



BODY COMPOSITION STATUS OF A PHYSICALLY INDEPENDENT 86-YEAR-OLD MAN: A CASE REPORT

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ABSTRACT

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A physically active lifestyle is known to be beneficial for optimal aging. However, as people get older, sedentary lifestyles become more prominent, especially in populations over the age of 80. The increase in sedentary behaviors can make the studying of geriatric populations challenging and limiting. Thereof, this descriptive study presents the case report of an 86-year-old man who has been physically active for over a decade. This study highlights the utilization of a dual-energy X-ray absorptiometry scan to assess the body composition of the participant, along with a qualitative interview to examine the lifestyle of the participant. Overall, the participant presented an optimal amount of body fat percentage and bone mineral density. In addition, the participant reported having a satisfactory quality of life, which are benefits linked to the participant remaining physically active after major surgical procedures. Altogether, this study denotes the importance of physical activity for healthy aging.

Contribution/Originality: This case study highlights the body composition of an 86-year-old man that is part of an understudied age group. Importantly, this case study denotes how a physically active lifestyle has been critical for maintaining a good quality of life and sustaining healthy aging.

1. BACKGROUND

Participation in regular physical activity and exercise is important for the prevention and management of diseases. For geriatric populations, where disease progression is linked to a sedentary lifestyle, any increase in habitual physical activity and exercise that leads to an active lifestyle contributes to healthier aging in comparison to sedentary populations.

Regarding health benefits, there are ample physiological improvements that can be attributed to an active lifestyle and frequent exercises, such as improved cognitive function, adequate glucose regulation, and reduced cardiovascular disease risk, among other health benefits (Milanović et al., 2013). However, there is limited literature on geriatric populations over the age of 85 years that describes the impact of frequent physical activity and exercise on body composition and how the latter can be important for healthy aging and good quality of life.

2. CASE PRESENTATION

An 86-year-old Caucasian male cognitively present and with independent/not impaired mobility living in the southwest region of the United States consented to participate in a research study that was approved by the Institutional Review Board and followed all standards stipulated by the Declaration of Helsinki. Participant has a history of kidney stones in 1997, a coronary bypass heart surgery due to 6 blockages in 2005, and an abdominal aneurysm corrected with a stent in February of 2022. At the time of participation, medications included 1 pill/day of the following: 40 mg of pravastatin to control cholesterol levels, 2.5 mg of amlodipine to control blood pressure, 12.5 mg of hydrochlorothiazide to control blood pressure, 16 mg of galantamine to control cognitive health, and 81 mg of slow-release aspirin to control blood clotting.

3. MAIN FINDINGS

Baseline Information: Participant's height, weight, and BMI were 177.1 cm, 80.9 kg, and 25.8 kg/m², respectively. Participant's systolic and diastolic blood pressure at rest was 124/78 mmHg, and resting heart rate was 62 bpm. Waist and hip circumferences were 95.2 cm and 109.9 cm, respectively, yielding a waist-to-hip ratio of 0.87.

Body Composition: The participant underwent a dual-energy X-ray absorptiometry scan (Horizon, Hologic, Marlborough, MA, USA). The tissue distribution within body compartments is presented in Table 1. In addition, the participant had 1.8 kg and 3.3 kg of fat mass deposited in the android (abdomen) and gynoid (hips) regions, respectively, yielding an android to gynoid ratio of 1.05.

Table 1. Anthropometric data of the participant.

Fat-Free Mass	Fat Mass	Body Fat Percentage	Visceral Fat Mass	Visceral Fat Volume	Visceral Fat Area	Total Bone Mineral Density	Total Bone Mineral Density T-Score
59.3 kg	21.6 kg	26.7 %	612 g	662 cm ³	127 cm ²	1.2 g/cm ²	-0.3

Routine Exercise: The participant has been exercising since 2005 (after the open-heart surgery). On a weekly basis, the participant exercises 3 days a week (Monday, Wednesday, and Friday) unsupervised. Each workout's goal is to complete 6 miles from a combination of aerobic-based exercises, including walking laps on a track, elliptical, or using a recumbent bike. In addition, the participant engages in some machine-based weightlifting, where he utilizes machines that allow him to do pull and push exercises for both upper and lower body. On average, each workout lasts 1 hour and 30 minutes.

