



Definition, criteria, and core concepts of guidelines for the management of obesity disease in Japan

Ogawa, Wataru ; Hirota, Yushi ; Miyazaki, Shigeru ; Nakamura, Tadashi ; Ogawa, Yoshihiro ; Shimomura, Ichiro ; Yamauchi, Toshimasa ; Yokote, ...

(Citation)

Endocrine Journal, 71(3):223-231

(Issue Date)

2024

(Resource Type)

journal article

(Version)

Version of Record

(Rights)

© The Japan Endocrine Society

This article is licensed under a Creative Commons [Attribution-NonCommercial-NoDerivatives 4.0 International] license.

(URL)

<https://hdl.handle.net/20.500.14094/0100488529>



Definition, criteria, and core concepts of guidelines for the management of obesity disease in Japan

Wataru Ogawa¹⁾, Yushi Hirota¹⁾, Shigeru Miyazaki²⁾, Tadashi Nakamura³⁾, Yoshihiro Ogawa⁴⁾, Ichihiro Shimomura⁵⁾, Toshimasa Yamauchi⁶⁾ and Koutaro Yokote⁷⁾, on behalf of the Creation Committee for Guidelines for the Management of Obesity Disease 2022 by Japan Society for the Study of Obesity (JASSO)

¹⁾ Division of Diabetes and Endocrinology, Department of Internal Medicine, Kobe University Graduate School of Medicine, Kobe 650-0017, Japan

²⁾ Center for Comprehensive Health Check and Promotion, Japan Anti-Tuberculosis Association, Tokyo 101-8372, Japan

³⁾ Department of Internal Medicine, Kawasaki Hospital, Kobe 652-0042, Japan

⁴⁾ Department of Medicine and Bioregulatory Science, Graduate School of Medical Sciences, Kyushu University, Fukuoka 812-8582, Japan

⁵⁾ Department of Metabolic Medicine, Osaka University Graduate School of Medicine, Suita 565-0871, Japan

⁶⁾ Department of Diabetes and Metabolic Diseases, Graduate School of Medicine, The University of Tokyo, Tokyo 113-8655, Japan

⁷⁾ Department of Endocrinology, Hematology, and Gerontology, Chiba University Graduate School of Medicine, Chiba 260-8670, Japan

Abstract. To identify those who might benefit from weight reduction within a large population of obese individuals, Japan Society for the Study of Obesity (JASSO) advocated the concept of “obesity disease.” Here we summarize the definition, criteria, and core concepts for the management of obesity disease based on JASSO’s latest guideline. JASSO defines obesity as excessive fat storage in adipose tissue associated with a BMI of ≥ 25 kg/m². The threshold BMI of obesity is low as compared to Western countries given that Japanese individuals tend to develop obesity-related health disorders at lower BMI. Obesity with a BMI of ≥ 35 kg/m² is referred to as “high-degree obesity” as treatment strategies vary based on the degree of obesity. Obesity is diagnosed as “obesity disease” if accompanied by any of the 11 specific obesity-related health disorders that weight reduction can prevent or alleviate, or if it meets the criteria for visceral fat obesity with a visceral fat area of ≥ 100 cm². The initial weight reduction goals for high-degree obesity disease range from 5% to 10% of their current body weight, depending on the associated health disorders. That for those with obesity disease who do not qualify as high-degree is 3% or more. If these initial goals are not achieved, intensifying dietary therapy or introducing drug therapy (or both) may be necessary. While surgical treatment is primarily indicated for high-degree obesity disease, it might be appropriate for cases of obesity disease with a BMI < 35 kg/m², depending on the accompanying health disorders. Enhancing the quality of life for individuals with obesity or obesity disease necessitates a broader societal approach, emphasizing the resolution of related stigma.

Key words: Obesity, Obesity disease, Management guideline, Visceral fat obesity

Introduction

Not all individuals with a large body mass require treatment, from both medical and social perspectives. To identify those who might benefit from weight reduction from among a large population of obese individuals,

Japan Society for the Study of Obesity (JASSO) more than 20 years ago advocated the concept of “obesity disease” [1, 2]. Obesity disease is diagnosed not solely on the basis of body mass index (BMI) but rather if a high BMI is accompanied by (i) specific obesity-related health disorders or (ii) visceral fat accumulation, which

Submitted Nov. 2, 2023; Accepted Dec. 4, 2023 as EJ23-0593
Released online in J-STAGE as advance publication Dec. 20, 2023
Correspondence to: Wataru Ogawa, MD, PhD, Division of Diabetes and Endocrinology, Department of Internal Medicine, Kobe University Graduate School of Medicine, 7-5-1 Kusunoki-cho, Chuo-ku, Kobe 650-0017, Japan.
E-mail: ogawa@med.kobe-u.ac.jp

The authors are members of the Guideline Deliberation Expansion Academic Committee for Guidelines for the Management of Obesity Disease 2022 by Japan Society for the Study of Obesity (JASSO).

is an important risk factor for such health disorders. The decision to base medical need not only on the extent of obesity (BMI) but also on accompanying obesity-related health disorders or visceral fat accumulation was clear and rational. Since the initial publication of these diagnostic criteria [1, 2], JASSO has continually updated the guidelines for management of obesity disease [3-5] in order to promote the treatment of patients in line with this concept. We here summarize the definition, criteria, and core concepts for the management of obesity disease based on the latest guidelines of JASSO published in 2022 [5], and we discuss the goals of JASSO to be achieved through its scientific and social activities.

