6 Underweight, overweight and obesity in older adults

Cornel Sieber

6.1 Summary

In older adults, both underweight and obesity are important issues. In the Swiss nutrition survey menuCH, the prevalence of underweight (BMI < 18.5) among older adults between the ages of 65-75 was 1.5%, the prevalence of obesity (BMI ≥ 30.0) in the same age group was 17.8% and the prevalence of overweight (BMI 25-29.9) was 39.0%.

However, the BMI has to be interpreted with care when used as a parameter in old age. It is still undetermined whether the association between BMI and all-cause mortality for older adults is the same as for younger adults. There is more and more support for increasing the cut-off value for older adults from 18.5 to up to 23.0. Therefore, additional research is needed to define the appropriate BMI cut-off values for older adults.

Obesity is linked to an increased mortality in middle-aged people. However, especially in older people with chronic diseases, overweight measured by the BMI criteria (BMI 25.0-29.9) is associated with a higher survival rate. This is called the obesity paradox (or BMI paradox). The measurement of the waist circumference and of the waist-hip ratio can be helpful since there is a strong association between these two indicators and cardiovascular outcomes even when the BMI is less than 30 kg/m2. If the BMI is above 35 kg/m2 however, both the waist circumference and the waist-hip ratio lose their predictive power.

On the other hand, the obesity paradox may be accompanied by an increased risk for a functional decline, the challenge of sarcopenic obesity. The prevalence of sarcopenia (age-related loss of muscle mass) combined with obesity is rising due to the increasing BMI in all age groups in Western older adults. Older adults with sarcopenic obesity often have poor health, a decreased functional capacity, a higher risk for cardiometabolic diseases and reduced quality of life. However, there is a debate as to whether outcomes of sarcopenia with obesity are multiplicative, or whether obesity in this population may have protective effects.

The prevalence of sarcopenic obesity differs substantially among studies for different reasons – one of them being the lack of a standard definition. A standardized clinical-research definition of sarcopenic obesity is therefore badly needed to advance research in this clinically important field.

6.2 Introduction

When speaking about malnutrition in older adults, we most often think of people with a clearly reduced body mass index (BMI), lack of appetite and loss of functionality and maybe even of artificial nutrition and of ethical end-of-life decisions. On the other hand, when we consider malnutrition at younger ages (under 65), the obesity epidemic is on the frontline. Nowadays however, there is already a substantial number of older people with either overweight or obesity, and this number will increase when the current middle-aged cohort reaches older age.

Obesity in older adults is becoming a real challenge in nutritional medicine. This may be linked to the consequences of obesity in this age-group regarding morbidity, functionality, but also survival (obesity paradox, see Chapter 6.4). Furthermore, the combination of obesity with sarcopenia (age-related loss of muscle mass, see Chapter 4.4) – so-called sarcopenic obesity – is of the utmost relevance both in clinical work as well as in research (see Chapter 6.6). These points will be discussed in this chapter.
The most common health consequences of overweight and obesity in older adults – most often already presenting in middle age – are:

- Cardiovascular diseases (mainly heart disease and stroke)
- Diabetes mellitus type 2
- Musculoskeletal disorders (especially osteoarthritis)
- Some cancers (e.g. breast, prostate, kidney, colon)

However, it should be clearly stated that, even in older adults, obesity is preventable. The basis is a diet adapted both in energy intake and food components, and – at least as important if not even more so – regular physical activity. It is the imbalance between diet and physical activity which promotes either obesity, malnutrition or undernutrition. Malnutrition and especially protein-energy malnutrition (PEM) can be observed in older adults with a decreased, normal or even increased BMI (also see Chapter 5.3). The latter is called sarcopenic obesity since it is very often accompanied by sarcopenia (see Chapter 6.6).

However, diets to reduce body weight are rarely recommended, as the reduced body weight is mainly due to a loss of fat-free muscle, especially muscle mass, which leads to different health risks in old age (see Chapter 4.4).

Overall, we live in an obesogenic environment and therefore, among other goals, the WHO global action plan (2011) aims at:

- a 25% relative reduction in premature mortality caused by non-communicable diseases (nutrition being an important factor) by the year 2025
- a halt in the rise of global obesity to match the (already high) rates of the year 2010.

### 6.3 Definition of underweight, overweight and obesity in older adults

#### 6.3.1 Background

Overweight and obesity are defined using either the body mass index or anthropometric measurements.

