

CASE STUDY:

Assessing body composition

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COMPREHENSION:

Validation of Five Simple Models Estimating Body Fat in White Postmenopausal Women: Use in Clinical Practice and Research

The purpose of this study was to validate and compare easy, simple to use anthropometric measurements such as BMI, skin-folds and waist circumference to DXA, (the gold standard method of estimating body-fat percentage) amongst white, postmenopausal women. Almost 300 women aged around 56 through 68 were used in this research study to conclude that skinfold measurements are quite difficult to obtain in elderly clients and that due to the decline in muscle mass as people age and lack of physical activity, BMI levels can possibly be more accurate (compared to an athletic, lean population). Another interesting point that was discovered was that certain body-fat percentage equations either underestimated or overestimated the actual values associated with the true percentage of body-fat. In conclusion, the researchers found that the Brozek equation for estimating body-fat was a valid method to assess body composition compared to DXA.

Take Home Points:

Don't use skinfold measurements with elderly clients.

BMI is probably more accurate in this population to the lack of muscle mass on the person's frame and lack of physical activity.

Brozek equation trumps all other equations of estimating body-fat.

Body composition and body fat distribution in relation to later risk of acute myocardial infarction: a Danish follow-up study

COACH GEOFF'S COMMENTS

• *Solid comprehension and simple translation of complex study.*

• *Practical advice broken down by specific populations.*

In this study, researchers set out to provide insight on specific relationships between incidents of MI (myocardial infarction) and measurements of body-fat percentage through BIA (bioelectrical impedance analyses) in combination with BMI and other anthropometric measurements. Over 58,000 people were studied and analyzed over the course of an average follow-up time of approximately 12 years. After reviewing the data, the researchers concluded that all measurements of obesity calculated through the BIA method had a significant relationship with incidences of MI. As higher levels of obesity were found, either abdominal or general, the risk of MI increased. However, if body-fat mass was adjusted for certain waist circumference values, there was no association to MI. Also, the researchers found that if women had a higher level of lean body mass than men, it substantially modified the effect of obesity on future incidence of MI.

Take Home Points:

When using BIA to estimate body-fat percentage among clients; the higher level of BF directly correlated to a higher chance of suffering an MI.

Women who improve the ratio of LBM to BFM can have a greater effect of modifying future incidences of an MI.

To be classified as obese, it is better to look at the percentage of body-fat rather than relying only on waist circumference or BMI measurements.

People can still suffer an MI, whether you have a low or high level of LBM.

The Relationship of Waist Circumference and BMI to Visceral, Subcutaneous, and Total Body Fat: Sex and Race Differences

Is there a difference in anthropometric measurements and levels of fat mass between different sexes and races? If so, what is the relationship? And is there a correlation of these values to BMI and waist circumference? Those same questions were the goals of these researchers who measured both visceral (deep) and subcutaneous (superficial) fat sites through computed tomography (CT) and fat mass through DXA. Over 1,600 white and african-american adults, between the ages of 18 and 64 were analyzed. Results showed that waist circumference or BMI had a more significant relationship to fat mass than specific visceral fat mass in each sex by

Some universal advice for managing MI risk factors.

Looking at the whole client, instead of specific numbers.

race category. Regardless of levels of BMI or WC, there were significant differences in where the fat was stored between sexes. White adults had higher levels of visceral fat than african-american adults at higher levels of BMI and WC. Women were also found to have higher levels of subcutaneous fat and overall fat mass than men. In conclusion, there were greater differences between race or sexes as the levels of overall adiposity increased.

Take Home Points:

WC and BMI can tell us more about overall fat mass than specific visceral fat mass. It also tells us that white adults have higher levels of visceral fat when looking at WC and BMI compared to african-american adults.

Males and females have different levels of fat storage sites, either visceraally or subcutaneously. Regardless of the level of WC, women have higher levels of fat mass than men.

Prevalence of Obesity and the Relationship between the Body Mass Index and Body Fat:
Cross-Sectional, Population- Based Data

In this study, researchers set out to evaluate the levels of obesity and overweight incidences among Australian adults according to BMI and WC formulas. Additionally, the researchers wanted to find out if there is a relationship between BMI and DXA body-fat estimations. After evaluating results from over 2,500 people, the researchers found that according to BMI and WC, men were less likely to become obese than women. Adults were also more likely to be labeled obese based off WC values rather than BMI. The researchers also confirmed that LBM significantly effects the BMI value of adults and age has an effect on body-fat percentage. In conclusion, excessive bodyweight for height does not necessarily mean people are fatter and that in order to improve body-fat estimations, there should be more specific gender and age guidelines on defining overweight and obesity.

