

Sarcopenic obesity

Featuring:

Richard Kirwan

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Transcript

Maura Bowen: Hello and welcome to Abbott Nutrition Health Institute's POWER OF NUTRITION podcasts. I'm Maura Bowen and I'm here today virtually with Richard Kirwan, a postgraduate researcher from Liverpool John Moores University with a particular interest in the effects of diet and exercise on muscle mass. Joining Richard is Imogen Watson, Dietitian and Medical & Scientific Affairs Manager from Abbott in the UK.

We're here to discuss sarcopenic obesity, which is a hot topic at the moment, because we all lose muscle mass as we get older, with a decline of 8% per decade between the ages of 40-70 years and that increases to 15% per decade in people aged 70 years and older. Low muscle mass and function coupled with obesity can lead to disability and poorer outcomes in older people, so it's important to identify and manage as early as possible.

Thank you both for joining us today! Imogen, I'll hand over to you so we can get started.

Imogen Watson: Thanks Maura – it's a pleasure to be here today and thanks again to Richie for joining us. Richie, perhaps you could start by introducing yourself and telling us more about your research and your interest in muscle mass and health?

Richie Kirwan: Hi Maura, Imogen. My name is Richie Kirwan. I'm a postgraduate researcher at Liverpool John Moores University, and my research focuses on the effects of muscle mass and cardiometabolic health. Specifically, in a cardiac rehabilitation population.

Just to give people a little bit of context. In the UK at least, if somebody has some sort of cardiac event, for example a heart attack or even a stroke, they often get referred to cardiac rehabilitation which is a rehabilitation programme that has the objective of reducing the risk of a secondary cardiac event. And we do this through lifestyle change. And that lifestyle change revolves mostly around exercise and to be specific, it revolves a lot around aerobic exercise because there are, has been a lot of research into the benefits of aerobic exercise in this population.

There is also some dietary recommendations given as well. But, potentially not as many as there should be. Which, we hopefully we talk a little more about. What my research wants to look into is the effect that muscle mass may have in these cardiac populations because at the moment there is a relatively well-known concept known as the obesity paradox. And the obesity paradox is a concept in cardiac populations whereby

people who have a higher body mass index, so people who may be overweight or even obese, tend to have better outcomes. They tend to have a lower mortality rate than people with a lower BMI and for some people that seems to be a little counterintuitive because we tend to associate higher body mass index with cardiometabolic problems like type-2 diabetes and heart disease.

What we are seeing is that these people who have this overweight or obesity tend to do a little bit better. And, people have been trying to figure out why for the longest time. And one of the leading theories around that is around their level of muscle mass because people who have a higher BMI also tend to have higher levels of muscle mass. And, we think this muscle mass may be protective in these individuals and in the people who have lower BMIs, the reason they may have such low survival rates after a cardiac event is because of much lower levels of muscle mass and the protective effects of that muscle mass.

We want to investigate how increasing muscle mass in a cardiac population, so in a cardiac population undergoing cardiac rehabilitation, how that might affect some cardiometabolic risk markers. There hasn't been any research into this specifically in the past and that's why we're very interested to see how increasing muscle mass may affect this population. Specifically, by increasing their muscle and potentially by reducing some of their body fats or changing some of their body composition overall.

Imogen Watson: Sarcopenia is a condition that we've become much more aware of in recent years, but less is known about sarcopenic obesity. Can you define sarcopenia and sarcopenic obesity for us and explain the difference between them?

Richie Kirwan: So, it very much depends on the diagnostic criteria that you are looking at. And, the reason why I'm saying it depends is because sarcopenia itself was only recognised as an actual diagnosable condition in 2016. That is when some diagnostic criteria became available.

The most common criteria available these days, or the most commonly used, was presented by the European Working Group on Sarcopenia in Older People, which is an absolute mouthful. But they have diagnostic criteria that are based initially on muscle strength or function. And that's used to indicate the potential presence of sarcopenia. Now, once that's been identified, and that is usually identified by two main methods. One is to use a hand grip strength, so low hand grip strength is an indicator that there is potentially sarcopenia. The other is a low functional capacity using something like a sit to stand test or a timed walk test which can indicate poor lower body muscle function.

