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ORIGINAL ARTICLE

Comparison of a new bioelectrical impedance device and its use in the assessment of body composition: A pilot study

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ABSTRACT

The objective of the present study is to determine the reliability of the measurements in the parameters of body composition of the Smart Performance measurement device and to compare the results with those produced by the InBody 270 device. Ten professional-level male athletes (mean weight = 58.4 kg ; height = 165.4 cm; BMI = 26.9 kg/m^2) were analysed. An experimental design of a single cohort was carried out. Participants were tested on two 5-point bioimpedance devices: In-Body 270 (Biospace, Seoul, Korea) and Smart Performance. Measurements were made in the after-noon (6:30 p.m. - 7:30 p.m.). The variables used were weight (kg), fat mass (kg), muscle mass (kg), body water (L), BMI (kg/m^2), protein and minerals. the Smart Performance Composition device presents a high degree of reliability for the analysis of body composition and its use at a recreation-al, sports and scientific level.
Keywords: Performance analysis of sport, Physical conditioning, Body composition, Impedance, Reliability.

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INTRODUCTION

The increase in sedentary behaviours, related to new technologies (television, mobile phones, tablets), represents one of the great problems in today's society (Becerra et al., 2013). That is why a sedentary lifestyle is considered a risk factor for health causing cardiovascular diseases, as well as obesity, diabetes and hypertension (Leiva et al., 2017). The practice of physical activity, from an early age, is one of the most important elements to achieve active and healthy lifestyles, preventing both obesity and overweight, in children, youth and adults (Mendoza-Muñoz et al., 2020) (Ortega et al., 2007).

In this way, body composition and nutritional status are understood as two key components that are associated with both health and sports performance (Larsen et al., 2021) (Campa et al., 2021). For this reason, in most sports, athletes can achieve great advantages in their modalities by changing their characteristics of mass or body composition, a fact by which athletes carefully adjust their training and nutritional habits according to the demands of his discipline (Sundgot-Borgen and Torstveit, 2010).

In this context, monitoring body composition has become crucial, and assessing it properly allows a more reliable assessment through anthropometry and bioelectrical impedance devices (Inbody 270). Specifically, the latter is used to calculate the total water in the body, fat mass and fat-free mass. Despite presenting less reliability and greater variability, it is compensated by the large number of people evaluated, simplicity, speed, safety and low application costs.(Costa et al., 2015).

In this way, the objective of this study is to determine the reliability of the measurements in the parameters of body composition of the Smart Performance measurement device and to compare the results with those produced by the InBody 270 device.

MATERIALS AND METHODS

Participants

10 professional-level male athletes (mean weight = 58.4 kg; height = 165.4 cm; BMI = 26.9 kg/m^2) and with a stable socio-economic profile were analysed.

All subjects were informed verbally and in writing of the procedure and purpose of this investigation and of the possible risks. The study was carried out in accordance with the Declaration of Helsinki and the protocol was approved by the Ethics Committee of the Technology-Based Company of the University of Alicante, and the Alicante Science Park (Kinetic Performance, S.L.)

Measures and procedures

An experimental design of a single cohort was carried out. Participants were tested on two 5-point bioimpedance devices: InBody 270 (Biospace, Seoul, Korea) and Smart Performance. Measurements were made in the afternoon (6:30 p.m. - 7:30 p.m.). The variables used were weight, Fat free mass (FFM), muscle mass, body water, BMI, protein and minerals. Participants did not consume alcohol 24 hours prior to measurements, did not engage in vigorous exercise 12 hours prior to measurements, did not eat or drink 3 hours prior to measurements, and urinated prior to measurements.

Statistical analysis

Descriptive (mean and standard deviation) and inferential tests were carried out using SPPS Statistics 18. We carried out the Kolmogorov–Smirnov test to analyse normality of data. The Mann–Whitney U-test with a

Bonferroni post hoc ($p < .01$) was carried out to analyse variables with non- parametric distributions. Variables with parametric distributions were analysed with Student's t-distribution ($p < .05$).

RESULTS

The results do not show significant differences between both devices (Table 1 and Figure 1).

Table 1. Statistical test for the comparison of body parameters.

Variables	Inbody270	Smart	Differences	Sig. (bilateral)
Height (kg)	69.2	70.2	1.03	.856
Fat (kg)	11.5	11.5	0.03	.991
Water (L)	42.2	43.1	0.83	.814
Fat free mass (kg)	32.4	33.2	0.79	.787
BMI (kg/m^2)	22	21.9	0.92	.920
Protein	11.4	11.7	0.75	.756
Minerals	4	3.9	0.81	.813