Definition of Obesity

Obesity is defined by JASSO as excessive fat storage in adipose tissue associated with a BMI of ≥ 25 kg/m² (Table 1). This threshold of BMI for the definition of obesity was first established in the guidelines published in 2000 [1] and is based on the finding that the mean number of obesity-related health disorders—including glucose intolerance, dyslipidemia, and hypertension—exceeded 1.0 when BMI reached 25 kg/m² for individuals who underwent health checkups [2]. This threshold, which has been consistently adopted in subsequent guidelines [3-5], is lower than that of other guidelines such as those of the World Health Organization (WHO), the latter stipulating that individuals with a BMI of ≥ 25 but < 30 kg/m² are overweight and those with a BMI of ≥ 30 kg/m² are obese [6]. However, individuals of East Asian ethnicity, including Japanese, tend to develop certain obesity-related health disorders at a lower BMI than do those of European ethnicity [7-9], with the risk

of developing diabetes or nonalcoholic fatty liver disease (NAFLD) at a BMI of 30 kg/m² in the latter being almost equal to that at a BMI of 25 kg/m² in the former [10, 11]. Such a lower BMI threshold is therefore appropriate for the identification of individuals of Japanese ethnicity who are in need of medical intervention.

The proportion of the adult population with a BMI of ≥ 30 kg/m² is approximately 5% and 35% in Japan and the United States, respectively, with the average value for countries in the Organisation for Economic Co-operation and Development (OECD) being 15% [12, 13]. On the other hand, the proportion of the adult population with a BMI of ≥ 25 kg/m² in Japan is about 25% [12, 14] (Fig. 1). Whereas it is commonly stated that Japan has a low obesity rate, the proportion of obese people in Japan—based on the diagnostic criteria of JASSO—is similar to that in European countries or the United States, where a BMI cutoff of 30 kg/m² is generally adopted. Consistent with this equivalence, the prevalence of certain types of obesity-related health disorders including type 2 diabetes and nonalcoholic steatohepatitis in Japan is similar to that in populations of European descent [7, 8].

Definition of Obesity Disease

JASSO defines obesity disease as obesity accompanied by obesity-induced or obesity-associated health disorders, or by a high probability of their development, and as a condition that from a medical viewpoint requires body weight reduction (Table 1). This concept of obesity disease, developed with the aim of selecting individuals who require medical care from among the large obese population, is unique from an international

Table 1 Definition and diagnosis of obesity disease

Definition of obesity
Excess fat storage in adipose tissue
Body mass index (BMI) of ≥ 25 kg/m ²
Classification of obesity levels
Obesity with a BMI of ≥ 35 kg/m ² is defined as high-degree obesity
Definition of obesity disease
A condition that is characterized by obesity accompanied by obesity-induced or obesity-associated health disorders, or by a high probability of their development, and which from a medical viewpoint requires body weight reduction
Diagnosis of obesity disease
Category 1: Obesity accompanied by any one of 11 specific obesity-related health disorders
Category 2: Obesity accompanied by visceral fat obesity (visceral fat obesity is a diagnostic criterion for obesity disease even in the absence of apparent obesity-related health disorders)
Diagnosis of visceral fat obesity
Accumulation of visceral fat is screened for by measurement of waist circumference (male ≥ 85 cm, female ≥ 90 cm). Visceral fat obesity is diagnosed when a visceral fat area of ≥ 100 cm ² is confirmed by computed tomography or other modalities

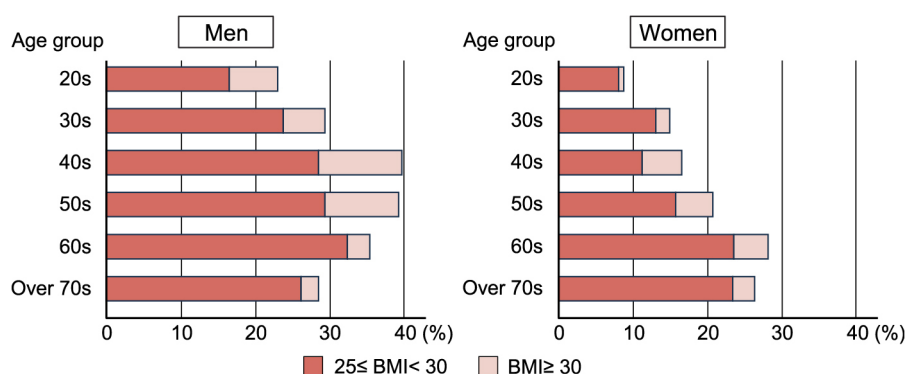


Fig. 1 Prevalence of obesity (BMI of ≥ 25 kg/m²) among the adult Japanese population by sex and age group in 2019. The proportion of obese individuals with a BMI of ≥ 25 but < 30 kg/m² or of ≥ 30 kg/m² varies according to sex and age. In Japan, the proportion of the population with a BMI of ≥ 25 kg/m² is $\sim 25\%$. These data are derived from the National Health and Nutrition Survey Japan 2020 performed by the Ministry of Health, Labour and Welfare (https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryuu/kenkou/eiyuu/r1-houkoku_00002.html [accessed on August 12, 2023]).

