BALNEO RESEARCH JOURNAL
English Edition
eISSN 2069-7619 pISSN 2069-7597 ROMANIAN ASSOCIATION OF BALNEOLOGY

EFFECTS OF KINETIC MEANS IN RECOVERING PUBALGIC SYNDROME TO FOOTBALL PLAYERS

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Balneo Research Journal DOI: http://dx.doi.org/10.12680/balneo.2020.357 Vol.11, No.3, September 2020 p: 304–309

Peer reviewer: **Liviu LAZĂR**, Romanian Association of Balneology, office@bioclima.ro

Abstract

Pubalgic syndrome is a growing disease with an incidence of 10% -13% of all injuries suffered during a competitive year in 2011. Once installed, it has negative repercussions on the spatial-temporal parameters, eliminating them from the competitive activity and implicitly having a negative effect on the socio-economic situation of the athlete, but also on the capital of the club where he operates. The study was conducted on a batch of football players affected by the pubalgic syndrome (pubis osteitis). All study participants were evaluated both initially and finally. Between the two evaluations, they benefited from a kinetic treatment protocol. At the end of the initial evaluation, the data obtained were compared and processed using statistical programs. Both in comparison of the results and their processing with the help of the statistical programs showed that the treatment protocol had positive effects on the symptomatology generated by the pubalgic syndrome, but also to the socio-economic situation of the athlete.

Key words: *pubalgic syndrome, football game, recovery protocol, spatial-temporal parameters,*

Introduction

The soccer game has undergone major changes over the past decade, both economically and in terms of player performance. Increased performance was induced by club owners, coaches, trainers etc. using different techniques and approaches (1, 2, 3, 4). The methods used, along with club owner requirements, have increased the number of training for athletes. The increased number of training has also decreased the time for recovery. A decrease in recovery time leads to an increased stress on the myo-arthro-kinetic chain, which promotes the development of pathologies. The most complex and difficult pathology seen in football players is pubalgic syndrome (pubis osteitis) (5). Pubalgic syndrome is a noninfectious inflammation that affects the anatomical structures with the insertion point at the level of the pubic branch (6, 7, 8). Pubalgic syndrome accounted for 10-13% of the total number of illnesses recorded in football players in 2011 (8). Once the pubalgia has been installed, it has a negative effect on perceiving and fitting the patient's spatial-temporal parameters, exponentially affecting sports performance. In order to assess athletes' behavior in terms of both performance gains and rehabilitation following injury or surgery, parameters spatial-temporal (9, 10, 11, 12, 13). Affecting the spatial-temporal parameters also automatically leads to a decrease in football co-ordination capacity (14). Leporace G. mentions that the return of athletes to the competitive activity must be made when the clinical test parameters reach values very close to normal (9). Starting from the hypothesis that if we use one treatment based on kinetic means on pubalgic syndrome at soccer players, for a period of 6 weeks, there is an improvement of spatial-temporal parameters. We aimed at highlighting the effects of using kinetic means in the treatment of pubalgic syndrome. As objectives, we pursued a theoretical research to know the concepts in this direction and to organize an experimental research by which we check the hypotheses and highlight the fulfillment of the goal.

Materials and methods

The research was conducted at SC Pro Life Clinics SRL, Iaşi, between April 15 2018 - march 25 2019. To carry out the research we chose a group of 6 patients, football players with pubalgic syndrome (pubis osteitis). They were selected on the basis of the following criteria: diagnosed by the rheumatologist with pubalgic syndrome (pubis osteitis), male, aged 20-30 years, weight 60-95 kg, height 175-195 cm, the size of the planting vault

ranging from 22.5 to 28.5 cm with a minimum of 5 years of sports performance (football game).

The selected subjects (in this case patients) were evaluated both initially and ultimately with the BTS G-Sensor and BTS G-Studio software. With the help of the device and the software it was possible to perform an analysis of the spatial-temporal parameters such as the pivot phase support phase (steps 2 and 3 of the walk), the simple step distance (for the left foot and the right foot), the step length simple (for left and right leg), cadence of the steps and speed of movement of the individual.