COACH GEOFF'S COMMENTS

• Coach sees through the red herring of visceral fat and focuses on more practical measures.
• Biological sex will impact expectations and normal levels of fat.

• Looking at the whole client. Sex, age, and body composition all need to be taken into account.

Take Home Points:

Women have a greater chance of becoming overweight or obese than men.
When just using WC values, more people get labeled overweight or obese. BMI is a better measurement.
Higher levels of LBM will yield an incorrect, high BMI.

Obese and overweight categories should be more specific, primarily between genders and ages instead of traditional measurements.

ANALYSIS:

When using different body-fat measurement methods, there are a variety of things to consider when selecting the best method for specific situation. DXA scans are labeled as the gold-standard of body-fat percentage predictions but can be expensive, inconvenient to access, can cause discomfort and might be available for larger adults for accurate screens. Taking WC and BMI measurements are the easiest methods but can offer substantial amounts of error and do not give practitioners the complete story behind the skin, primarily level of lean body mass. Skinfolds appear to be somewhere in the middle of the spectrum but require an experienced professional to get an accurate pinch and measurement. When using skinfolds, practitioners should be aware of gender, age and race differences as they can have an effect on the estimation through various formulas. Personally, I feel that skinfold measurements are the most practical and can give the client and trainer the best indication of lean/fat mass in the position they are in, with ease and convenience. However, I have noticed that skinfold measurements should be done as consistent as possible in terms of client hydration, time of day and eating habits surrounding the time around measurement.

SYNTHESIS

Coming from a practical application background of coaching, I take each research study with multiple grains of salt. I have worked with coaches, professors and trainers who take the research as explicit truth to every real, life situation we can come across. While I believe research can point us in the right direction and reaffirm what people "in the trenches" have been doing for years, we cannot take each decision or relationship significantly correlated as the Holy Grail. Specifically working with athletes, I always look to see how the research study was performed (questionnaires, laboratory based, types of training done), who was used (untrained adults or athletes) and the mechanisms performed (multiple sets versus single sets, laboratory controlled settings or real life scenarios, etc). What I sincerely appreciate about those in academia is their constant quest to prove or disprove what coaches and trainers are practicing on a daily basis. Finding something you believe whole-heartedly to work in your gym or with your client in a research journal adds more credibility and efficacy to those who may be skeptics. However, it's also very important to understand both sides of the research and as coaches we must look through both sides of the window and not simply look for research that

COACH GEOFF'S COMMENTS

ONLY supports our claims. This confirmation bias is something I see a TON in today's field of strength and conditioning. We must actively seek out arguments, discussions and research methods that do not agree with our findings and decipher the information appropriately.

EVALUATION:

If price and feasibility were not an issue, I would choose the DXA scan because of the ability to look at bone density as well. I primarily work with female athletes and establishing the relationship between strength training and bone density early on with athletes and parents is something very important and should be communicated and exhibited. My research has found that simply taking a Viactive chocolate in your 50's/60s is frankly too late and in order to decrease the risk of future injury, we should be targeting supervised strength training early on. Also, it would be a valuable tool when communicating with parents when their stereotypes of "closed growth plates" and damage to pre-pubescent/adolescent development.

When I was in undergraduate, our goal standard was underwater weighing, which was pretty shoddy in itself if you ask me, or at least our set-up was. While the NFL uses the Bod Pod system in their combines and most of their facilities, I have witnessed first hand the errors in repeated measurements between athletes in the same testing session. I believe skin folds can offer the ease of use and can be more applicable with group testing, but for the truest measurements and accuracy, I would stick with DXA and schedule appropriately.

APPLICATION:

I would tell Maria that losing body-fat is an excellent goal for her to improve her health and I would commend her on her specificity in losing body-fat not simply trying to lose weight. The studies presented in this case study clearly display the relationship between high levels of body-fat and the risk of heart disease and associated issues. I would explain to her that through a combination of healthier eating, strength training and cardiovascular work, we would develop a plan to fit her schedule and needs appropriately. I would encourage her throughout the process to not simply look at the numbers of waist circumference and BMI that are most often presented in her primary physician's office because they do not consider lean body mass which is extremely important for bone health, activities of daily living and overall metabolism. Our focus should be on developing sustainable habits overtime to help with her goals of losing body-fat and improving her overall health. This should not be a warrior dash or quickest body transformation challenge but rather a continuous journey towards mindful eating and exercising.