Table 2 Obesity-related health disorders

Obesity-related health disorders included in the diagnostic criteria for obesity disease

1. Glucose intolerance (including type 2 diabetes and impaired glucose tolerance)
2. Dyslipidemia
3. Hypertension
4. Hyperuricemia or gout
5. Coronary artery disease
6. Cerebral infarction or transient ischemic attack
7. Nonalcoholic fatty liver disease (NAFLD)
8. Menstrual abnormalities or female infertility
9. Obstructive sleep apnea syndrome or obesity hypoventilation syndrome
10. Musculoskeletal disorders (including osteoarthritis of knee, hip, or finger joints as well as spondylosis deformans)
11. Obesity-related kidney disease

Obesity-related health disorders not included in the diagnostic criteria for obesity disease

1. Malignant disease (including colorectal, esophageal, endometrial, pancreatic, renal, breast, and liver cancer)
2. Cholelithiasis
3. Venous thrombosis or pulmonary embolism
4. Bronchial asthma
5. Skin disorders (including acanthosis nigricans, frictional dermatitis, and others)
6. Male infertility
7. Gastroesophageal reflux disease
8. Mental disorder

perspective, but seems logical and reasonable.

Obesity-related health disorders included in the diagnostic criteria for obesity disease are listed in Table 2. These 11 health disorders are triggered by or associated

with obesity, and there is substantial evidence that weight reduction can alleviate their severity or reduce the risk of their development. In addition to these 11 conditions, other health disorders, also shown in Table 2, are known to be associated with obesity. However, these latter disorders are not included in the diagnostic criteria for obesity disease because current evidence in support of the benefits of weight reduction for them is not as strong as that for the 11 included health disorders. Obesity accompanied by any one of these 11 obesity-related health disorders is therefore diagnosed as obesity disease (Table 1).

Visceral Fat Obesity as an Alternative Criterion of Obesity Disease

Much evidence indicates the pathological relevance of exaggerated accumulation of visceral fat [15-17]. Visceral fat accumulation has thus been linked with health disorders including glucose intolerance, dyslipidemia, and hypertension [1, 18]. The amount of visceral fat, and its clinical marker waist circumference, declines more rapidly than does the amount of subcutaneous fat in response to diet or exercise therapy for weight reduction [16, 17, 19, 20], and a reduction in waist circumference is associated with a decrease in the number of cardio-metabolic risk factors [21, 22]. Analysis of body fat distribution by abdominal computed tomography (CT) has shown that visceral fat obesity poses a higher risk for metabolic disorders and atherosclerotic cardiovascular disease than does subcutaneous fat obesity [23]. A study of subjects who underwent health checkups revealed that visceral fat area (VFA) was positively correlated with the number of cardiovascular risk factors, whereas subcutaneous fat area was not [24]. The same study also found that the mean number of risk factors exceeded

one at a VFA of -100 cm^2 in both males and females. Visceral fat obesity is therefore diagnosed when a VFA of $\geq 100 \text{ cm}^2$ is confirmed by CT or other modalities. Individuals of East Asian ethnicity, including Japanese, tend to accumulate more visceral fat compared with those of European ancestry with a similar BMI [23, 25-27]. This difference may explain why Japanese or other East Asian individuals develop obesity-related health disorders at lower BMIs [10, 11].

It thus appears rational to target individuals with visceral fat obesity for medical treatment and to include this condition as a second category of obesity disease (Table 1). Measurement of waist circumference at the umbilical level is recommended as a screening tool for visceral fat obesity. The waist circumference equivalent to a VFA of 100 cm^2 is -85 and -90 cm in adult Japanese men and women, respectively [28]. Given that females tend to have more subcutaneous fat than males, the waist circumference criterion for the same level of visceral fat accumulation is greater in females [1]. Consistent with JASSO's emphasis on visceral fat obesity, a consensus statement by the International Atherosclerosis Society and International Chair on Cardiometabolic Risk also emphasizes the importance of waist circumference measurement, in addition to BMI, for assessment of cardiometabolic risk [17].

Classification of Obesity and Obesity Disease

Fig. 2 shows a flowchart for the classification of

obesity and obesity disease. Obese individuals (BMI of $\geq 25 \text{ kg/m}^2$) should first be evaluated to determine whether obesity is secondary to another condition such as endocrinopathy, genetic disease, a hypothalamic disorder, or drug treatment. If a treatable factor responsible for obesity is identified, treatment for this factor should be prioritized.

High-Degree Obesity and High-Degree Obesity Disease

Whereas certain obesity-related health disorders can occur at a low BMI in individuals of Japanese ethnicity, others are typically associated with pronounced obesity. These latter health disorders include respiratory diseases such as obstructive sleep apnea syndrome and hypoventilation syndrome, heart failure, obesity-related kidney disease, venous thrombosis, musculoskeletal disorders such as osteoarthritis, and skin disorders such as acanthosis nigricans and intertrigo. The treatment strategy for obesity disease therefore differs depending on the degree of obesity. JASSO recommends that obesity be classified into two categories on the basis of its degree: BMI $\geq 35 \text{ kg/m}^2$ or $25 \leq \text{BMI} < 35 \text{ kg/m}^2$ (Table 1). Obesity with a BMI of $\geq 35 \text{ kg/m}^2$ is referred to as high-degree obesity, and, when it is associated with any of the 11 stipulated obesity-related health disorders or visceral fat accumulation, it is referred to as high-degree obesity disease (Fig. 2).

