International Journal of Physical Education & Sports Sciences
Vol. 15, Issue No. 2, October-2020, ISSN 2231-3745

DOI: https://doi.org/10.29070/vwyn9k60

Effect of Proprioceptive Training on Foot Pressure Distribution and Stabilometric Performance of Sprinters

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Abstract: The study was conducted to determine the effect of proprioceptive training on foot pressuredistribution and stabilometric performance of sprinters.To facilitate the study ten female sprinters of the LNIPE match practice group were selected. The selectedsubjects were in the range of 18 to 24 years of age.BTS-P-Walk (Bodopometric platform) was used to collect the data for this study. The subjects were askedto stand still in a normal standing position on the bodopometric platform and data was recorded for a 05-sec duration.The data collected from participants were statistically analyzed by employing paired t-test to examine thesignificant effect of proprioceptive training on the dependent variablesThe result has exhibited that the obtained value of paired t-test has shown an insignificant differencebetween the pre-test and post-test of the female sprinters as the p-value is greater at 0.05 level ofsignificance.

Keywords: proprioceptive training, foot pressure distribution, stabilometric performance, sprinters, BTS-P-Walk, data collection, paired t-test, significant effect, dependent variables, pre-test, post-test

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INTRODUCTION

The purpose of the study was to know the effect of proprioceptive training on foot pressure distribution and stabilometric performance of sprinters. The sprinters of LNIPE having age between 18-24 years were chosen as subjects. Subjects with pathological conditions like fracture, soft tissue injuries, ligament injury were excluded.

- The study was delimited to static foot pressure measurement and further delimited to:-
    - ✓ Tarsal (1-5)
    - ✓ Metatarsal (1-5)
    - ✓ Mid Foot
    - ✓ Lateral Heel
    - ✓ Stabilometry evaluation
    - ✓ CoP distance Average Speed

Hypotheses formulated were that:-

- There would be a significant impact of proprioceptive training on foot pressure distribution of the sprinters.
- Therewould be a significant effect of proprioceptive training on stabilometric performance of sprinters.

PROCEDURE

For the purpose of the present study the players were tested for stability using COP distance and average speed of COP for 05 seconds in boropodometric pressure platform. The performances of the players were measured in mm and mm/sec. Pre-test and post-test group design were adopted for this study. To test the results of the training given, paired t-test was applied at 0.05 level of significance .The pre-test data were collected before training and the post-test data was collected after six weeks of training.

