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Original Article

Comparative Study between Actofit Pro/Max and Inbody 270 BIA Machine for Measuring Body Composition Parameters

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Abstract

Background: The measurement of body parameters such as body weight, body fat %, and body water % is crucial in assessing the health and fitness status of individuals. The Actofit Pro Max/Max and Inbody 270 bioelectrical impedance analysis (BIA) machine are commonly used for this purpose, but their comparative accuracy has not been extensively studied.

Methods: A comparative study was conducted over 319 subjects comprising athletes, standard body type, and obese subjects. The aim of the study was to determine the correlation between the body parameters measured over 30 days of interval with Actofit Pro Max/Max and Inbody 270 BIA machine. Pearson correlation coefficient (r) was used to calculate the data correlation.

Results: The results of the study showed that the change in the body weight, body fat %, and body water % measured over 30 days of interval with Actofit Pro Max/Max is highly correlated with that of the Inbody 270 BIA machine ($r = 0.95$, $P < 0.001$).

Conclusion: The Actofit Pro Max/Max and Inbody 270 BIA machine showed a high correlation in measuring body parameters such as body weight, body fat %, and body water %. These findings suggest that both devices can be used interchangeably for body parameter measurement.

Key words: Accuracy, Actofit Pro Max/Max, Athletes, Body fat %, Body parameters, Body water %, Body weight, Comparative study, Correlation, Fitness status, Health, Inbody 270 BIA machine, Interval, Measurement, Obese subjects, Pearson correlation coefficient, Standard body type

INTRODUCTION

Body composition analysis has become a critical tool for assessing the health and fitness of individuals across a wide range of populations. Accurate measurement of body composition parameters such as body weight, body fat percentage, and body water percentage is essential for personalized nutrition and exercise plans, tracking changes in body composition over time, and monitoring the progress of weight loss or muscle gain programs.[1-4]

Bioelectrical impedance analysis (BIA) is one of the most commonly used methods for measuring body composition due to its non-invasive nature, low cost, and ease of use.[5-7] BIA works by passing a small electrical current through the body and measuring the resistance or impedance to the flow of that current. This resistance is used to calculate body composition parameters, including body fat percentage, lean body mass, and body water percentage.[8-10]

Despite the widespread use of BIA, the accuracy of BIA measurements can vary depending on the type of BIA machine used.[11] There are various BIA machines available on the market with different features, such as different

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frequencies of electrical current, number of electrodes, and algorithms for calculating body composition parameters. Therefore, it is crucial to evaluate the accuracy of different BIA machines before using them for clinical or research purposes.[12]

In this study, we aimed to compare the accuracy of two BIA machines, the Actofit Pro Max/Max and Inbody 270, in measuring body composition parameters such as body weight, body fat percentage, and body water percentage. The Actofit Pro Max/Max is a relatively new BIA machine that uses eight electrodes, while the Inbody 270 is a well-established machine that uses four electrodes.[13] By comparing the measurements obtained from these two machines, we can provide insights into the accuracy of these BIA machines and help healthcare professionals and individuals make informed decisions about which BIA machine to use for their body composition analysis needs.[14]

METHODS

Participants

The study included 319 participants aged between 11 and 90 years, consisting of athletes, standard body type, and obese individuals. The participants were selected based on the criteria of having no known medical conditions that could affect their body composition. The participants were distributed as 101 females and 218 males. Participants were recruited from sports centers, gyms, and community centers.

Instruments

The study utilized two body composition analyzers, the InBody 270 and the Actofit Smart Scale Pro/Max. Both instruments utilize direct segmental multi-frequency BIA to measure various body parameters including body weight, body fat %, and body water %. The InBody 270 operates at frequency ranges of 1 kHz, 5 kHz, and 50 kHz and has a measurement time of <15 s, while the Actofit Smart Scale Pro/Max operates at frequency ranges of 5 kHz and 50 kHz and has a measurement time of <30 s.

The Actofit Pro Max and InBody 270 are both popular body composition analyzers that use BIA technology to measure various body composition parameters such as body fat percentage, muscle mass, and basal metabolic rate.

The technology used in Actofit Smart Scale Pro/Max and InBody Body Impedance Analysis involves the use of BIA.

BIA is a method of assessing body composition by measuring the electrical conductivity of body tissues. Both machines use multiple frequencies of electrical currents to penetrate different layers of body tissues, including fat, muscle, and bone. As the electrical current passes through the body, the machine measures the resistance to the current. Since different types of body tissues have different levels of electrical conductivity, the machine is able to determine the relative amounts of fat, muscle, and water in the body.

The Actofit Smart Scale Pro/Max machine is designed with advanced algorithms that can account for factors such as age, gender, height, and weight to provide accurate and personalized body composition measurements. In addition, the machine is equipped with on scale color displays and user-friendly mobile to make it easy to use and understand the results.

Design

The study was designed as a comparative study between the two body composition analyzers, with the aim of determining the correlation between the measurements obtained from the InBody 270 and Actofit Smart Scale Pro/Max. The study was conducted in two phases, with a 30-day interval between them. During both phases, each participant's body weight, body fat %, and body water % were measured on both the InBody 270 and Actofit Smart Scale Pro/Max. The order in which the instruments were used was randomized to minimize the order effect. The measurements were taken at the same time of day, in a standardized testing environment, and participants were asked to refrain from eating or drinking for at least 2 h before the test. In addition, participants were asked to avoid intense physical activity for 24 h before the test.