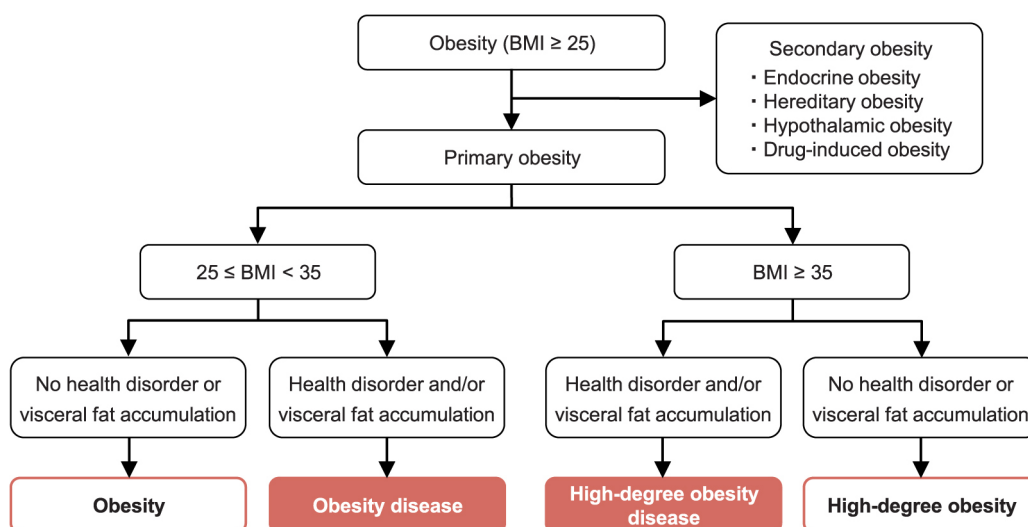


Fig. 2 Diagnostic flowchart for obesity disease. Individuals with obesity (BMI of $\geq 25 \text{ kg/m}^2$) should first be evaluated to determine whether their obesity is secondary to other conditions. The treatment strategy for obesity disease depends on the degree of obesity. JASSO recommends classifying obesity into two categories based on its severity: $25 \leq \text{BMI} < 35 \text{ kg/m}^2$ and $\text{BMI} \geq 35 \text{ kg/m}^2$. The latter is referred to as high-degree obesity. If obesity is accompanied by any of the 11 specified health disorders or by visceral fat accumulation, it is diagnosed as either obesity disease or high-degree obesity disease according to the level of obesity.

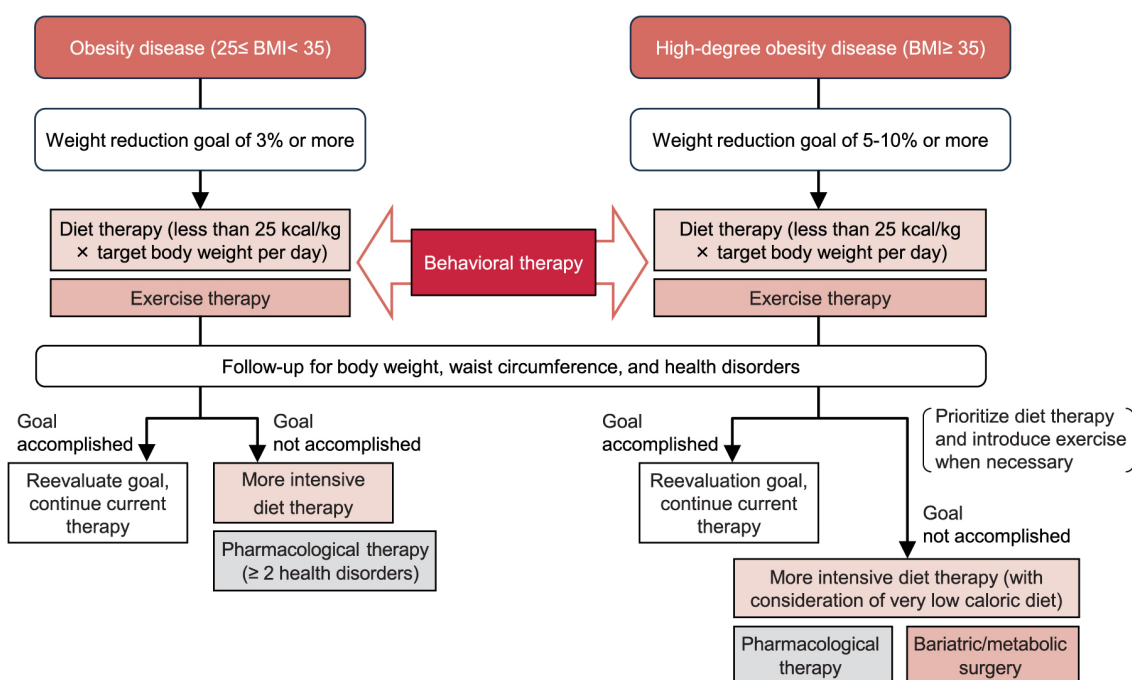


Fig. 3 Treatment guidelines for obesity disease. Treatment strategies for obesity disease differ according to the degree of obesity. For obesity disease with a BMI of $\lt; 35 \text{ kg/m}^2$, an initial weight reduction goal of at least 3% should be set. For high-degree obesity disease (BMI of $\geq 35 \text{ kg/m}^2</math>), the initial weight reduction goal depends on the associated health disorders, but in most cases is 5 to 10% of current body weight. After these initial weight reduction goals have been achieved, the goal should be reassessed in light of any associated health disorders and the current therapy should be continued. If the initial weight reduction goals are not met through dietary, exercise, and behavioral therapy, more intensive interventions such as rigorous diet therapy, pharmacological treatment, and bariatric or metabolic surgery should be considered.$

Treatment Guidance for Obesity Disease

Treatment guidance for obesity disease is outlined in Fig. 3. When obesity disease is not classified as high-degree obesity disease, an initial weight reduction goal of 3% or more should be set, with this recommendation being based on evidence that multiple obesity-related health disorders are improved by such a weight reduction [29]. For the treatment of high-degree obesity disease, the weight reduction goal depends on the associated health disorders, but the initial goal should generally be a loss of 5% to 10% of current body weight.