So once that has been potentially identified, we have to try and confirm it. And, the way it is confirmed is by assessing body composition or specifically muscle mass. And, this is the one that is a little more tricky to do, and it's not as easy to do in a clinic for example. So, you can imagine to measure somebody's hand grip, what we need is a hand grip dynamometer which is basically something that somebody squeezes and it measures their strength. Very easy and the same for a walk test, is quite easy to measure.

If we're trying to measure body composition, it's much more difficult. And, at the moment what we consider to be the gold standard is something known as a DEXA, which is dual-energy x-ray absorptiometry. It's a very, very expensive machine that is not available in many locations; you will see it in some larger hospitals, you will see it in research institutions as well. And, what that does is be able to measure the amount of muscle mass, fat mass and bone mass in an individual and we can identify sarcopenia there, based on different cut offs in different populations. So, there is a different cut off for men, and there is a different cut off for women, obviously, women tend to have lower muscle mass in general, so that is what we call the gold standard. Unfortunately, a DEXA is not a very easy machine to get access to and it can be quite expensive. So, a more commonly used tool is something known as bioelectrical impedance and a bioelectrical impedance analysis machine measures the same thing. So, muscle mass, well basically fat mass, and fat free mass by measuring the resistance against electrical currents in the body.

So, that is sarcopenia. Unfortunately, sarcopenic obesity is another story. To give people an idea of what sarcopenic obesity is. It's basically a combination of sarcopenia – which is the low muscle mass and strength, and hopefully we will talk a little more about strength in a moment – and higher body fat. Now, traditionally obesity is defined using body mass index. And, as we mentioned earlier, body mass index doesn't tell us much about our body composition as muscle mass or fat mass. We don't have a very good definition for sarcopenic obesity right now, what's our definition for a high-level of fat mass. Some people use a percentage fat mass, for example some people say 30% fat above classes as obesity. Other people use waist circumference. There is no consensus on that at the moment and that is one of the major issues in research.

I would be inclined to, just because I like to go for very practical methods, I think waist circumference has the potential to be a very, very useful tool in the future to help identify because it's very, very quick to measure and can give us a good measure of something known as abdominal obesity, which we know can be quite metabolically damaging to some individuals.

Imogen Watson: I think you are absolutely right Richie; I think whatever measurement we end up with has to be practical doesn't it, and applicable in the clinical setting, so thank you. What kind of patients do you find will be most likely to suffer from sarcopenic obesity? And, is it becoming more prevalent?

Richie Kirwan: We don't have any definite numbers on sarcopenic obesity because of the different types of measurement available. But we do know that sarcopenia is becoming more common and there is a reason for that because people are living longer. And, we know that sarcopenia is a progressive condition whereby the older we get, the more rapid our declines in muscle mass can happen. And hopefully we can talk about it while that happens, but we know that this decrease in muscle mass and muscle function and strength tend to increase and become much more rapid when we get older. And we have an older population. A population that is getting considerably older and we know that sarcopenia is increasing and what tends to happen when sarcopenia increases is that we have this interesting cycle whereby when somebody loses muscle, they lose muscle function, it becomes less easy for them to move about. And what happens is that their energy expenditure, their activity levels drop considerably. And what happens with that is you get less energy expenditure in the body and it can be quite easy to gain weight especially if somebody maintains the same level of food intake that they have. And, that is where we can see an increase in fat mass. It is something we

tend to observe as a population gets older. We see that individuals tend to have a reduction in muscle mass and this increase in fat mass over time. So, you could say that in older populations it's becoming more of an issue. And hence in some cardiac populations as well which tend to be quite a little bit more advanced in age, we tend to see it popping up a little bit more frequently as well.