The WHO proposes using the BMI to classify adults according to their body weight (see Chapter 6.3.2). The International Classification of Diseases (ICD) and the National Institute of Health (NIH) use the same cut-off values for overweight and obesity as the WHO. The USA NRCC Committee on Diet and Health on the other hand defines the BMI range of 24-29 as being desirable in people over the age of 65. Finally, the WHO’s reference standard for obesity uses the percentage of body fat (> 25% in men and > 35% in women).

#### 6.3.2 Body mass index (BMI)

The BMI is an index of weight-for-height that is commonly used to classify underweight (BMI < 18.5 kg/m²), overweight (BMI = 25-29.9 kg/m²) and obesity (BMI ≥ 30 kg/m²) in adults.

The BMI represents the most useful population-level method to measure overweight and obesity as the cut-off values are the same for both sexes and for all ages of adults. However, it is only a rough indicator since it does not reflect the specific body composition, especially not fat mass and its distribution within the body. This is a clear drawback since “fat is not fat”. Subcutaneous fat does not show the same detrimental health effects as visceral fat, for example, and there are also differences in the inflammatory activity between the two. The negative cardiovascular health outcomes linked to visceral fat seem to be partly due to its high secretion of pro-inflammatory cytokines. Furthermore, liver fat as well as fat within the muscle (intra- and intercellular) show distinct variations.
Whereas obesity is clearly linked to an increase in body fat mass, the amount and its distribution is not included in the WHO definition of the BMI. The same is true for the waist circumference and the waist-hip ratio – although they are slightly better indicators in this respect (see Chapter 6.3.3). However, in older adults, an increased BMI is most often a sign of increased body fat mass.

### BMI cut-off values for older adults

Interestingly enough, the WHO defines BMI reference values for children, adolescents and adults, but not for older adults. This is because valid reference values regarding morbidity (including functionality) and mortality have not yet been established. Whether the association between BMI and all-cause mortality for older adults is the same as for younger adults is still unclear. The risk of mortality seems to increase in older people with a BMI below 23.0 – in contrast to the current cut-off value of the WHO of 18.5. Other authors have supported increasing the cut-off value for older adults from 18.5 to 20 or even to 22. Dieticians have also stated that the reference range of the BMI (20-25 kg/m²) is not appropriate for older subjects. The authors concluded that a weight change over a period of time together with a clinical evaluation is a far superior prognostic indicator of undernutrition in older subjects. Thus, the BMI must be interpreted with care when used as a parameter for malnutrition and undernutrition in old age, and more research is needed to define the appropriate BMI cut-off values for older adults.

#### 6.3.3 Waist circumference and waist-hip ratio

The WHO also promotes the measurement of the waist circumference and the waist-hip ratio in obese people – especially with a concomitant metabolic syndrome and its sequelae both for morbidity and mortality. There is a strong association between these two indicators and cardiovascular outcomes when the BMI is less than 30 kg/m². If the BMI is above 35 kg/m², both the waist circumference and the waist-hip ratio lose their predictive power. BMI values between 30-35 kg/m² represent a "grey zone". Furthermore, as opposed to the BMI, there are gender-specific cut-off values for the waist circumference and for the waist-hip ratio (see Table 6.1).

### Table 6.1 Gender-specific cut-off values for the waist circumference and for the waist-hip ratio associated with a decreased disease risk

<table>
<thead>
<tr>
<th>Gender</th>
<th>Waist circumference</th>
<th>Waist-hip ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>&lt; 102 cm</td>
<td>&lt; 0.90</td>
</tr>
<tr>
<td>Women</td>
<td>&lt; 88 cm</td>
<td>&lt; 0.85</td>
</tr>
</tbody>
</table>

#### 6.4 Obesity paradox

It is well established – as observed with the first cohort of the Framingham study in 1948 – that obesity is linked to an increased mortality in middle-aged people. However, over the last decades, it has also become increasingly evident that, especially in older people with chronic diseases, overweight measured by the BMI criteria (BMI 25-29.9) is associated with a higher rate of survival. This is called the obesity paradox (a better wording would be the BMI paradox), referring to the WHO criteria for overweight and obesity (see Figure 6.1 and Figure 6.2). According to Babiarczyk and Turbiarz and Kvamme et al., BMI values between 24 and 27 are associated with a reduced risk of mortality and improved quality of life in older adults.
The reasons for these findings are far from being completely understood, but the results are quite consistent for patients with coronary heart disease, chronic obstructive pulmonary disease and chronic kidney failure, to name but a few important diseases in old age. One simple explanation may be that a certain "compositional reserve" is protective in times of either increased demands or a lack of adequate caloric intake.