Implementation of a combination of dietary, exercise, and behavioral therapy has been shown to be effective for weight loss [30]. With regard to behavioral therapy, JASSO’s guidelines highlight exploitation of tools such as a graphed weight diary (Fig. 4) and food behavior diagram (Fig. 5) [1].

If the initial weight reduction goal is achieved, it is recommended that a new goal be set and the current treatment strategy be continued. If the initial weight reduction goal is not met, intensification of dietary therapy or the introduction of drug therapy (or both) may be necessary. For such intensification of dietary therapy, a very low calorie diet is an option for individuals with

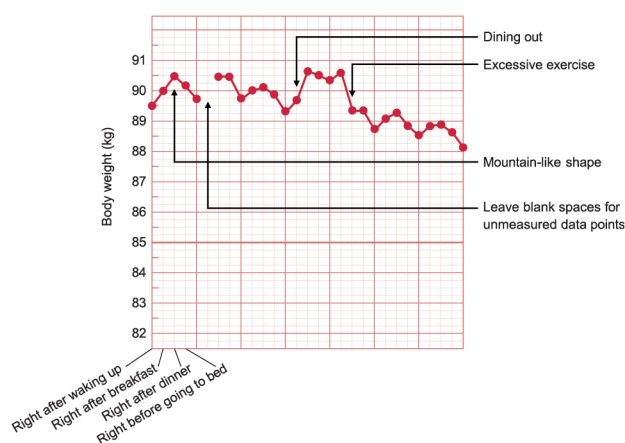


Fig. 4 Graphed weight diary. A graphed weight diary requires individuals to measure their weight four times a day: immediately after waking, after breakfast, after dinner, and before going to bed. The diary illustrates both daily weight fluctuations and weight changes over a week. On days when three meals are consumed in appropriate amounts and at regular intervals, the weight fluctuations generate a mountain-like shape. However, deviations from a regular and desirable lifestyle—such as dining out, late-night snacking due to staying up late, constipation, or excessive exercise—can disrupt this pattern. Analysis of these fluctuations alongside daily activities and bowel movements can pinpoint inconsistencies in lifestyle rhythm.

high-degree obesity disease. Pharmacological therapy should take into account the mode of action, effectiveness, and safety of the considered drug. Surgical treatment is indicated mostly for high-degree obesity disease, but it may also be appropriate for obesity disease with a BMI <35 kg/m² depending on the accompanying health disorders. It is important to emphasize that weight reduction is not the end goal, but rather a means to treat obesity disease. Throughout the treatment process, it is crucial to evaluate the improvement in obesity-related health disorders in tandem with changes in body mass and waist circumference.

During interventions for weight reduction, it is also important to be aware of potential harmful effects associated with excessive weight loss, such as frailty in older adults. Japan has an exceptionally high aging rate, with approximately 28% and 15% of the population being 65 or 75 years of age or older, respectively [31]. The relation between obesity and health impairments varies with age [32, 33], necessitating specific treatment guidance for older adults. However, because of insufficient evidence, JASSO has yet to establish clear treatment guidelines for obesity disease in this age group. Mental disorders are among the health issues associated with obesity, and a substantial number of individuals with high-degree obesity have mental health concerns. It is therefore also important to include appropriate mental health evaluations and to provide necessary psychological support during the treatment of obesity disease.

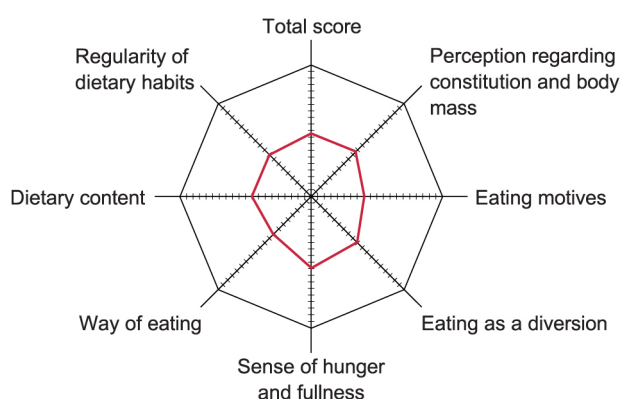


Fig. 5 Food behavior diagram. Patients are asked to complete a dietary behavior questionnaire composed of 55 questions spanning seven domains: Regularity of dietary habits, Dietary content, Way of eating, Sense of hunger and fullness, Eating as a diversion, Eating motives, and Perception regarding constitution and body mass. On the basis of the answers, total scores for each of the seven domains and the overall total score are calculated, plotted, and connected with a line. The pattern formed helps to identify issues with dietary behavior.