Imogen Watson: And so how does sarcopenia and sarcopenic obesity affect patients, in terms of what impact does it have on longer term patient outcomes?

Richie Kirwan: The interesting thing with muscle mass is, because people ask me a lot, because people say what good is muscle mass if I'm not planning to go to the beach or walk around in a bikini anytime soon? And I would say it is very, muscle is probably one of the most important determinates of our metabolic health outside of our levels of fat mass and our physical fitness. The reason for that is many fold. So for example we know that in diabetic populations, so type-2 diabetes, there tends to be an increased level of sarcopenia observed in this population too and one of the reasons why these two conditions may be so well linked is because muscle is one of the biggest metabolic sinks of glucose in our body. What I mean by that is when we eat glucose, our body needs to dispose of it in a number of ways. And, one of the ways it disposes of glucose is by shunting it into muscles, where it gets stored as glycogen. The more muscle you have there tends to be an increase in what we call insulin sensitivity, so somebody's ability to react to insulin and shunt that glucose into their muscles.

So, people tend to be more insulin sensitive when they have a higher level of muscle mass. Then on the opposite side of the scales, if somebody has less muscle mass, they tend to be less insulin sensitive and glucose can become a bit of an issue, leading up to conditions like diabetes. Diabetes is a major complication in sarcopenia. As I mentioned earlier, there is also a fairly consistent link between higher levels of sarcopenia or reduced muscle mass and cardiovascular disease and particularly cardiovascular outcomes. So, people who tend to have higher levels of muscle mass tend to have much better survival rates compared to individuals with lower levels of muscle mass when it comes to cardiovascular events.

So, those would be the two main metabolic ones. But, besides that there are a huge number of other conditions that have been linked with sarcopenia. For example, one of the other big ones that is quite an issue these days in older populations is poor bone mineral density and the risk of falls. So, both of those are linked to muscle quite directly. So, for example with bone mineral density we know that people who are more active tend to have higher muscles and that tends to lead to a greater deposition of calcium within the bones and greater bone mineral density. So, what that means is the more active we are, the more our muscles work and our muscles are actually the main stimulus for bone development. Whenever we move our muscle it directly and indirectly impacts our bones by causing greater deposition of calcium, leading to stronger bones over time. And, this is why people who are quite active tend to have lower levels of osteoporosis when they get older.

So, in people who have sarcopenia, we see a greater incidence of osteoporosis or brittle bones. But on top of that we also see that when people get older and lose muscle. Very, very broadly, and this is a much more

complicated area that I'm going to give the impression of right now, we have two different types of muscle fibre in our bodies, what we called fast twitch and slow twitch. The fast twitch fibres are often known as type 2, and it's a bit more complicated than that. But, type 2 fibres are the kind of muscles that we use when we need to react quickly and powerfully to a stimulus. So, for example, the example I always give is if somebody slips. What you are going to do is your muscles are going to react really quickly and they are going to try and right you or prevent you from falling, or at least when you are falling they're going to try and help to turn so you can fall in the 'best way possible'. And, as we get older, we know there is a specific decline in those type 2 muscle fibers. And, what that means is as people get older, if they lose their balance because of this reduction of type 2 fibres they've got less power, less quick muscle reactions. They are more likely to fall in the long run and this is why the level of falls tends to increase in individuals with sarcopenia.

You've got a combination of things there. If somebody falls or is more likely to fall and they have brittle bones which are both associated with sarcopenia, they are also more likely to suffer from things like hip fractures. And we know that in older individuals, those who haven't, who suffered from hip fractures, have a much greater incidence of mortality within the next 12 months. And that is something that potentially we can prevent with some of the strategies that we'll talk about for preventing sarcopenia a little bit later.