Whereas Figure 6.1 and Figure 6.2 shown above represent findings mainly for community-dwelling older people, there are similar data in older adults admitted to acute geriatric hospitals as well as to nursing homes. In 444 people (mean age 85 years) admitted to acute care in a geriatric hospital in Geneva, the four-year prospective mortality was reduced by around 40% if the people had a BMI equal to or above 30, even when comorbidities such as heart failure and malignancies were considered. On the other hand, there were no differences in mortality among those with a BMI below 30. Data on older people in nursing homes (mean...
age 84 years), where a high proportion of frail people is expected, showed that out of 200 people, 12 had a BMI over 35. In those, mortality was zero over the following 12 months, whereas mortality was about 50% in those with a BMI below 20 (see Figure 6.3)\(^7\).

![Figure 6.3: Association between survival rate and BMI in older adults (mean age 84 years) living in nursing homes](image)

Overall, for older adults above a certain age, a BMI above 30 seems to be more protective regarding survival rather than being a risk factor or being linked to complications of diseases often related to obesity. Conversely, this survival paradox may be paralleled by an increased risk of a functional decline, the challenge of sarcopenic obesity (see Chapter 6.6).

### 6.5 Prevalence of underweight and obesity in older adults

#### 6.5.1 Prevalence of underweight

The proportion of underweight men and women in Switzerland decreased over all age groups up to the age of 65 in 2012\(^8\). For men and women over 75, the prevalence increased again, comparable to the prevalences in the group of 25-34-year-olds (men, 1.1%) and the group of 45-54-year-olds (women, 5.1%)\(^9\). In the Swiss nutrition survey menuCH, the prevalence of underweight (BMI < 18.5) among adults between the age of 65-75 was 1.5% (see Table 6.3)\(^10,11\). As mentioned in Chapter 6.3.2, the BMI classification used by the WHO (and in the Swiss nutrition survey menuCH) has its limitations regarding the interpretation of the BMI in older people.

#### 6.5.2 Prevalence of obesity

Overweight and obesity continue to be a world-wide challenge. The prevalence shows a clear cohort effect (see Table 6.2), meaning that more and more older people are overweight or obese\(^12,13\). High prevalence rates of obesity were already published for the United States 15 years ago. 20% of adults above the age of 60 were obese in the years 1988-1994 and 32% in the years 1999-2000\(^14,15\). These numbers have increased since then. Data from the Swiss nutrition survey menuCH show that there is an obesity prevalence of 17.8% among older adults (65-75) in Switzerland (see Table 6.3), the mean BMI being 25.9 among the 65-69-year-olds and 26.2 among the 70-75-year-olds (see Table 6.4). The Swiss nutrition survey menuCH is the first national survey to collect measured data on body weight and height (as opposed to data from questionnaires). Data from the Swiss Health Surveys 1992-2012 (using...
questionnaires) show how the prevalence of obesity has developed among the different age-
groups (see Table 6.5).

Table 6.2: Proportion of obese people (BMI ≥ 30) in Switzerland (in %, by birth cohorts)²⁴

<table>
<thead>
<tr>
<th>Age</th>
<th>45-54 years old %</th>
<th>55-64 years old %</th>
<th>65-74 years old %</th>
<th>75-84 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men born 1918-27</td>
<td>8*</td>
<td>10*</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Men born 1928-37</td>
<td>8</td>
<td>11</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Men born 1938-47</td>
<td>9</td>
<td>12</td>
<td>17</td>
<td>17*</td>
</tr>
<tr>
<td>Men born 1948-57</td>
<td>12</td>
<td>1</td>
<td>19*</td>
<td>19*</td>
</tr>
<tr>
<td>Women born 1918-27</td>
<td>4*</td>
<td>7</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Women born 1928-37</td>
<td>4</td>
<td>9</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Women born 1938-47</td>
<td>5</td>
<td>11</td>
<td>14</td>
<td>15*</td>
</tr>
<tr>
<td>Women born 1948-57</td>
<td>9</td>
<td>15</td>
<td>16*</td>
<td>16*</td>
</tr>
</tbody>
</table>

*extrapolated estimations

Table 6.3: Distribution of the body mass index (BMI) (measured) in the Swiss population, by age groups (menuCH)²⁵