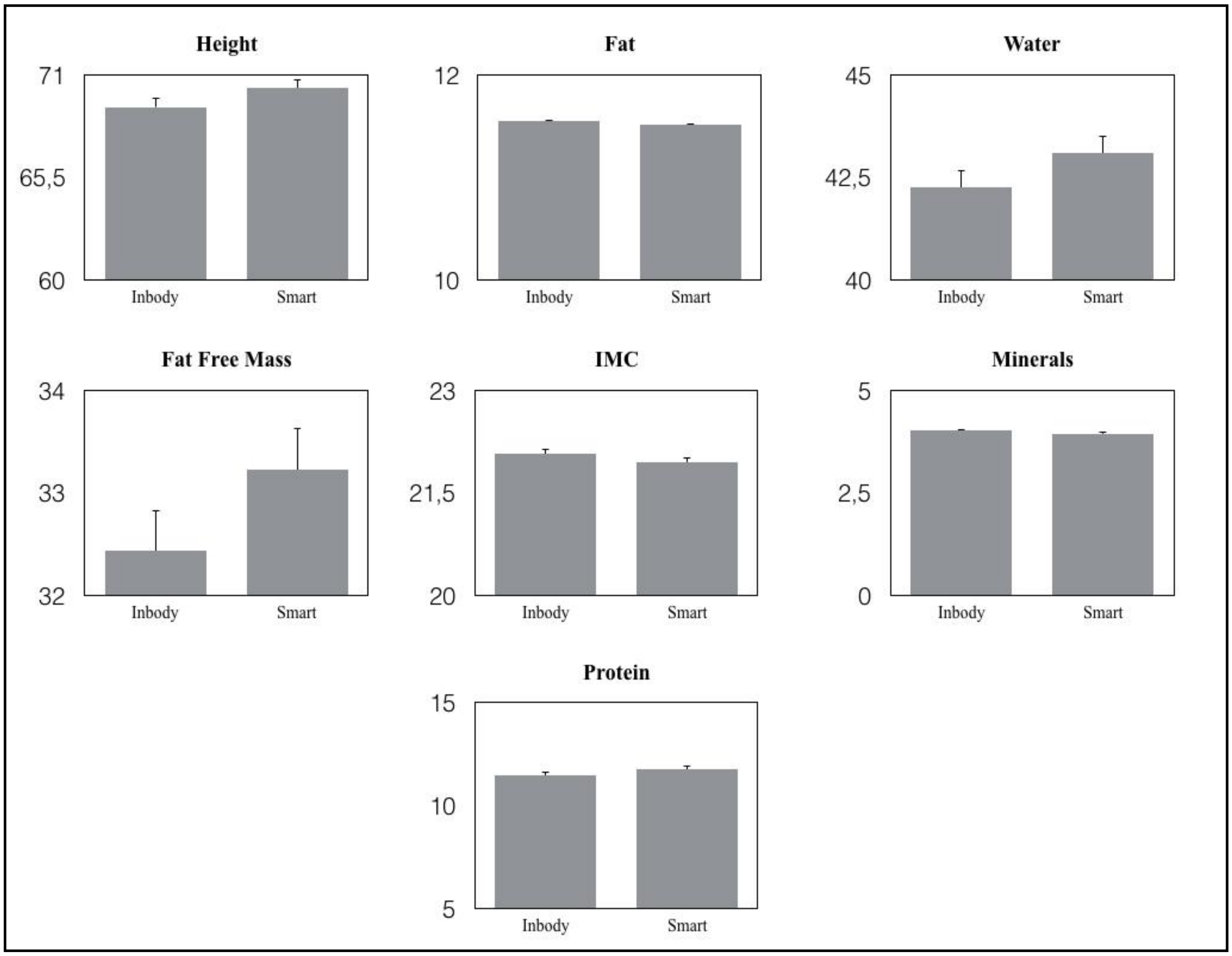

Figure 1. Results for the comparison of body parameters.

DISCUSSION AND CONCLUSION

The objective of this study is to determine the reliability of the measurements in the body composition parameters of the Smart Performance measurement device and to compare the results with those produced by the InBody 270 device.

Monitoring and evaluation of body composition can be decisive in sports performance (Malina, 2007). But the importance of body composition, and especially of bioelectrical impedance devices, is increasing in the health field. These kits are used in dialysis centres to help determine dry weight (Chamney et al., 2002). This makes comparisons between analysers necessary. InBody analysers have shown correlations of .94-.96 with the DEXA reference method (Karelis et al., 2013).

Fat Free Mass and body water are the main indicators in the physical performance of athletes (Toselli, 2021). The results obtained after comparing the body composition parameters of 10 athletes show values between both anthropometric analysis devices without significant differences. The differences in total water between both devices were 2% without reporting significant differences. Hydration is an important parameter in the health status of the population. In some studies, it has been reported that a reduction in body water between 3-5% can cause digestive problems and muscle spasms (Burke, 2007). The FFM values do not show percentage or significant differences. FFM values represent an essential indicator in sport. This has given rise to new productive models to determine excess fat mass and thus be used by trainers (Mascherini et al., 2019).

In conclusion, the Smart Performance Composition device presents a high degree of reliability for the analysis of body composition and its use at recreational, sports and scientific levels.

AUTHOR CONTRIBUTIONS

C.E.A. and D.T.C. manuscript writing, collected the data, preparation and research design; M.T.S. and M.J.G.G. critically reviewed the work, result interpretation and manuscript writing; L.W. manuscript writing and collected the data, and P.P.S. research design, statistical analysis and result interpretation.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

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