Between the two evaluations (initial and final), the patients benefited from a kinetotherapeutic treatment consisting of: massage techniques: smoothing, friction and vibration, pelvic muscle elasticizing techniques, static and dynamic stretching of the adduction muscles, proprioceptive neuromuscular facilitation techniques: opposing relaxation (agonist) (14). The protocol of therapeutic intervention was applied for a period of 6 weeks (30 days). Each treatment session lasted between 50 and 70 minutes. The dosing of each treatment session was based on: muscle mass of each patient, tissue liability to therapies performed by the therapist, pain experienced by the patient, general condition of the patient, etc. (16).

All the results obtained at the initial and final evaluation were staggered, statistically processed using the IMB SPSS Statistical Version 25 statistical program, analyzed and compared. The analysis was also made by comparison with the reference value provided by the software program.

Statistical processing was performed using the t test for two independent samples. The t test for 2 independent samples requires 3 essential conditions: comparison of the two groups; the two groups are independent (there is no connection between the data input order for the subjects in a group and the input of the data from the other group); the variable (dependent) to be compared to be expressed numerically (measured by the scale interval or scale). SPSS always calculates the significance threshold for a bilateral hypothesis. From the perspective of the size of the effect, it is important to know the type of hypothesis formulated to assign the magnitude of the effect size

Statistical processing focused on the null hypothesis (H_o). The result provided by this is a p number that is interpreted as follows: $p > 0.05$ is not rejected H_o, the difference is insignificant at the significance threshold of 95%, $p < 0.05$ rejects H_o with the significance threshold of 95 % (at least two averages differ significantly), $p < 0.01$ rejects H_o with the significance threshold of 99% (at least two averages differs significantly) and $p < 0.001$ rejects H_o with the significance threshold of 95% (at least two mediums differ significantly).

The research methods were: the bibliographic study, the method of pedagogical observation, the method of measurement and evaluation, the case study method, the statistical-mathematical method and the graphical method. It would be good to present the calculated statistical indicators and their significance.

Results

Table 1 shows the values obtained in the initial and final evaluation by the football players, but also the reference value indicated by the BTS G-Studio Software. It can be seen how the values obtained in the initial evaluation change positively, migrating to the reference value offered by the BTS G-Studio program. The statistical processing of the described statistical parameters indicates the recovery mode following the kinetotherapeutic treatment and the evolution of these parameters be along the indicated and followed schedule.

Thus, in figure 1 is represented phase of pendulum - initial evaluation, both in the left and right legs. There is an asymmetry in the right foot, statistically highlighted by the Skewness coefficient indicating a value of 1.479 for the right foot and 0.903 respectively. The Skewness coefficient asymmetry is positive for both the right foot and the left leg, but a plateau value for values greater than 38%. The coefficient Kurtosis differs, having a value of -1.374 for the left foot indicating a platykurtic distribution and a positive value for the right foot of 2.559,

indicating a leptokurtic distribution. This shows how the left foot value range is more dispersed than the value beach around the right foot mean. Previous statistical interpretation demonstrates the patient's tendency to move the weight of the segment onto the healthy lower limb, thus protecting the affected inferior limb.

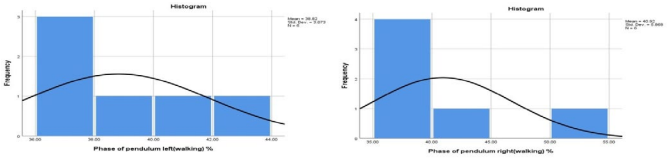

Figure 1. *Phase of pendulum – left foot/ right foot – initial.*

For a final evaluation of the comparative pendulum phase after kintotherapeutic treatment, we observe a value of the Skewness coefficient for the left foot of -1.294 and the right foot of -0.573 respectively, with a negative asymmetry and with a higher incidence for a higher frequency of 38% specific to prolonged effort. The coefficient Kurtosis also changed, showing a value of 0.259 for the left foot and a value of -0.756 for the right foot. This indicates that a leptokurtic distribution, left foot and a platykurtic distribution for the right foot. This suggests that switching to an increased sporting effort can cause major changes to the pacing phase by increasing the spatial-temporal parameters such as the rhythm of the steps, the speed of movement, the distance of the step.

Table 2 shows in the initial assessment a higher pressure on the left foot where the value was -2.1, and following therapeutic intervention, the pressure at this level has a normalization trend indicating a value of -1.45 for the left foot, which is translates into a standard deviation of the step length of 2.213 compared to 0.403 of what rating. This demonstrates how the patient was trying to protect his affected inferior limb, stepping further with his inferior healthy limb.