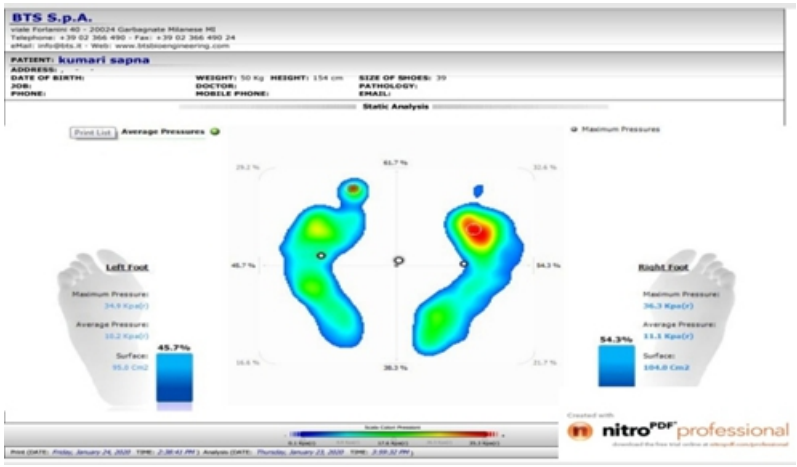

Figure 1: plantar pressure distribution analysis

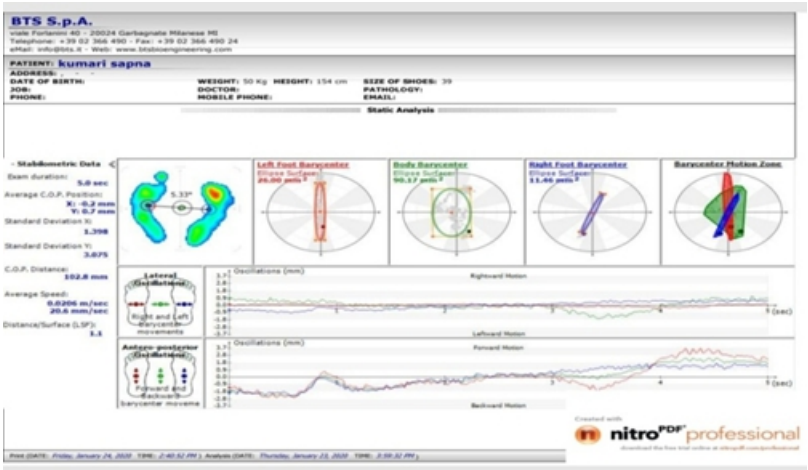

Figure 2: Stabilometric data of subject

TRAINING PROTOCOLS

Six weeks training program was conducted by the scholar for the selected group. The practice session was conducted five days per week in the evening session. The subjects were trained at the time of match practice for the duration of 30 minutes with all the participants doing it together. Various exercises were included and each exercise was done with gradual increase in difficulty level.

FINDINGS AND DISCUSSIONS

Paired t-test was applied to find the significant effect of proprioceptive training on foot pressure distribution and stabilometric performance of sprinters. The level of significance was set at 0.05.

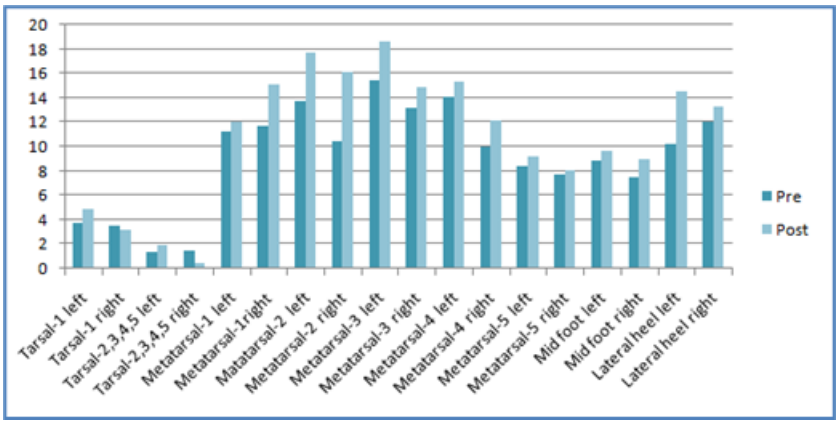

Figure 3: Graphical representation of comparison of means of foot plantar pressure of pre-test and post-test of the subjects

Table-1 Paired sample t-test for variables of feet in plantar pressure distribution.

Variables	Paired differences					t	df	Sig (2-tailed)
	Mean	Std. deviation	Std. error mean	95% confidence interval of the difference				
				Lower	Upper			
Tarsal-1 left	-1.100	7.505	2.373	6.459	4.269	-.464	9	.645
Tarsal-1 right	-.300	6.667	2.108	-4.470	5.070	.142	9	.890
Tarsal-2,3,4,5 left	-.300	1.494	.473	-1.369	.769	-635	9	.541
Tarsal-2,3,4,5 right	-1.000	3.256	1.033	-1.336	3.336	-.969	9	.358
Metatarsal-1 left	-.800	6.250	1.977	-5.271	3.671	-.405	9	.695
Metatarsal-1 right	-3.400	6.204	1.963	-7.838	1.038	-1.733	9	.117
Metatarsal-2 left	-4.000	10.176	3.210	-11.280	3.280	-1.243	9	.245
Metatarsal-2 right	-5.600	3.893	1.231	-8.384	-2.815	-4.549	9	.001
Metatarsal-3 left	-3.200	9.612	3.040	-9.076	3.676	-1.053	9	.320

