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Reliability of DEXA on Body Composition in Korean Athletes

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ABSTRACT

PURPOSE: The purpose of this study was to assess the reliability of DEXA for measuring body composition in Korean Athletes.

METHODS: Twenty-nine athletes (n=29) registered for the college athlete program voluntarily participated in the study. Participants' height and weight were measured, and BMI (Body Mass Index) was calculated before the participants' body composition was measured. Muscle mass (kg), lean mass (kg), bone mineral density (BMC) (g·cm⁻²), and total fat mass (kg) of each participant was assessed by DEXA lunar DPX-L (GE Lunar, Madison, USA) for four times within a day to examine the difference by time frames. Four trials consist of 'early in the morning × 2 with fasting' with 30min break between two trials, 'after lunch × 2' with 30 min break between the two trials. Intra-class correlation (ICC) was conducted for overall reliability (p<0.05) and a repeated measure ANOVA was performed to compare the difference of each trial (p<0.05).

RESULTS: The mean ± SD of muscle mass, lean mass, BMC, and fat mass was 56.4 ± 4.6kg, 59.4 ± 5.0kg, 2.3 ± 0.4g·cm⁻², and 9.3 ± 4.8kg respectively. Each trial (mean ± SD) of muscle mass were 56.4 ± 4.7kg, 56.1 ± 4.8kg, 56.5 ± 4.6kg, and 56.4 ± 4.7kg, respectively, lean mass were 59.4 ± 5.1kg, 59.2 ± 5.1kg, 59.5 ± 5.0kg, and 59.4 ± 5.0kg, respectively, BMC were 3.0 ± 0.4g·cm⁻², 3.0 ± 0.4g·cm⁻², 3.0 ± 0.4g·cm⁻², and 3.0 ± 0.4g·cm⁻², respectively, and fat mass were 9.3 ± 4.9kg, 9.2 ± 4.8kg, 9.3 ± 4.9kg, and 9.3 ± 4.9kg, respectively.

Reliability of the ICC test showed strong agreement on muscle mass (r=0.994 and p<0.0001), lean mass (r=0.995 and p<0.0001), BMC (r=0.995 and p<0.0001), and fat mass (r=0.998 and p<0.0001). Cronbach's alpha were 0.99 (muscle mass), 0.99 (Lean Mass), 0.99 (BMC), and 1.00 (Fat mass). No significant difference between each trial was observed in fat mass (p>0.36). However, there was a significant difference in muscle mass (p<0.001), lean mass (p<0.001), and BMC (p<0.04).

CONCLUSION: Although all of the variables showed strong agreement on overall reliability from the ICC test, the reliability for the muscle mass, lean mass, and BMC showed significant differences in different time frame.

INTRODUCTION

Measuring and monitoring body composition is very important for athletes to achieve their optimal performance ability. DEXA (Dual Energy X-ray Absorptiometry), one of the gold standard measures for body composition, is widely used. Although measures for body composition by DEXA have been validated by several studies, the reliability, especially in athletes, was not studied yet.

METHODS

Participants

Twenty-nine athletes (n=29) registered for the college athlete program voluntarily participated in the study.

Instruments

DEXA lunar DPX-L (GE Lunar, Madison, USA)

Protocol

Participants' height and weight were measured, and BMI (Body Mass Index) was calculated before the participants' body composition was measured. Muscle mass (kg), lean mass (kg), bone mineral density (BMC) (g·cm⁻²), and total fat mass (kg) of each participant was assessed by DEXA lunar DPX-L (GE Lunar, Madison, USA) for four times within a day to examine the difference by time frames. Four trials consist of 'early in the morning × 2 with fasting', 'after lunch × 2'.



· DEXA

RESULTS

Table 1. Physical characteristics of participants (n=29).

	Mean	SD	Minimum	Maximum
Age	21.0	2.3	19.0	26.0
Height (cm)	174.2	6.3	162.0	186.0
Weight (kg)	70.7	8.1	58.5	88.2
BMI (kg·m ⁻²)	23.3	2.2	19.7	28.0

Table 2. Descriptive Statistics for the variables of DEXA

	Muscle Mass (kg)	Lean Mass (kg)	BMC (g·cm ⁻²)	Fat Mass (kg)
1 st Trial	56.4 ± 4.7	59.4 ± 5.1	3.0 ± 0.4	9.3 ± 4.9
2 nd Trial	56.1 ± 4.8	59.2 ± 5.1	3.0 ± 0.4	9.2 ± 4.8
3 rd Trial	56.5 ± 4.6	59.5 ± 5.0	3.0 ± 0.4	9.3 ± 4.9
4 th Trial	56.4 ± 4.7	59.4 ± 5.0	3.0 ± 0.4	9.3 ± 4.9

BMC: Bone Mineral Density

RESULTS (Cont.)

Figure 1. Descriptive Statistics for the variables of DEXA

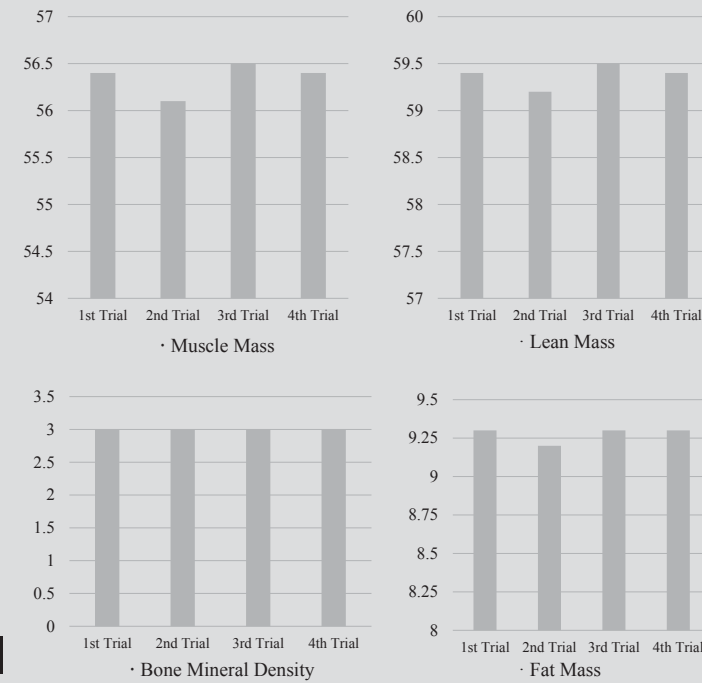


Table 3. Intra class coefficient for the variables of DEXA

	R	P value	Cronbach's alpha
Muscle Mass (kg)	0.994	< 0.0001	0.99
Lean Mass (kg)	0.995	< 0.0001	0.99
BMC (g·cm ⁻²)	0.995	< 0.0001	0.99
Fat Mass (kg)	0.998	< 0.0001	1.00

BMC: Bone Mineral Density

CONCLUSIONS

Although all of the variables showed strong agreement on overall reliability from the ICC test, the reliability for the muscle mass, lean mass, and BMC showed significant differences in different time frame.