Importance of Social Engagement and the Initiatives of JASSO

The ultimate goals of treatment for obesity disease, similar to those of treatment for other conditions, is to prevent early death, to prolong healthy life expectancy, and to preserve quality of life (QOL) (Fig. 6). The maintenance or improvement of QOL for individuals with obesity or obesity disease cannot be achieved solely by a medical approach, with an approach from a social perspective, including the resolution of stigma, also being important.

The development of obesity depends on various factors including genetic or epigenetic factors, factors related to growth and development, and socioeconomic factors. However, it is often overly attributed to an individual's lifestyle. As a result, individuals with obesity often face prejudice that labels them as lacking the ability of self-management. In addition to such social stigma, personal stigma characterized by the perception that obesity is their own responsibility, often raises problems in the treatment of individuals with obesity disease. The inappropriate conclusion that obesity is solely a matter of self-control and thus not a subject for medical treatment deters individuals from receiving appropriate medical care.

One reason that obesity is often viewed as an individual issue is that treatment has long been limited to lifestyle modification. The recent proliferation of surgical treatments and the development of effective medicines should not only promote patient care but also help shift societal perceptions of obesity. The development of new treatments and the dissemination of knowledge about the pathogenesis and appropriate management of obesity and obesity disease—efforts that also contribute to elimination of obesity stigma—are key responsibilities of academic organizations engaged in obesity research. Given the wide array of health issues linked to obesity, a broad-ranging collaboration is crucial. In 2018, JASSO, together with 23 other Japanese academic societies, issued the Kobe Declaration, pledging to collaborate broadly on academic and social initiatives addressing obesity [34]. Since then, and within this framework, JASSO has been conducting activities to promote understanding of the concept of and appropriate treatment for obesity disease. These activities will also contribute to enhancement of QOL for individuals dealing with obesity or obesity disease.

Summary and Conclusion

We have here described the diagnostic criteria and core concepts for the treatment of obesity disease based on the guidelines of JASSO. The relation between



Fig. 6 Aims of obesity treatment and goals pursued by JASSO. The ultimate goals in treatment of obesity disease, as in that of other conditions, are to prevent early death, promote a healthy life expectancy, and preserve quality of life. Achievement of these goals requires more than just a medical approach. It is thus also important to address societal perspectives, especially in resolving the stigma associated with obesity. Providing the public with accurate information about obesity and obesity disease can contribute substantially to dispelling such stigma. Furthermore, prevention of obesity and obesity disease requires wide-ranging and visionary approaches, encompassing collaboration with health professionals from various fields and the government.

obesity and health disorders varies according to ethnicity, likely as a result of many factors including genetic, geographical, and societal influences. It is therefore rational that the diagnostic criteria and treatment for obesity also vary depending on ethnicity. This concept is becoming more widely recognized among practitioners and researchers who specialize in obesity treatment, but not as much among those with other specialties. Given the diversity of health disorders caused by or associated with obesity, professionals in various medical fields should be aware of the ethnicity-dependent differences in the connection between obesity and its related health disorders.

Acknowledgments

We thank all the authors of Guidelines for the Management of Obesity Disease 2022 as well as Hitoshi Nishizawa for assistance with writing the draft of this paper.

Disclosure

Wataru Ogawa has received the following remuneration and financial assistance: lecture fees from Abbott Japan LLC., Nippon Boehringer Ingelheim Co., Ltd., Sumitomo Pharma Co., Ltd., and Novo Nordisk Pharma Ltd.; research expenses (including those for contracted research, joint research, and clinical trials) and grants

from Abbott Diabetes Care UK Ltd., Eli Lilly Japan K.K., Nippon Boehringer Ingelheim Co., Ltd., Noster Inc., Teijin Pharma Ltd., and Sumitomo Pharma Co., Ltd.; scholarship donations from Kowa Company, Ltd., Novo Nordisk Pharma Ltd., Sumitomo Pharma Co., Ltd., Teijin Pharma Ltd. and Takeda Pharmaceutical Co. Ltd. Yushi Hirota received the following remuneration and financial assistance: lecture fees from Eli Lilly Japan K.K. Sanofi, Terumo Corp., Sumitomo Pharma Co., Ltd., and Abbott Japan LLC.; research support from Sumitomo Pharma Co., Ltd., Kyowa Kirin Co., Ltd. and Medtronic Japan Co., Ltd. Shigeru Miyazaki received the following remuneration: lecture fees from Novo Nordisk Pharma Ltd. Yoshihiro Ogawa has received the following remuneration and financial assistance: lecture fees from Daiichi Sankyo Co., Ltd.; scholarship donations from Medical Corporation Saisei Mirai, and Federation of National Public Employees Mutual Aid Associations Sasebo Kyosai hospital. Ichiro Shimomura has received the following remuneration and financial assistance: lecture fees from Ono Pharmaceutical Co., Kowa Company, Ltd., Sumitomo Pharma Co., Eli Lilly Japan K.K., and Novo Nordisk Pharma Ltd.; research expenses (including those for contracted research, joint research, and clinical trials) and grants from Japan Agency for Medical Research and Development (AMED), Cancerscan Inc., Kubarathonke Co. Ltd., Kowa Company, Ltd., Kobayashi Pharmaceutical Co. Ltd., and