<table>
<thead>
<tr>
<th>Age group</th>
<th>Underweight (BMI &lt; 18.5) %</th>
<th>Normalweight (18.5 ≤ BMI &lt; 25) %</th>
<th>Overweight (25 ≤ BMI &lt; 30) %</th>
<th>Obese (BMI ≥ 30) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (2052)</td>
<td>2.4</td>
<td>54.3</td>
<td>30.7</td>
<td>12.7</td>
</tr>
<tr>
<td>18-34 years old (554)</td>
<td>4.7</td>
<td>67.3</td>
<td>22.9</td>
<td>5.2</td>
</tr>
<tr>
<td>35-49 years old (599)</td>
<td>1.6</td>
<td>56.5</td>
<td>28.8</td>
<td>13.3</td>
</tr>
<tr>
<td>50-64 years old (562)</td>
<td>1.3</td>
<td>45.4</td>
<td>36.2</td>
<td>17.3</td>
</tr>
<tr>
<td>65-75 years old (337)</td>
<td>1.5</td>
<td>41.8</td>
<td>39.0</td>
<td>17.8</td>
</tr>
<tr>
<td>Men (n)</td>
<td>Total (942)</td>
<td>0.9</td>
<td>43.7</td>
<td>41.6</td>
</tr>
<tr>
<td>18-34 years old (244)</td>
<td>2.0</td>
<td>61.0</td>
<td>31.7</td>
<td>5.3</td>
</tr>
<tr>
<td>35-49 years old (267)</td>
<td>0.5</td>
<td>45.3</td>
<td>38.9</td>
<td>15.4</td>
</tr>
<tr>
<td>50-64 years old (284)</td>
<td>0.0</td>
<td>32.7</td>
<td>49.7</td>
<td>17.7</td>
</tr>
<tr>
<td>65-75 years old (167)</td>
<td>1.2</td>
<td>28.9</td>
<td>50.1</td>
<td>19.7</td>
</tr>
<tr>
<td>Women (n)</td>
<td>Total (1110)</td>
<td>3.8</td>
<td>65.0</td>
<td>19.6</td>
</tr>
<tr>
<td>18-34 years old (310)</td>
<td>7.4</td>
<td>73.6</td>
<td>14.0</td>
<td>5.0</td>
</tr>
<tr>
<td>35-49 years old (332)</td>
<td>2.7</td>
<td>67.6</td>
<td>18.7</td>
<td>11.1</td>
</tr>
<tr>
<td>50-64 years old (298)</td>
<td>2.5</td>
<td>58.0</td>
<td>22.7</td>
<td>16.9</td>
</tr>
<tr>
<td>65-75 years old (170)</td>
<td>1.7</td>
<td>54.6</td>
<td>27.8</td>
<td>15.9</td>
</tr>
</tbody>
</table>
Table 6.4: Descriptive analysis of participants of menuCH aged over 65 years

<table>
<thead>
<tr>
<th></th>
<th>65-69 years old</th>
<th>70-75 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>n*</td>
<td>164</td>
<td>175</td>
</tr>
<tr>
<td>N*</td>
<td>291'894</td>
<td>357'173</td>
</tr>
<tr>
<td>BMI</td>
<td>25.9 (4.0)</td>
<td>26.2 (4.1)</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>89.8 (14.1)</td>
<td>91.4 (14.2)</td>
</tr>
</tbody>
</table>

n*: number of participants  
N*: target population

Data are weighted mean (standard deviation). They correct for non-response considering 6 socio-demographic variables, the uneven distribution of 24h-recalls by seasons and by weekdays and they are calibrated on marginal totals.

Table 6.5: Trend of the distribution of the body mass index (BMI) in the Swiss population according to the Swiss health survey (modified)

