AN OBSERVATIONAL STUDY CARRIED OUT IN WOMEN LIVING IN SOUTHERN ITALY

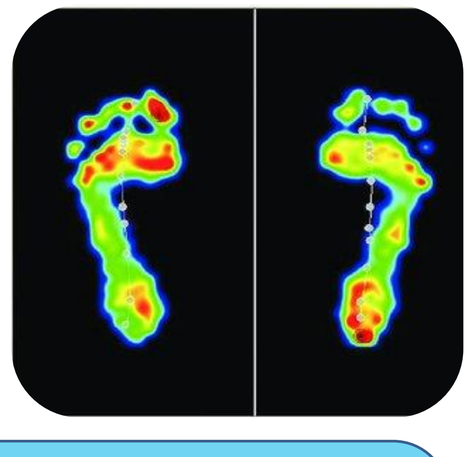
Kaltrina Feka[1] , Giuseppe Messina[2], Francesco Pomara[3], Valerio Giustino[4], Angelo Iovane [4], Marianna Bellafiore[4], Giuseppe Battaglia[4], Antonio Palma[4], Antonino Bianco[4].

1. Ph.D. Program in Health Promotion and Cognitive Sciences, University of Palermo, Palermo, Italy
2. POSTURALAB Italia, Palermo, Italy
3. MEDEOR Research Institute, Palermo, Italy
4. Sport and Exercise Sciences Research Unit, SPPF Department, University of Palermo, Italy.

Background

It is the first body part to receive the impact, and serves as a base for support.

AIM: The purpose of the study was two-fold: a) to see the differences in plantar pressure distribution between athletes and sedentary women; and b) additionally to investigate the differences, if any, in plantar pressure between sports within athletes' group.



Baropodometry is a reliable instrument to determine plantar pressure distribution.

Methods

173 healthy females

- 98 Sedentary (S)
- 75 Athlete (A) (soccer, swimming, rowing, dancing, judoka)

Table 1 - Age and physical characteristics of Sedentary and Athlete groups

	S (n° = 98)	A (n° = 75)	
Age, yrs	24.23 ± 6.11	22.47 ± 4.89	NS
Height, cm	161.11 ± 6.44	159.98 ± 5.95	NS
Body weight, kg	56.70 ± 8.19	55.49 ± 7.61	NS
BMI, kg/m²	21.81 ± 2.52	21.62 ± 2.18	NS
BSA, m²	1.59 ± 0.13	1.57 ± 0.12	NS
Shoe size, n°	37.83 ± 1.53	38.05 ± 1.55	NS

Body weight:
- SECA 709 Hamburg, Germany

Height:
- SECA 220 Hamburg, Germany

BMI:
- Kg/m²

- FreeMed posturography system
- FreeMed baropodometry platform
- Free Step v.1.0.3 software

Results

Table 2 -Plantar surface areas (cm²) in Sedentary and Athlete groups.

	S (n° = 98)	A (n° = 75)	P-value
Total surface, cm²	246.48 ± 34.14	254.71 ± 32.21	NS
Forefeet surface, cm²	138.43 ± 18.79	144.45 ± 18.92	NS
Rear feet surface, cm²	108.05 ± 17.15	110.15 ± 16.33	NS
Total left foot surface, cm²	121.68 ± 17.92	126.44 ± 18.20	NS
Total right foot surface, cm²	124.80 ± 18.08	128.27 ± 18.05	NS

Table 3 - Per cent loads on the plantar areas, maximum peak pressure and mean pressure values of Sedentary and Athlete groups.

	S (n° = 98)	A (n° = 75)	P Value
Maximum peak, g/cm²	518.06 ± 111.50	445.38 ± 88.47	0.0001
Pressure mean, g/cm²	232.99 ± 43.26	217.95 ± 38.11	0.0182
Forefoot load, %	50.39 ± 3.60	52.36 ± 3.76	0.0006
Rear foot load, %	49.61 ± 3.60	47.64 ± 3.73	0.0006
Total left foot load, %	50.68 ± 4.27	49.93 ± 2.97	NS
Total right foot load, %	49.32 ± 4.27	50.07 ± 2.97	NS

Sedentary *VS* Athlete

- No significant differences were found regarding age and physical parameters.
- Interestingly, S participants do not show any significant difference compare to A participants in plantar surface areas.
- Athlete group showed a tendency to use fore feet more than sedentary group.