Physical Activity: Since 2010, the participant has been volunteering on Tuesdays for 6 hours/day at a hospital. The main volunteering duties involve discharging patients from the hospital by taking him out in a wheelchair, delivering meals/food to staff and in-bed patients, and cleaning/restocking supplies. In addition, every Wednesday, the participant partakes in the choir of his local church. Furthermore, between Friday to Sunday, each day, the participant spends around 45 minutes deep cleaning his house.

Diet: Since 2005 (after the open-heart surgery), the participant has been eating 3 meals (breakfast, lunch, and dinner) per day with an evening snack prior to dinner. The snack aims to increase satiety and allow him to eat a smaller dinner compared to lunch. Overall, the participant follows a Mediterranean diet and limits his sugar and sodium intake as much as possible. Daily, they drink an average of 60 oz or more of water, while on rare occasions they drink a few sips of soda.

Sleep: On average, the participant sleeps 7 to 8 hours per night. Normally, they go to sleep around 8:30PM and wake up around 4:30 AM completely energized. The participant described that because they are physically active throughout the day, they can fall asleep rapidly and have no reported issues with snoring. A normal night involves

waking up about 3 times to utilize the restroom. In addition, since they have been 24 years old, the participant takes an 8 to 19 minute “power nap” that they recognize as critical to have energy throughout the day.

4. DISCUSSION

Aging is associated with a decline in cognitive function, muscle strength, flexibility, agility, endurance, and increased fat mass (McPhee et al., 2016; Milanović et al., 2013). In this context, evidence suggests that frequent engagement in physical activity and exercise is an effective approach to reducing the aging-associated functional decline (McPhee et al., 2016). Though, this evidence is not new and has been well concluded that the risks of falls, disease progression, and metabolic disturbances can be reduced with an active lifestyle. However, this case report highlights a rather unique event for two reasons: First, the participant of this case report is an 86-year-old man, which categorizes him as part of a population (> 85 years) that warrants further studying. For example, a recent systematic review included 116 randomized controlled trials as part of an update to disseminate the effectiveness of the World Health Organization guidelines on physical activity in preventing falls for people over the age of 65 (Sherrington et al., 2020). In this systematic review, out of the 116 included studies, only 30 of them have participants with a mean age of 80 years or higher, while only 3 studies included participants over the age of 85. Secondly, the participant illustrated in this case report had body composition measured via dual-energy X-ray absorptiometry, which provides a good estimate of muscle and fat mass and compares bone mineral density in relation to other studies. The purpose of this case report was to illustrate how being physically active and engaging in frequent exercise has helped the participant to remain functionally independent and maintain an optimal body composition following major surgical procedures.

Based on BMI, the participant is classified as slightly overweight. However, accounting for body fat percentage, contrasted to a study that also used dual-energy X-ray absorptiometry with physically inactive (3hrs < of exercise/week) and overweight older male and female adults (age: 50 ± 23 years) (Tomlinson, Erskine, Morse, & Onambélé, 2019), their participants had a body fat percentage of 36.2% compared to our participant who had a body fat percentage of 26.7%. Although caution of interpretation must be given because they combined males and females, the mean body weight and fat mass were 77.1 ± 9.1 kg and 26.9 ± 4.1 kg, respectively, while our participant weighed 80.9 kg and had a total fat mass of 21.6 kg, indicating that our participant not only is heavier but has a lower fat mass. Furthermore, compared to another study where individuals with an average age of 70 years lost a significant amount of fat mass after 8 weeks of frequent aerobic or resistance exercise compared to the control group who was sedentary and gained fat mass (Irving et al., 2015); such study provides results in alignment to our participant who is older and is also benefiting from being active throughout the whole week by having a noticeably lower body fat percentage than adult males over the age of 60 years (Silveira, Barbosa, Noll, Pinheiro, & de Oliveira, 2021).