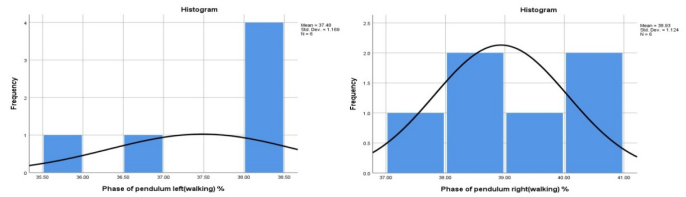

Figure 2. *Phase of pendulum – left foot/ right foot – final.*

Comparing the results in table 2, graphically represented in figure 1 and figure 2, as well as the values indicated by them, we can see how the difference in the Skewness coefficient is 2.197 for the left foot and 2.052 for the right foot in the final evaluation following the treatment protocol. This emphasizes that observing and running the treatment protocol altered the value of the Skewness coefficient from a positive asymmetry, in a negative asymmetry, indicating the location of the values to the left of the mean, which is the result of the decrease in the duration of the penetration step.

The T-value comparison test shows a value of -0.949 in the initial phase and -3.597 in the final phase, respectively. The test evaluation is statistically significant and certifies the patient's tendency is to protect the affected foot as well as move the weight of the body to the healthy leg. The proposed kinetoterapeutical treatment improves on the patient's tendency to protect the affected leg by moving the body weight to the healthy leg that is also pointed out by the Sig value. (2-tailed) of 0.016 interdependence of the variables obtained in the final phase of evaluation of the batch of patients.

The same statistical calculations were performed for step distance (m) both for the parameters obtained in the initial assessment and the final evaluation. In figure 3 is the data obtained by the patients initially for both left and right legs. From Figure 3 we can deduce the Skewness coefficient for the left foot with a value of -0.403, and for the right foot a value of -0.462 indicating a negative asymmetry. The coefficient Kurtosis is shown in figure 3 with a statistical value of -1.701 on the left foot and a value of -2.076 for the right foot.

This indicates a platykurtic distribution for both the left foot and right foot, presenting a left foot value plate around the 10th frequency.

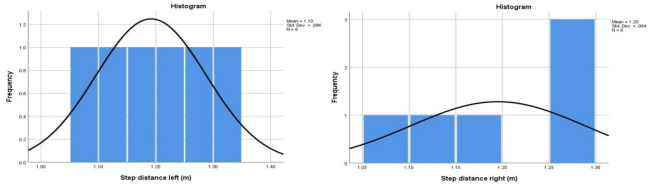

Figure 3. *Step distance – left/ right – initial.*

In figure 4 we provide data on the final step distance evaluation and we can see how the Skewness coefficient for the left foot indicates a value of 1.722 and for the right foot 1.655, indicating a positive asymmetry for both legs. The coefficient Kurtosis also changed, showing a value of 3.278 for the left foot and a value of 2.968 for the right foot. This indicates that the leptokurtic distribution is present for both the right foot and the left foot, with a much higher left foot frequency in the 1.20-1.40 m range, which demonstrates the more frequent use tendency of healthy leg.

It should be noted that both the statistical processing of the pendulum phase and the step distance (initial and final) Std Skewness Error was maintained at 0.845 and Std Kurtosis Error at 1.741.

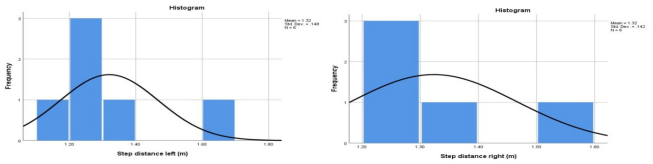

Figure 4. *Step distance – left/ right – final.*

Comparing the two figures, figure 3 and figure 4, as well as the values indicated by them, we can see how the difference in the Skewness coefficient is 2.125 for the left foot and 2.117 for the right foot following the treatment protocol. This shows how the treatment protocol changed the Skewness coefficient if the values are at the right of the average increasing the step distance. This, together with the decrease of the time of pendulum, led to the increase of the spatial-temporal parameters and their bringing into normal values.