Sports within Athlete group

When compared sports within Athlete group significant differences were found.

Table 4 – Plantar surface values (average ± standard deviation) of Athlete subgroups.

	Soccer players (n° = 18)	Rowers (n° = 11)	Dancers (n° = 12)	Swimmers (n° = 16)	Judoka (n° = 18)	P Value ANOVA
Total surface, cm²	265.83 ± 30.58	275.82 ± 23.95	250.58 ± 29.37	241.06 ± 39.00	245.56 ± 25.44	0.0183
Fore-feet surface, cm²	155.17 ± 19.17	152.27 ± 14.48	139.67 ± 15.93	136.88 ± 22.34	139.33 ± 14.26	0.0474
Rear-feet surface, cm²	110.67 ± 14.08	123.55 ± 11.18	110.92 ± 15.61	104.19 ± 20.58	106.22 ± 13.71	0.0262
Total left foot surface, cm²	134.33 ± 17.54	137.00 ± 13.18	124.25 ± 16.50	119.13 ± 22.18	120.06 ± 13.63	0.0132
Total right foot surface, cm²	131.50 ± 14.42	138.82 ± 11.62	126.33 ± 13.69	121.94 ± 17.86	125.50 ± 12.83	0.0378

Table 5 – Per cent and absolute plantar load values (average ± standard deviation) of Athlete subgroups.

	Soccer players (n° = 18)	Rowers (n° = 11)	Dancers (n° = 12)	Swimmers (n° = 16)	Judoka (n° = 18)	P Value
M peak, g/cm²	419.00 ± 76.15	399.45 ± 87.72	390.82 ± 46.03	509.00 ± 85.20	476.61 ± 82.23	0.0002
Pressure mean, g/cm²	216.72 ± 30.56	208.45 ± 40.84	182.09 ± 14.21	238.44 ± 44.61	228.67 ± 32.24	0.0008
Total left foot load, %						
- Percentage (%)	50.67 ± 2.57	49.18 ± 1.17	50.50 ± 2.58	49.56 ± 4.38	49.61 ± 2.91	NS
- Kilogram (kg)	29.89 ± 4.66	28.30 ± 4.28	23.73 ± 2.40	27.79 ± 2.73	27.65 ± 3.14	0.0007
Total right foot load, %						
- Percentage (%)	49.33 ± 2.57	50.82 ± 1.17	49.50 ± 2.58	50.44 ± 4.38	50.39 ± 2.91	NS
- Kilogram (kg)	29.02 ± 4.03	29.25 ± 4.42	23.19 ± 1.49	28.52 ± 4.57	28.16 ± 3.82	0.0010

Conclusions

This study demonstrated that there are no significant differences in plantar surface areas between the two groups. Regarding plantar pressure distribution, there is a tendency from athletes to lean forward when compared to sedentary. Furthermore, there are significant differences between sports in athlete group, and this phenomenon of leaning forward could be due to sport specific adaptations.

1. Wong, P.L., K. Chamari, D.W. Mao, et al., Higher plantar pressure on the medial side in four soccer-related movements. British Journal of Sports Medicine, 2007. 41: p. 93-100.
2. Gravante, G., G. Russo, F. Pomara, et al., Influence of physical activity on plantar pressures and on ground projection of the body barycentre.Med Sport 2002. 55: p. 269-78.
3. Russo, G., G. Gravante, G. Amato, et al., *Analisi dell'appoggio plantare e del centro di pressione in soggetti adolescenti: un confronto tra canottiere e sedentarie.* Chirurgia del Piede, 2003. **27**: p. 19 - 23.