Metatarsal-4 left	-1.200	5.959	1.884	-5.463	3.063	-.637	9	.540
Metatarsal-4 right	-2.200	3.293	1.041	-4.556	.156	-2.113	9	.064
Metatarsal-5 left	-1.500	4.950	1.565	-5.041	2.041	-958	9	.363
Metatarsal-5 right	-.400	3.438	1.087	-2.860	2.060	-.368	9	.721
Mid foot left	-.800	2.201	.696	-2.375	.775	-1.149	9	.280
Mid foot right	-1.500	5.442	1.721	-5.393	2.393	-.872	9	.406
Lateral heel left	-4.400	2.119	.670	-5.916	-2.884	-6.567	9	.000
Lateral heel right	1.200	5.846	1.849	-2.982	5.382	.649	9	.532

It is evident from the above table that the p-value (sig.) for the metatarsal-2 right and lateral heel left are 0.01 and 0.00 , which is less than 0.05. Except them, all other variables are insignificant as the p-value is greater than 0.05.

Thus, the null hypothesis may be accepted and it is concluded that there is no significant effect of proprioceptive training on foot pressure distribution of the female sprinters.

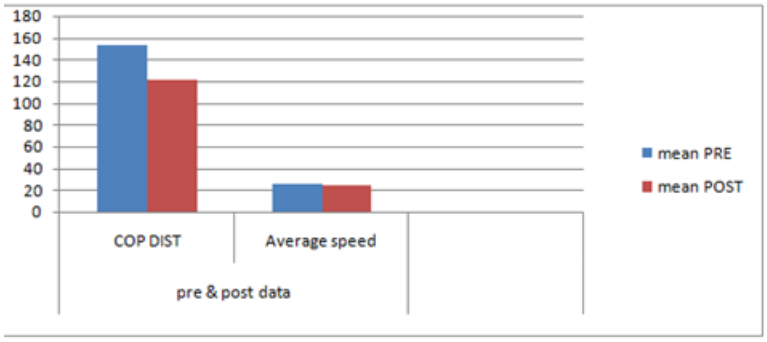

Figure 4 Graphical representation of pre-test and post-test with CoP distance and average speed of the subjects.

Table-2 Paired sample t-test for variables of CoP distance and Average speed.

Variables	Paired differences							
	Mean	Std. deviation	Std. error mean	95% confidence interval of the difference		t	Sd	Sig (2-tailed)
				Lower	Upper			
CoP Distance	31.870	68.981	21.814	-17.476	81.216	1.461	9	.178
Average speed	1.1600	6.3557	2.0098	-2.9366	6.1566	.801	9	.444

- The values of mean and standard deviation of different variables of subjects are given in table-1 and table-2.
- Graphical representation of comparison of mean of different variables between pre-test and post-test of female sprinters is shown in Figure-3 and Figure-4

DISCUSSIONS OF FINDINGS

The present study was designed to elucidate the effect of 6-week proprioceptive training on foot pressure distribution and stabilometric performanceof female sprinters. In this study the research scholar only confined to the foot pressure distribution and stabilometric performance of the female sprinters and there is a significant difference found in the metatarsal-2 right and lateral heel left of the subjects at 0.05 level of significance. Apart from these, no significant difference was found in other parts of the feet. But a significant result may also be obtained by increasing the sample size or by conducting study on elite performers.

The result also showed that there is no significant difference found between other parts of the feet,this might be because of the small sample size and low level of performance of the subjects. Some other causes of an insignificant result of the study may be due to having less time duration for the training.The study by Kuitunen Sami et.al. (2011) supports the findings of the study.

In the pretext of present findings, hypotheses for the selected variables failed to accept at 0.05 level of significance.

CONCLUSION

Based on the analysis and findings of the present study, the following conclusions were drawn:

- The p-value (sig.) for the metatarsal-2 right and lateral heel left was less than 0.05 so were found to be significant, except that, all other variables are insignificant as the p-value is greater than 0.05.
- There is no significant effect of proprioceptive training on stabilometric performance of the subjects.

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