Data Analysis

The differential data observed over Phase 1 and Phase 2 were recorded and analyzed to determine the reliability of both instruments. The correlation between the Actofit Smart Scale Pro/Max and InBody 270 data change over Phase 1 and Phase 2 was calculated using the Pearson correlation coefficient. Bland-Altman plots were also used to assess the level of agreement between the two instruments. Furthermore, a multivariate regression analysis was performed to identify the factors that may affect the correlation between the two instruments.

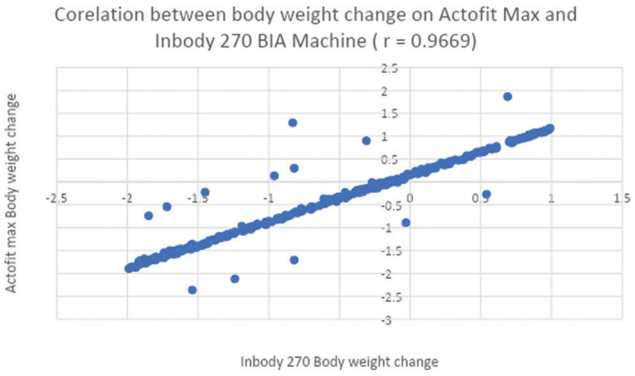
RESULTS

The correlation between body weight change on Actofit Max and Inbody 270 BIA Machine was found to be highly correlated with a Pearson correlation coefficient (r) of 0.9669. The correlation between body fat % change on Actofit Max and Inbody 270 BIA Machine was found to be highly correlated with a Pearson correlation coefficient (r) of 0.9353. The correlation between body water % change on Actofit Max and Inbody 270 BIA Machine was

found to be highly correlated with a Pearson correlation coefficient (r) of 0.9839.

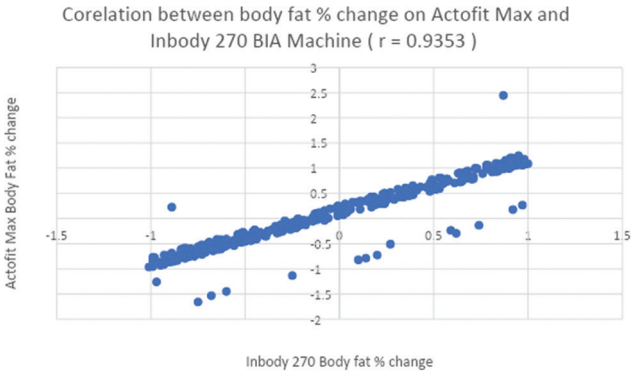
Correlation between Body Weight Change on Actofit Max and Inbody 270 BIA Machine

The change in the body weight over Phase 1 and Phase 2 is measured with Inbody 270 and Actofit Pro Max/Max. Then, the data correlation is plotted as shown. The Pearson correlation coefficient (r) is observed as 0.9669.



Correlation between Body Fat % Change on Actofit Max and Inbody 270 BIA Machine

The change in the body fat % over Phase 1 and Phase 2 is measured with Inbody 270 and Actofit Pro Max/Max. Then the data correlation is plotted as shown. The Pearson correlation coefficient (r) is observed as 0.9353.

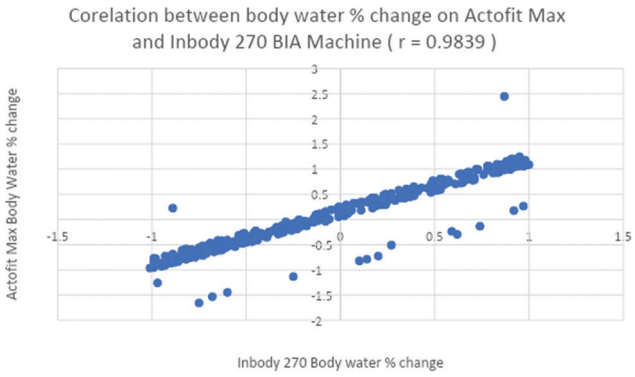


Correlation between Body Water % Change on Actofit Max and Inbody 270 BIA Machine

The change in the body water % over Phase 1 and Phase 2 is measured with Inbody 270 and Actofit Pro Max/Max. Then, the data correlation is plotted as shown. The Pearson correlation coefficient (r) is observed as 0.9839.

SUMMARY

During this comparative study, it is observed that the change in the body parameters such as body weight, body fat %, and body water % measured over 30 days of interval with Actofit Smart Scale ProMax/Max is highly correlated with that of the Inbody 270 BIA machine.



Change in parameter over 30 days	Pearson correlation coefficient between Actofit Pro Max/Max and Inbody 270
Body Weight	0.9669
Body Fat %	0.9353
Body Water %	0.9839

CONCLUSION

The comparative study between Actofit Pro Max/Max and Inbody 270 BIA machine conducted on a sample of 319 subjects has demonstrated that Actofit Smart Scale ProMax/Max is a highly accurate and reliable tool for measuring body composition parameters such as body weight, body fat %, and body water %. The results indicate that the change in the body parameters measured over a period of 30 days using Actofit Pro Max is highly correlated with that of the Inbody 270 BIA machine. This suggests that Actofit Pro Max can be used as a viable alternative to Inbody 270 for measuring body composition parameters. Overall, this study provides evidence supporting the effectiveness of Actofit Pro Max/Max and its potential utility in clinical settings.

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