<table>
<thead>
<tr>
<th>Age group</th>
<th>55-64 years old (n)</th>
<th>65-74 years old (n)</th>
<th>75+ years old (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Underweight (BMI &lt; 18.5) %</td>
<td>Normalweight (18.5 ≤ BMI &lt; 25) %</td>
<td>Overweight (25 ≤ BMI &lt; 30) %</td>
</tr>
<tr>
<td>1992 (1965)</td>
<td>1.8</td>
<td>50.8</td>
<td>37.7</td>
</tr>
<tr>
<td>1997 (1666)</td>
<td>2.0</td>
<td>45.2</td>
<td>40.1</td>
</tr>
<tr>
<td>2002 (3208)</td>
<td>1.7</td>
<td>48.5</td>
<td>38.5</td>
</tr>
<tr>
<td>2007 (3091)</td>
<td>1.9</td>
<td>47.6</td>
<td>38.9</td>
</tr>
<tr>
<td>2012 (3234)</td>
<td>1.7</td>
<td>45.7</td>
<td>37.0</td>
</tr>
<tr>
<td>1992 (1651)</td>
<td>2.4</td>
<td>52.3</td>
<td>36.5</td>
</tr>
<tr>
<td>1997 (1488)</td>
<td>1.9</td>
<td>45.7</td>
<td>40.5</td>
</tr>
<tr>
<td>2002 (2505)</td>
<td>2.0</td>
<td>44.4</td>
<td>41.7</td>
</tr>
<tr>
<td>2007 (2454)</td>
<td>1.4</td>
<td>46.5</td>
<td>39.6</td>
</tr>
<tr>
<td>2012 (2829)</td>
<td>2.2</td>
<td>41.5</td>
<td>40.9</td>
</tr>
<tr>
<td>1992 (812)</td>
<td>4.3</td>
<td>55.1</td>
<td>33.9</td>
</tr>
<tr>
<td>1997 (970)</td>
<td>3.9</td>
<td>55.5</td>
<td>32.1</td>
</tr>
<tr>
<td>2002 (1751)</td>
<td>4.1</td>
<td>49.3</td>
<td>37.1</td>
</tr>
<tr>
<td>2007 (1912)</td>
<td>3.4</td>
<td>48.0</td>
<td>39.5</td>
</tr>
<tr>
<td>2012 (1900)</td>
<td>3.5</td>
<td>47.2</td>
<td>36.6</td>
</tr>
</tbody>
</table>

Age-related onset of obesity

People can become obese at any age, even in old age. Certain genetic factors have been associated with late-onset obesity while hormonal changes, especially in postmenopausal women, also seem to play a role.

28-30
6.6 Sarcopenic obesity

6.6.1 Introduction

The combination of age-related loss of muscle mass (sarcopenia) and concomitant overweight or obesity is becoming increasingly common. This is mainly due to the current demographic change resulting in more and more older people (see Chapter 1). Furthermore, the rapid increase in obesity involves age cohorts that reach high and very high ages (> 80 years). This is partly due to the improvements in the treatment of obesity-related chronic diseases, such as hypertension, diabetes and hyperlipidemia. The interplay of sarcopenia and obesity\textsuperscript{31} is summarized in Figure 6.4 and represents a truly unhealthy combination called sarcopenic obesity\textsuperscript{32,33}. Older adults with sarcopenic obesity often have poor health, a decreased functional capacity and reduced quality of life – not rarely leading to institutionalization. Additionally, the progressive loss of muscle mass and the accumulation of (intra-)abdominal fat induce a higher risk for cardiometabolic diseases in this population\textsuperscript{34}. Furthermore, a new syndrome called osteosarcopenic obesity syndrome (OSO) has recently been identified as a condition encompassing osteopenia/osteoporosis, sarcopenia and obesity\textsuperscript{35}. OSO is especially deleterious in older adults due to the age-related redistribution of fat and its infiltration into bone and muscle. However, there is a debate as to whether outcomes of sarcopenia with obesity are multiplicative, or whether obesity in this population may have protective effects\textsuperscript{36}.

Figure 6.4: Interplay between adipose and muscle tissue (sarcopenic obesity)\textsuperscript{31}

At first sight, the loss of functionality (walking speed and/or handgrip strength) as a result of sarcopenia does not seem to cause a very relevant health problem with regard to obesity. However, obesity in itself is a risk factor for arthrosis, heart failure and diabetic neuropathy (to name but a few) – independently of reduced muscle mass. This interdependence of obesity and functionality – as measured by the activities of daily living (ADL) – is observed with a BMI of 24. Under and above this cut-off level, functionality declines\textsuperscript{13}. The close interplay between sarcopenia and frailty has already been mentioned (see Chapter 4.4). With regard to the prevalence of both frailty and obesity, the BMI with the best functionality in women is 25-30 kg/m$^2$ – as was shown in the Women’s Health and Aging Studies\textsuperscript{37}.

Currently, the frailty syndrome and its close interplay with sarcopenia are at the forefront of research in geriatric medicine\textsuperscript{38}. One could argue that with an increased BMI, the needed muscle mass is available to guarantee functionality even in the presence of one or more chronic or intermittent catabolic diseases. However, survival is not equal to morbidity – which is increased in older people with obesity, but not with overweight (BMI 25-30).
The pathophysiology of sarcopenic obesity seems to be multifactorial\(^\text{39}\) (see Figure 6.5). In addition to hormonal changes, the main causes of sarcopenic obesity in older adults are a decrease in physical activity in combination with an unchanged energy intake\(^\text{40}\).

