

“Preliminary Results of the Assessment of Percent Body Fat of High School Athletes”

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Context: Body composition is an important component of health and sports performance. Understanding and accurately measuring body composition is imperative to athletes, especially those in weight-sensitive sports. There are multiple ways to measure body composition, including Skinfold (SF), Bioelectrical Impedance Analysis (BIA) and the relatively new practice, Ultrasound imaging (US). It is uncertain if these measures are accurate on the adolescent athletic population. Research investigating the relationship between body composition assessments on high school athletes is currently limited. **Objective:** To determine if US, SF and BIA are reliable measures of determining body composition in high school athletes compared to a Underwater weighing (UWW). **Design:** Repeated measures **Setting:** High school **Participants:** 16 high school wrestlers (male= 10, female=6, mean age:15.625±1.3y/o) **Interventions:** Study was approved by an Institutional Review Board before proceeding. Subjects first underwent hydration testing using urinalysis. Then subjects completed all the body composition measurements in the following order, BIA on a Tanita (TAN) DC-430U Dual Frequency Full Body Composition Monitor Model and an Inbody (INB) Intelametrix model. Subjects then completed a three site (male: triceps, subscapular, abdomen) or four site (female: triceps, supriliac, abdomen, thigh) SF assessment. Immediately after, subjects then underwent the US assessment, using the same sites. The same examiner was used for all sites for each test. Finally, participants completed an UWW assessment, with Residual Volume measurements. Percent fat was derived for the UWW using body density. $(4.57/\text{Body Density})-(4.142)$ **Results:** Results were calculated using IBM SPSS Statistics software. Data was compared using a One-way Repeated ANOVA test with a Least Significant Difference adjustment. Means and Standard Deviations for each assessment are as follows (\bar{x} , SD) US : 18.77437, 5.85433, SF: 17.3125, 7.90543 TAN: 18.9188, 7.76000 INB: 21.2123, 8.32200 UWW: 17.8763, 915187. For this study, sphericity was not assumed. To adjust for this a Greenhouse-Geisser device was used which elicited a p-value of 0.088 and an observed power of 0.52. Although the p-value is not significant, it is very close to the alpha set at 0.05. The power is low as well, which may change if the end size was increased. With an increased end size, the main effect might have been significant. The only assessment which does produce a significant difference when compared to UWW is the INB. This produces a mean difference of -3.355, a p-value of 0.011, and using a 95% CI, upper bound -5.815, lower bound -0.895. In this case we see a negative mean

difference and CI difference because the UWW mean was about 17 and was then subtracted from the INB mean which was about 20. This creates a negative value, and also means the INB is estimating each athlete's body composition about 3% higher each time. **Conclusion:** According to this study, the US, TAN and SF are valid measures to use assess body composition on high school level athletes. This data currently implicates that athletic trainers can opt to choose any of those three measures as a way of measuring body fat percentage for high school athletes. However, there are inherent limitations to this study. The first limitation is the small sample size, but this report is just preliminary data. The statistical power for this study is also relatively low as well. Although, data collection is still on-going for this study, there are other studies that would better our understanding of this still. One such study would be to assess these body composition measures against a four-compartment model. The four-compartment model is regarded as the "gold standard" for body composition. Also, this preliminary report focuses on wrestlers, however as the data collection proceeds the subjects will not be solely wrestlers. To truly understand the validity of these measures on wrestlers, it would be beneficial to collect this same data on a population that is only wrestlers, not all athletes.

References:

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