The T-test comparing the average values of the step length indicates a value of -0.542 in the initial phase and -0.466 respectively in the final phase. The application of the test is statistically significant and certifies that the step length is closely correlated with the pivotal phase and the improvement of the spatial-temporal parameters is directly proportional to the pivotal phase, as evidenced by the minor changes in the average values of the step length in the two stages: initial and final.

Conclusion

Pubalgic syndrome has negative effects on the spatial-temporal parameters affecting the patient both physically, mentally and economically. These negative effects are reflected in the overload of the mio-arthro-kinetic chain by loading the lower inferior limb, thus protecting the affected limb.

The treatment protocol presented and performed in the present paper had positive effects, bringing a positive contribution to the spatial-temporal parameters, bringing it near or to the reference value. In this direction we can say that the hypothesis that if we use at athletes affected with the pubalgic syndrome, a treatment based on kinetic means, a period of 6 weeks, an improvement of the spatial-temporal parameters, has been confirmed. The effects of the proposed treatment have led to a balanced loading of body weight on both inferior limbs, thus reducing the over-stress of the myo-arthro-kinetic chain of the healthy limb confirming the scope of the above-mentioned research. Statistical programs helped us to interpret the results and present them in the form of charts to help the reader understand the study.

Declaration of conflict of interests

There is no conflict of interest for any of the authors regarding this paper.

Informed consent

An informed consent was obtained from the patient included in this study.

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Table 1. *Spatio-temporal parameters obtained at the initial and final evaluation.*

P	Support phase (%)				Phase of pendulum (walking) %				Step distance (m)				Step length (%)				Stage of steps (steps / min)		Speed (ms)	
	L.i.e	L.f.e	R.i.e	R.f.e	L.i.e	L.f.e	R.i.e	R.f.e	L.i.e	L.f.e	R.i.e	R.f.e	L.i.e	L.f.e	R.i.e	R.f.e	i.e	f.e	i.e	f.e
1	63,3	64,5	60,2	62,8	36,7	35,5	39,8	37,2	1,24	1,35	1,27	1,36	55,7	53,8	44,3	46,2	92,9	101,8	0,95	1,14
2	58,1	61,6	64,9	59,9	41,9	38,4	35,1	40,1	1,3	1,29	1,29	1,29	47,5	47,6	52,5	52,4	90,9	103,7	0,97	1,11
3	61,9	61,9	63	60	38,1	38,1	37	40	1,1	1,27	1,1	1,28	47,5	50,2	52,5	49,8	94,1	114,3	0,86	1,21
4	56,6	61,9	58,3	61,8	43,4	38,1	51,7	38,2	1,27	1,22	1,26	1,2	51,2	48,5	48,8	51,5	115,6	109,7	1,19	1,11
5	63,7	61,8	57,4	61,3	36,3	38,2	42,6	38,7	1,06	1,19	1,07	1,22	51,7	49,9	48,3	50,1	98	103,9	0,84	1,05
6	63,2	63,4	60,7	60,4	36,5	36,6	39,3	39,4	1,18	1,6	1,18	1,59	46,1	47	53,9	53	98,5	104,9	0,96	1,41
R	57-61				38.5–43.6				1.16-1.30				49.3–50.7				111 -126.6		1.12-1.34	

Legend: P. – pacients, L.i.e – left initial evaluation, L.f.e – left final evaluation, R.i.e – right initial evaluation, R.f.e – right final evaluation, i.e – initial evaluation, f.e – final evaluation, R. – normal values.

Tablel 2. *Testul T – Phase of pendulum – initial / final.*

T - test		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Initial	Phase of pendulum left(walking) % - Phase of pendulum right(walking) %	-2,1	5,422	2,213	-7,790	3,590	-.949	5	.386
Final	Phase of pendulum left(walking) % - Phase of pendulum right(walking) %	-1,45	0,987	0,403	-2,486	-0,413	-3.597	5	.016

Table 3. *Testul T – Step distance – initial/ final.*

T - test		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Initial	Step distance left (m) - Step distance right (m)	-0,003	0,0150	0,006	-0,019	0,012	-.542	5	.611
Final	Step distance left (m) - Step distance right (m)	-0,003	0,0175	0,007	-0,021	0,015	-.466	5	.661