Coach shows higher-order thinking here, demonstrating a pragmatic approach to understanding research. He also wisely recommends looking for research that challenges our claims, instead of just finding things that affirm our beliefs.

The voice of experience here.

Coaching win. This is about more than numbers.

While the research studies compared all measurements of body-fat predictions and estimations, I would most likely use the Brozek equation of estimation as it served as a solid comparison to the DXA results. I would also take anthropometric measurements like girth and skinfolds to validate where and how many sizes she was losing so she could see improvement in a quantitative value. For me, the value of skinfolds doesn't necessarily rely on the actual prediction of body-fat but rather the continual decrease of mm between skinfold measurements.

Also, the use of a girth tape will be able to resonate better with her in terms of "inches lost" and how her clothes will be fitting as a result of our program.

COMMUNICATION:

Hey Maria! Thanks for coming in today for your assessment! I know your time is super important with everything that you've got going on, but I just wanted to make sure I followed up with your questions that you asked in our initial meeting. I did some more research and was able to get everything I needed to help you out.

Now, if I remember correctly, you were interested in losing body-fat and figuring out which method was the best one to measure, correct? And I think your sister had saw something on the news about the relationship between body-fat and heart disease, right?

Ok great. Well, let's get right into it! As far as the best method of measuring body fat is, there something called a DXA scanner, which is really just like an x-ray machine that gives us a snapshot and analysis of how much fat you have on your body and where it's located. What I really like about it is it also takes into effect the density of your bones, which is super important because as you age, your bones tend to get weaker and more brittle, which unfortunately can set you up for things like osteoporosis down the road. But, the problem with DXA is its usually super expensive and hard to find one in the area. Luckily, the hospital in town has one but only takes appointments in the general public during limited hour throughout the week.

Good news is we can a very comparable estimation of how much fat mass you have on your body by just taking a few simple measurements and doing some math on the back end. This is

• *Coach opens with client-centred perspective.*

• *Coach repeats client concerns back before launching into to denser information.*

• *A big complicated machine is now far more understandable.*

• *Coach speaks to the specific advantages of DXA as they relate to his client.*

actually much easier and more applicable towards yours and I's busy schedule throughout the week. What we'll do is take some basic measurements before we begin and then follow up with them every month to see our progress. While these will serve as some quantitative numbers to measure our progress, you'll be experiencing a host of other results that you might not be able to quantify, which is great! You might feel better throughout the day, have more energy and even notice your clothes will be fitting better! Just keep me in the loop with how you're feeling and any changes you notice and we'll track those as well!

And as far as this whole body-fat and heart disease relationship is concerned, that news story was right. Unfortunately, the greater amount of fat we carry on our body does put us at more risk of suffering a heart attack and having cardiovascular issues down the road BUT it's different for each person. There is no set amount of excessive fat mass CLEARLY defined for females and older individuals, kind of only for the general public. And what I've noticed is that because you have different levels of certain hormones than me, you're naturally going to carry more body-fat than a comparable male. I know, totally unfair but that doesn't mean we're going to be necessarily unhealthy.

Now, you said earlier that you've tried to lose some body-fat earlier and had some issues with your last trainer right? Something about doing too much, too soon? I can definitely see why you are frustrated. We're going to take a different approach, focusing on one small thing at a time and building momentum. It's kind of like trying to pay off debt. We're going to focus on just doing a little bit more and taking care of one bill. Once we successfully pay that bill off, we're going to move to the next one, and keep going until we take care of each and every one.

I'm ready when you are to help you change your life, one habit at a time. Let's go!

COACH GEOFF'S COMMENTS

Coach highlights the advantages of a more practical approach.

Coach highlights other details that may resonate more than just hard numbers.

Coach eschews scare tactics about MI risk. He instead normalizes body fat and describes a continuum of risk factors.

Coach provides an empathetic, very human voice.

Coach emphasizes his client-centred approach and provides a salient metaphor. The road ahead feels far less intimidating with this type of approach.