So, that is a major concern. And then, apart from that we've also seen that there are issues with mental health, and one of those is cognitive decline. And we know that older individuals' sarcopenia is associated with cognitive decline especially in older populations. And, interestingly enough also it's associated with depression, and people have a little bit of trouble understanding why that is, and it may not be a direct link. But the way I see it, if someone gets older and they have lost a lot of muscle function, that is going to greatly impact their quality of life and what they are able to do. It can also lead to something called frailty which unfortunately doesn't have a proper definition. But, basically, it's an incapacity to do the activities of daily life. And, when I describe that and I talk to people about, imagine not being able to comfortably get out of your bed in the morning or get out of a chair or get up from the ground if you fall down or carry your groceries or put your groceries back home.

That could lead to a great reduction in somebody's quality of life, but it also impacts their ability to go out and see friends and socialise. And all of that can have a negative impact on somebody's mental health and that can lead to the greater increase in depression that we see in individuals with sarcopenia as well. It's a very wide variety of conditions that are affected by our level of muscle mass.

Imogen Watson: I'm just thinking back to a previous question. Obviously, you talked about potential ways to measure sarcopenic obesity or potential difficulties in measuring sarcopenic obesity. Just thinking now, we are becoming more virtual world, remote consultations. Is there any way we could assess sarcopenic obesity in the virtual world?

Richie Kirwan: There are interestingly a couple of questionnaires that have been developed. One that is potentially very useful from a clinical point of view, especially with the advent of telehealth like we have seen in the past year, is a questionnaire known as SARC-F. And the SARC-F questionnaire is based around five different questions. And, it can be used by a trained clinician, so it needs to be used by somebody who is trained in how to use it. And it asks individuals certain questions about their quality of life and their activities

they are able to do during the day, and the score they get at the end of that questionnaire can be used to give a potential diagnosis of sarcopenia.

Imogen Watson: Would you say patients with sarcopenic obesity are malnourished? If so, how can we manage patients and what nutritional interventions should we be thinking about or considering for our patients?

Richie Kirwan: This is a very interesting topic. We know that in community settings, so individuals who may be in a nursing home, there tends to be a larger prevalence of sarcopenia in individuals who have lower protein intakes. We do know that protein is directly related to what we call the MPS response, the Muscle Protein Synthesis response. So, what that means is every time we eat protein, we stimulate a process called protein synthesis, and specifically one type of protein synthesis is muscle protein synthesis which is related to the skeletal muscle we have on our body. And we know that the level of muscle mass we have is defined by a balance between two processes. One is muscle protein breakdown, which happens continuously throughout our body because we are continuously renewing body cells, renewing tissues. And then the other process is muscle protein synthesis, and if we have a greater net effect of muscle protein synthesis, you get, tend to see an increase in muscle mass over time, and the opposite holds true of muscle protein breakdown if that is a net greater effect, you tend to see lower levels of muscle over time.

So, we know that eating protein, specifically larger boluses of protein can stimulate muscle protein synthesis, which can be quite beneficial. But, one thing I really, really want to highlight is that I am a nutritionist and I think nutrition is absolutely key to health, but I think very, very important to point out at this point is that sarcopenia is very, very much related to activity levels because activity, exercise, movement are also a very, very important stimulus or stimuli of muscle protein synthesis as well. And, we need that initial stimulus from exercise to be able to take advantage of it, with protein afterwards, to stimulate further growth of muscle through protein synthesis.

And when it comes to protein, I did mention sarcopenic populations tend to have lower protein intakes. Here in the UK the RNI, the recommend nutrient intake for protein is 0.75 g protein/kg of bodyweight. And that is established pretty much globally as what people should be eating to prevent protein malnutrition, to make sure people are not becoming deficient, it's not necessarily an optimal number. A few years ago, there was a very, very interesting paper published by the PROT-AGE group, so Protein in Ageing Group. And they reasoned that protein intakes in older populations should be increased to 1.2 g of protein/kg of body weight. And that is a considerable amount of protein compared to what people are eating at the moment. So, to give a little bit of an idea, within the UK up to 30% of the population is not getting 0.75 g/kg body weight and only 15% of the population is getting the 1.2 g/kg of body weight. And, that is in an older population, above 60 or 65 years of age.