As technological advances continue to extend life expectancy, extra attention should be given to the geriatric population. Paired with the steadfast rise in obesity prevalence among all age groups, a sedentary lifestyle dramatically hinders the quality of life in the aging population (Rezende, Rey-López, Matsudo, & Luiz, 2014). Part of a good quality of life is attributed to restful sleep (Frohnhofer, Popp, Stieglitz, Netzer, & Danker-Hopfe, 2020), which allows geriatric individuals to have enough energy throughout the day. Although there are pharmacological methods that can aid geriatric populations to achieve better sleep, being physically active and frequent exercise is arguably one of the most effective non-pharmacological approaches to improved sleep for older adults (Brewster, Riegel, & Gehrman, 2018). In connotation with this, it is suggestive that the active lifestyle of the participant in this case study not only helps him to have a good body composition but also a restful sleep pattern. In hindsight, although research is lacking in older adults, young individuals with poor sleep have shown to have increased visceral fat deposition that predisposes them to a higher inflammatory state and cardiovascular risk (Gaines et al., 2016). The participant of this case study had a visceral fat area of 127 cm², a waist-to-hip ratio of 0.87, and android

to gynoid ratio of 1.05, which are all variables suggestive of high visceral adiposity. Importantly, aging is associated with a higher predisposition of visceral fat storage than in other body compartments (Hunter, Gower, & Kane, 2010), and an expected visceral fat area value for the average male of 60-69 years would be around 162 cm². Although there is limited evidence to infer this from, it is likely that visceral fat content would continue to rise and be higher in someone that is 86 years old (Hunter et al., 2010), yet that is not the case for the participant of this case report.

In addition, it must be acknowledged that to date, there is no preset diet that works for everyone, and rather, there are suggestions that help some people more than others. Within this context, the participant in this case report primarily follows a Mediterranean type of diet. To adhere to this diet style, he reported that every meal is freshly home cooked, allowing him to minimize the consumption of processed foods. This by itself is likely a critical favoring factor towards the good body composition of the participant (Panagiotakos, Polystipiotti, & Papairakleous, 2007; Roman, Carta, Martínez-González, & Serra-Majem, 2008). In addition, combined with their active lifestyle, this has allowed them to remain energized, healthy, and eat normal meals as they reported no decrements in appetite. This last point is important because frailty in older adults (Capurso, Bellanti, Lo Buglio, & Vendemiale, 2019) is in part linked to weight loss due to a reduced appetite and therefore reduced energy intake.

An additional aspect to highlight is the high bone mineral density and T-score of the participant in this case report. In males and females over the age of 78, evidence purported that low-intensity exercise provided sufficient stimuli to promote an increased bone mineral density alike a vigorous resistance training program (Villareal et al., 2004). Such statement might be true for the participant of this case study, as they do not engage in vigorous exercise, and rather engage in frequent and daily physical activity that they described as essential to maintain an independent and good quality of life. Despite having major surgical procedures, the participant acknowledged that being physically active has been critical for his recovery and well-being as well. Altogether, this case report highlights the benefits of an active lifestyle in a geriatric participant of an age group that warrants further research. Because there are ample complications when it comes to studying geriatric populations, this case report should be interpreted with caution and only serves as a summary of findings of a research participant that cannot be generalized or expected in someone of the same age. However, in the context of this participant, it has been evident that an active lifestyle and frequent exercise have been vital for his quality of life.

5. CONCLUSION

Interpretation of the findings in this case report cannot be generalized to all individuals. However, the participant in this case report, who has been physically active and engaged in frequent exercise, has enabled to maintain a healthy body composition regardless of his age. This has bolstered him to remain physically independent and achieve a good quality of life.

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