 ± 36.79
	Flexion	87.23 ± 11.26	86.77 ± 17.42
180°/sec	Extension	130.62 ± 24.51	126.92 ± 33.37
	Flexion	82.77 ± 15.39	78.38 ± 16.55
240°/sec	Extension	115.46 ± 20.09	112.69 ± 27.88
	Flexion	73.08 ± 10.69	70.46 ± 11.01
Female subjects with "gonalgia sine materia" (n°11)			
120°/sec	Extension	103.00 ± 16.05	97.82 ± 19.94
	Flexion	54.27 ± 13.19	54.18 ± 13.88
180°/sec	Extension	85.82 ± 11.35	83.73 ± 14.65
	Flexion	47.27 ± 9.60	48.00 ± 9.88
240°/sec	Extension	72.82 ± 14.18	74.18 ± 13.51
	Flexion	44.64 ± 6.15	45.82 ± 6.31

within the subgroup of healthy subjects and within the subgroup of subjects with "gonalgia sine materia".

DISCUSSION AND CONCLUSION

No statistically significant differences emerged from the tests performed on healthy subjects with regard to dominant and not dominant lower limb, both in males and in females, at each of the three speeds tested, in extension as well as in flexion.

For this reason, the distinction between the pathological and the normal lower limb and between the dominant pathological limb from the not dominant pathological one was not needed. We could therefore implement the same test performed on healthy subjects also on individuals affected by "gonalgia sine materia".

Analogously, no statistically significant differences between the painful lower limb and the healthy lower limb emerged in our study, in any of the three speeds tested, neither in extension nor in flexion.

Therefore, the relevance of psychological features in the genesis and in the maintenance of "gonalgia sine materia" could be speculated.

A confirmation to our findings seems to come from the only similar study available in biomedical literature (Brandt K.D. et Al., 2000). In this study a comparison between the strength of extensor and flexor knee muscles, obesity and depressive picture in a group of 72 elderly subjects (aged more than 65 years), carriers of knee pain with clear radiographic signs of osteoarthritis and a group of subjects free of these same alterations has been performed. The isokinetic method (KINETIC-COMUNICATOR) was used to evaluate muscular strength in this case too.

The results of this study point to the fact that the subjects without clear signs of osteoarthritis had not obesity, had no significant differences in the strength of the muscular groups tested, but had a higher score in the scale adopted to assess their depressive picture, if compared with the group of patients with manifest osteoarthritis.

On the basis of these findings the Authors concluded that in a number of subjects of the group with knee pain without signs of osteoarthritis the pain could be considered as the epiphenomenon of a depressive picture, rather than of an intrinsic joint alteration.

The fact that the perception of pain is related to complex mechanisms and influenced by a series of factors such as the personality, the ethnic and cultural background, the psychophysical well-being should also be taken into account.

As far as concerns our study, the limited dimension of the studied sample does not allow us to expand analogous considerations to a larger population; however, it permits to indicate the isokinetic test as a valid tool for the collection, the processing

and the comparison of data, even if "per se" not sufficient to provide a full evaluation of the clinical picture.

As a matter of fact, this method should be critically appraised, given the extent of available information: the results of the tests have to be correctly interpreted and to be constantly included in the context of individual case clinical-objective evidence.

Further studies are needed to reach a better evaluation of the relevance of psychological variables (e.g. depression, anxiety) on referred pain, independently on the presence of specific organic alterations.

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