We know that protein is quite low and the reason we think this higher dose of protein is necessary for older populations is because of something called anabolic resistance. And, this is one of the major contributors to sarcopenia as we get older. What happens is as we get older, our body does not react to anabolic stimuli as

easily as a younger person does. For example, I mentioned exercise and I mentioned protein as being very, very potent stimuli of muscle protein synthesis. The best example I give is in younger people. We know that in young men, if you give young men in their 20s about a 20 g dose of whey protein, so whey protein is a very high-quality protein. If you give them that amount of protein, you can maximally stimulate muscle protein synthesis. You are not really going to increase it any more with that dose. However, if you give that same dose to a 70-year-old, you are not going to see as robust an increase. And, what we have actually seen is that up to twice that amount of protein, so 40 g of whey protein may be necessary to get that stimulatory effect on muscle protein synthesis. And that is a big deal because we know that that's a lot of protein. So, for example a 40 g bolus of protein is a lot. If it's coming from whey protein, you know that it is relatively easy to take as a shake. But, in wholefood terms that is quite a large chicken breast or a lot of meat which again is expensive for older individuals. So, that is a potential issue in older populations, that they are not getting enough protein in per meal to stimulate the muscle protein synthesis response.

Imogen Watson: So obviously protein or enough protein is absolute vital to our health and wellbeing particularly in older life. I would be interested to hear your thoughts on the role of vitamin D in terms of sarcopenia.

Richie Kirwan: This again is a very, very interesting topic. So, vitamin D is becoming almost like the golden boy of vitamins at the moment just because it has a huge role in so many different aspects of health. And it is now classified more as a hormone as opposed to a vitamin, as a nutrient, just because it exerts its effects on a huge amount of tissues and functions within the body, and this is due to the presence of something called vitamin D receptor, which is found in pretty much every tissue type throughout our body. Which means that vitamin D can have an effect on the expression of genes within a lot of different systems in our bodies.

So, it's a major nutrient when it comes to health. And, there has been a lot of research into how it affects muscle health. We have seen in population studies that lower levels of serum vitamin D tend to be associated with lower levels of muscle mass. And this is very, very interesting because lower levels of vitamin D are very prevalent, especially here in the UK, and pretty much anywhere in the northern hemisphere. I would go as far to say most parts of the world because nowadays we tend to spend all of our time indoors and we avoid sunlight. And sunlight is one of the ways that we produce vitamin D. It's actually probably the main way that most people produce vitamin D because dietary sources of vitamin D are very, very few and far between.

So, we are talking about things like organ meats, certain fish are, tend to be high in vitamin D but besides that meat, eggs, dairy products, vegetables are not very, very potent sources of vitamin D. So, we get it from the sun or four to five foods. And, most people do not get a lot of sun, you just have to look at most people in the UK and they are not getting enough sun.

And, we do know from population studies again, that vitamin D insufficiency, which is below 50 nmol per litre of serum, is very, very prevalent. And, we know that even vitamin D deficiency, which is below 30 nmol per litre, is quite common as well. And, it's been described as a global health issue. And, we do think that it may contribute to the sarcopenic effects that we see or the prevalence of sarcopenia we see in older populations. Our own research group, we've actually recently submitted a paper on the role of vitamin D in muscle health.

I can't speak about it in detail here, just because obviously it hasn't been published yet, but there is and there does seem to be quite a significant connection between vitamin D and muscle mass. So, it is probably a nutrient that older individuals, especially, if their levels are insufficient, older individuals should be focusing on, to try to get their levels up in the more optimal ranges of about 75 nmol per litre.

Imogen Watson: You mentioned exercise earlier, do you have any recommendations about the type and frequency of exercise that we should be recommending to our patients?