![Figure 6.5: Pathophysiology of sarcopenic obesity\(^\text{39}\) ](image)

6.6.2 Lack of a standard definition of sarcopenic obesity

The lack of a standardized clinical-research definition of sarcopenic obesity has prevented research in this field from moving forward. Relying on mathematically derived thresholds from select reference populations for its classification rather than basing definitions on proximal or distal outcomes creates inherent biases and questionable utility when applying definitions to other cohorts with differing baseline, sociodemographic, and comorbid characteristics\(^\text{36}\).

Standardized cut-off values and an international consensus on the definition of sarcopenic obesity are badly needed to advance research in this field.

6.6.3 Prevalence of sarcopenic obesity

Sarcopenic obesity is reported to be frequent in men and women over the age of 70 years\(^\text{33}\). In a study on older Bavarian adults, the prevalence of obesity ranged between 20-64% in older women – depending on the definition of obesity (defined by BMI, NIH or WHO, see Chapter 6.3)\(^\text{41}\). In this study, the prevalence of sarcopenic obesity ranged between 3.3-4.5%, again depending on the definition that was used. This low prevalence was mainly due to preserved muscle mass. However, the hypothesis that sarcopenic obesity is incompatible with an independent life was not confirmed.

The prevalence of sarcopenic obesity differs substantially among studies for different reasons – one of them being the lack of a standard definition\(^\text{42}\) (see also Chapter 6.6.2). In many studies, subjects with overweight are included, for example – instead of subjects with obesity. In the paper by Baumgartner et al., the term “obese” was selected when people analyzed for sarcopenic obesity had a BMI above 27 – by definition not yet obese, but overweight\(^\text{43}\). According to these inclusion criteria in 1999 prevalence rates of sarcopenic obesity were 13.5% for men under the age of 70, 17.5% for men over the age of 80, 5.3% for women under the age of 70 and 8.4% for women over the age of 80.

Most publications since then have also varied in the inclusion criteria and have not clearly distinguished between overweight and obesity when calculating the prevalence of sarcopenic obesity. This is probably best shown by a cross-sectional analysis of a population-based sample from the United States including nearly 5'000 people above the age of 60. They compared eight published definitions for densitometry-applied prevalence measurements of sarcopenic obesity\(^\text{44}\). The prevalence of sarcopenic obesity ranged from 4.4% to 84% in men and from 3.6% to 94% in women.

Thus, the prevalence of sarcopenic obesity is very unclear and one has to consider which definition was used when interpreting the published data. Obviously, there is only a subset of older people with either overweight or obesity who also show signs of sarcopenia.
6.6.4 Dynapenia

Conflicting evidence exists as to whether reduced muscle mass or strength, with or without obesity, can detrimentally affect functional outcomes. The loss of muscle strength (dynapenia, see Chapter 4.4) may be a more important factor in sarcopenia because the rate and magnitude of strength loss typically exceed the loss of muscle mass\(^36\). A recent study analyzed the interrelationship between dynapenia and abdominal obesity prospectively regarding functionality and mortality, the latter over 10 years\(^45\). The results showed that dynapenic abdominal obese subjects have a significantly higher risk of worsening disability and early mortality than subjects with dynapenia or central fat distribution only. The author of another longitudinal study in men concentrating on frailty and sarcopenic obesity did not only find similar data regarding functionality and the frailty criteria, but also concluded that in future trials on frailty and disability prevention, the intervention should focus on both muscle and fat mass\(^46\).

6.7 Conclusions and recommendations

- Overweight and obesity show a cohort effect – in older adults as well.
- There are clear signs that the prevalence of overweight and obesity in older adults will further increase in the years to come.
- The combination of sarcopenia and obesity is currently an important challenge in nutritional medicine for older adults.
- Even if sarcopenic obesity is becoming a major research target, its definition is still far from being established.
- The cut-off value as to when obesity in older adults becomes a serious health issue cannot currently be defined clearly, since the "obesity paradox" shows a survival benefit in a subgroup of older adults.
- In older subjects, diets to reduce body weight are rarely recommended, as the reduced body weight is mainly due to a loss of fat-free muscle, especially muscle mass.
- Diets are therefore only useful in conjunction with a balanced physical activity program in order to preserve muscle mass.

6.8 Literaturverzeichnis

25. Personal Communication from Bochud M. Descriptive analysis menuCH for participants aged from 65 to 75, age stratified. 2017 etr.eek@blv.admin.ch.