Rohto Pharmaceutical Co. Ltd.; scholarship donations from Kowa Company, Ltd., Daiichi Sankyo Co., Sumitomo Pharma Co., Takeda Pharma K.K., Mitsubishi Tanabe Pharma Co., Teijin Pharma, Novo Nordisk Pharma Ltd., Mochida Pharmaceutical Co., Suzuken Memorial Foundation, Manpei Suzuki Diabetes Foundation, Midori Health Care Center, McSYL, and Hakuhokai Central Hospital. Toshimasa Yamauchi has received the following remuneration and financial assistance: lecture fees from Ono Pharmaceutical Co., Takeda Pharma K.K., MSD, Sumitomo Pharma Co., Teijin Healthcare Ltd, Nippon Boehringer Ingelheim Co., Ltd., Novo Nordisk Pharma Ltd.; research expenses (including those for contracted research, joint research, and clinical trials) and grants from Kowa Company, Ltd., Minophagen Co., Nipro Co.; scholarship donations from Novo Nordisk Pharma Ltd., Mitsubishi Tanabe Pharma Co., Kyowa Kirin Co., Ltd., Takeda Pharma K.K., Ono Pharmaceutical Co., Sumitomo Dainippon Pharma Co., Ltd.; chairs courses endowed by Ono Pharmaceutical Co., Mitsubishi Tanabe Pharma Co., Novo Nordisk

Pharma Ltd., Nippon Boehringer Ingelheim Co., Ltd., Kowa Company, Ltd., Nitto Boseki Co., Ltd. and Asahi Mutual Insurance Co. Koutaro Yokote has received the following remuneration and financial assistance: lecture fees from Astellas Pharma Inc., AstraZeneca, Daiichi Sankyo Co., Eli Lilly Japan K.K., Jansen Pharma K.K., Kowa Company, Ltd., Mitsubishi Tanabe Pharma Co., MSD, Ono Pharmaceutical Co., Sumitomo Pharma Co., Takeda Pharma K.K., Nippon Boehringer Ingelheim Co., Ltd., Novartis Pharma K.K., Novo Nordisk Pharma Ltd., Sanofi and Taisho Pharma Co., Ltd.; research expenses (including those for contracted research, joint research, and clinical trials) and grants from Taisho Pharma Co., Ltd.; scholarship donations from Astellas Pharma Inc., Bayer Yakuhin Ltd., Daiichi Sankyo Co., Kowa Company, Ltd., Mitsubishi Tanabe Pharma Co., MSD, Nippon Boehringer Ingelheim Co., Ltd., Novo Nordisk Pharma Ltd., Ono Pharmaceutical Co., Shionogi Pharma Co., Ltd., Sumitomo Pharma Co., Taisho Co., Ltd., Takeda Pharma K.K., and Teijin Pharma. All remaining authors declare no conflict of interest.

References

- Matsuzawa Y, Inoue S, Ikeda Y, Sakata T, Saito Y, *et al.* (2000) Atarashii himan no hantei to himanshou no shindan kijun (New diagnostic criteria for obesity and obesity disease). *Journal of Japan Society for the Study of Obesity* 6: 18–28 (In Japanese).
- Examination Committee of Criteria for ‘Obesity Disease’ in Japan; Japan Society for the Study of Obesity (2002) New criteria for ‘obesity disease’ in Japan. *Circ J* 66: 987–992.
- Committee for Guidelines for the Treatment of Obesity Disease 2006 by Japan Society for the Study of Obesity (2006) Himanshou Chiryuu Gaidorain 2006 (Guidelines for the treatment of Obesity Disease 2006). *Journal of Japan Society for the Study of Obesity* 12 (Extra Edition): 1–91 (In Japanese).
- Japan Society for the Study of Obesity (2016) Guidelines for the management of obesity disease 2016. Life Science Publishing Company, Tokyo, Japan (In Japanese).
- Japan Society for the Study of Obesity (2022) Guidelines for the Management of Obesity Disease 2022. Life Science Publishing Company, Tokyo, Japan (In Japanese).
- World Health Organization (ed) (1998) Obesity: preventing and managing the global epidemic. Report of a WHO consultation on Obesity, Geneva 3–5 June 1997. World Health Organization, Geneva, Switzerland.
- Kodama K, Tojjar D, Yamada S, Toda K, Patel CJ, *et al.* (2013) Ethnic differences in the relationship between insulin sensitivity and insulin response: a systematic review and meta-analysis. *Diabetes Care* 36: 1789–1796.
- Shai I, Jiang R, Manson JE, Stampfer MJ, Willett WC, *et al.* (2006) Ethnicity, Obesity, and Risk of Type 2 Diabetes in Women. A 20-year follow-up study. *Diabetes Care* 29: 1585–1590.
- Huxley R, James WP, Barzi F, Patel JV, Lear SA, *et al.* (2008) Ethnic comparisons of the cross-sectional relationships between measures of body size with diabetes and hypertension. *Obes Rev* 9 Suppl 1: 53–61.
- Chiu M, Austin PC, Manuel DG, Shah BR, Tu JV (2011) Deriving ethnic-specific BMI cutoff points for assessing diabetes risk. *Diabetes Care* 34: 1741–1748.
- Azuma K, Kadowaki T, Cetinel C, Kadota A, El-Saed A, *et al.* (2009) Higher liver fat content among Japanese in Japan compared with non-Hispanic whites in the United States. *Metabolism* 58: 1200–1207.
- NCD Risk Factor Collaboration (NCD-RisC) (2017) Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. *Lancet* 390: 2627–2642.
- OECD (2017) Overweight and obesity among adults. In: Health at a Glance 2017. OECD Indicators, OECD Publishing, Paris, France. https://doi.org/10.1787/health_glance-2017-en accessed on August 12, 2023.
- (2020) Ministry of Health, Labour and Welfare. National Health and Nutrition Survey Japan 2020. https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryuu/kenkou/eiyuu/r1-houkoku_00002.html accessed on August 12, 2023 (In Japanese).
- González-Muniesa P, Martínez-González MA, Hu FB,