Richie Kirwan: First thing I'll say is that if somebody is not doing exercise right now, any exercise that they do is going to be of benefit. I think when we are working with individuals, and this is something that is really, really important as often clinicians, we have to think that a clinician works with an individual. We do need to tailor our advice to the individual's needs and what I would say, where they are right now in terms of their exercise level. So if you are working with someone who has not done any exercise in the last 20 years, if you are saying to them I want you to run 10 miles a day and I want you to lift weights five days a week. You are probably going to get somebody laughing at your face. So, if you can say to an individual, ok I want you to start walking a little bit more frequently, maybe give them a step tracker and say let's see if we can increase your step count. Because we know that step counts can be very important for improving muscle strength funnily enough, and muscle mass in older populations and for even increasing insulin sensitivity as well. So, if it's just getting somebody to walk a little bit more frequently or to walk up and down their stairs which is fantastic as it's a way of building the muscle. Or encouraging them to go to group exercise classes. So, for example if you can get some older individuals to go to in my case, we obviously focus on cardiac rehab which is group exercise, that is fantastic. Any movement you can get somebody to do is brilliant.

But when it comes to building muscle, we do know what is optimal as well. And what is optimal for building muscle mass is something known as resistance exercise. And resistance exercise is any type of exercise where your body works against an external resisting force. And that can be anything from body weight exercises like doing pushups or doing air squats to using weight machines in the gym or using free weights. And we do know that the type of stimulus that these types of exercise provide are particularly beneficial for stimulating muscle protein synthesis and muscle growth. But, not just muscle growth, they also benefit muscle strength. And one thing I'd like to get across to people, it's not just our muscle size and muscle mass that is important, it is also our muscle strength. Because at the end of the day, our muscle strength is what helps us get up and get out of a chair or it helps us to prevent ourselves from falling if we do fall. It helps us to put our groceries back into the cupboard at the end of the day or carry the groceries home.

So, muscle strength is very, very important. So, exercise that can help us to develop muscle strength, even if we are not increasing muscle mass a lot, is going to be hugely beneficial in terms of somebody's quality of life. And also, from looking at population data, muscle strength is directly related to mortality as well. So, people who have higher levels of muscle strength tend to live a little bit longer and be a little bit healthier as well.

Imogen Watson: Setting realistic goals and working with our patients to set realistic exercise goals would be my takeaway from that, thank you. So, in summary what would be your main take home message about sarcopenic obesity?

Richie Kirwan: I would say that it is a condition that we are aware of, but I would say that it's a condition that is almost invisible and that we need to be very cautious of just because you can't look at somebody and say ok this person is sarcopenic obese. It is quite difficult to diagnose and the problem is when it does become obvious, it's often very, very well developed. So, probably focusing on prevention strategies, from getting people to exercise basically from a younger age is fantastic. But in older populations getting them exercising more regularly is probably going to be one of the keys to avoiding the development of sarcopenia or the progression of sarcopenia and potentially even reversing it. On top of that exercise I think focusing on higher protein intakes. Particularly with larger per meal protein doses, so if we aim for 25 to 40 g of protein per meal, three meals a day, that has a good chance of stimulating muscle protein synthesis and helping to improve muscle mass. Assuming somebody is also exercising and getting some sort of activity to do that as well. And, supplementing with things like vitamin D for example may be beneficial as well.

But I would say that activity and getting sufficient protein are by far the most important factors that people need to consider if they want to prevent sarcopenia.

Imogen Watson: Thank you, Richie, for joining us today and sharing your expertise on sarcopenic obesity. I will now hand back to Maura to close our discussion for today. It's been great talking to you.

Richie Kirwan: Thanks Imogen.

Maura Bowen: Thank you, Imogen and thank you both for joining me today and for providing your expert insights on this important subject.

Richie Kirwan: Thank you very much Maura.

Maura Bowen: Listeners, if you found this topic to be of interest and would like to find out more about sarcopenia, as well as many other subjects relating to adult nutrition, please visit ANHI.org/uk. Abbott Nutrition Health Institute's POWER OF NUTRITION podcast is also on Spotify and we have more than 40 episodes to choose from, so be sure to subscribe today and share us with your colleagues.

Thanks for listening.