- Després JP, Matsuzawa Y *et al.* (2017) Obesity. *Nat Rev Dis Primers* 3: 17034.
16. Neeland IJ, Ross R, Després JP, Matsuzawa Y, Yamashita S, *et al.* (2019) Visceral and ectopic fat, atherosclerosis, and cardiometabolic disease: a position statement. *Lancet Diabetes Endocrinol* 7: 715–725.
 17. Ross R, Neeland IJ, Yamashita S, Shai I, Seidell J, *et al.* (2020) Waist circumference as a vital sign in clinical practice: a Consensus Statement from the IAS and ICCR Working Group on Visceral Obesity. *Nat Rev Endocrinol* 16: 177–189.
 18. WHO expert consultation (2004) Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet* 363: 157–163.
 19. Ryo M, Kishida K, Nakamura T, Funahashi T, Shimomura I (2014) Short-term intervention reduces bioelectrical impedance analysis-measured visceral fat in type 2 diabetes mellitus. *Diabetes Res Clin Pract* 103: e27–e29.
 20. Chaston TB, Dixon JB (2008) Factors associated with percent change in visceral *versus* subcutaneous abdominal fat during weight loss: findings from a systematic review. *Int J Obes (Lond)* 32: 619–628.
 21. Okauchi Y, Nishizawa H, Funahashi T, Ogawa T, Noguchi M, *et al.* (2007) Reduction of visceral fat is associated with decrease in the number of metabolic risk factors in Japanese men. *Diabetes Care* 30: 2392–2394.
 22. Ryo M, Nakamura T, Funahashi T, Noguchi M, Kishida K, *et al.* (2011) Health education “Hokenshido” program reduced metabolic syndrome in the Amagasaki visceral fat study. Three-year follow-up study of 3,174 Japanese employees. *Intern Med* 50: 1643–1648.
 23. Fujioka S, Matsuzawa Y, Tokunaga K, Tarui S (1987) Contribution of intra-abdominal fat accumulation to the impairment of glucose and lipid metabolism in human obesity. *Metabolism* 36: 54–59.
 24. Hiuge-Shimizu A, Kishida K, Funahashi T, Ishizaka Y, Oka R, *et al.* (2012) Absolute value of visceral fat area measured on computed tomography scans and obesity-related cardiovascular risk factors in large-scale Japanese general population (the VACATION-J study). *Ann Med* 44: 82–92.
 25. Katsuki A, Sumida Y, Urakawa H, Gabazza EC, Murashima S, *et al.* (2003) Increased visceral fat and serum levels of triglyceride are associated with insulin resistance in Japanese metabolically obese, normal weight subjects with normal glucose tolerance. *Diabetes Care* 26: 2341–2344.
 26. Nazare JA, Smith JD, Borel AL, Haffner SM, Balkau B, *et al.* (2012) Ethnic influences on the relations between abdominal subcutaneous and visceral adiposity, liver fat, and cardiometabolic risk profile: the International Study of Prediction of Intra-Abdominal Adiposity and Its Relationship With Cardiometabolic Risk/Intra-Abdominal Adiposity. *Am J Clin Nutr* 96: 714–726.
 27. Kadowaki T, Sekikawa A, Murata K, Maegawa H, Takamiya T, *et al.* (2006) Japanese men have larger areas of visceral adipose tissue than Caucasian men in the same levels of waist circumference in a population-based study. *Int J Obes (Lond)* 30: 1163–1165.
 28. Committee to Evaluate Diagnostic Standards for Metabolic Syndrome (2005) Definition and the diagnostic standard for metabolic syndrome. *Nihon Naika Gakkai Zasshi* 94: 188–203 (In Japanese).
 29. Muramoto A, Matsushita M, Kato A, Yamamoto N, Koike G, *et al.* (2014) Three percent weight reduction is the minimum requirement to improve health hazards in obese and overweight people in Japan. *Obes Res Clin Pract* 8: e466–e475.
 30. Barrett S, Begg S, O’Halloran P, Kingsley M (2018) Integrated motivational interviewing and cognitive behaviour therapy for lifestyle mediators of overweight and obesity in community-dwelling adults: a systematic review and meta-analyses. *BMC Public Health* 18: 1160.
 31. Cabinet Office (2021) Annual Report on the Aging Society: Summary FY2021. <https://www8.cao.go.jp/kourei/english/annualreport/2021/pdf/2021.pdf> accessed on October 3, 2023.
 32. Ahmadi SF, Streja E, Zahmatkesh G, Streja D, Kashyap M, *et al.* (2015) Reverse epidemiology of traditional cardiovascular risk factors in the geriatric population. *J Am Med Dir Assoc* 16: 933–939.
 33. Dramé M, Godaert L (2023) The obesity paradox and mortality in older adults: a systematic review. *Nutrients* 15: 1780.
 34. Japan Society for the Study of Obesity, along with 23 other Japanese academic societies (2018) the Kobe declaration 2018. <http://www.jasso.or.jp/data/data/pdf/kobe2018.pdf> accessed on August 12, 2023 (In Japanese).