https://doi.org/10.46389/rjd-2021-1067
www.rjdnmd.org

Rom J Diabetes Nutr Metab Dis
2021; volume 28, issue 4, pages 337–342

Editorial

Risk of obesity (RO) score – a new proposal for obesity staging

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Received: 11 October 2021 / Accepted: 23 November 2021

Abstract

Obesity is a multisystem chronic disease which has reached epidemic/pandemic proportions worldwide and poses serious medical and societal challenges. Very soon after the COVID-19 outbreak in March 2020, it became clear that obesity is one of the main risk factors for severe forms of SARS-CoV-2 infections and for mortality due to COVID. The collision of the two pandemics – obesity and COVID-19, created the opportunity to revisit the national, regional, and global plans to tackle obesity and was a powerful driver for various organizations to shed a stronger light on obesity problem. On the other hand, experts in the field of obesity raised the idea that in order to reduce the burden of adiposity-related comorbidities, there is a need for a better alignment between staging systems taking into account the presence and severity of comorbidities and weight loss treatment guidelines which still use body mass index (BMI) thresholds to recommend strategies choice. In line with these recommendations, we propose a new obesity staging system, the risk of obesity (RO) score, based on three criteria: anthropometric, the burden of diseases and cardiovascular risk. Its utility in clinical practice will be further tested.

Keywords: obesity, obesity-related comorbidities, pre-obesity, obesity staging.

Obesity – an epidemiological, medical and societal challenge

Obesity is a multisystem chronic disease that has reached epidemic/pandemic proportions worldwide. Since 1980, in more than 70 countries the obesity rates have doubled and continuously increased in most other countries. Globally, in 2015 107.7 million children and 603.7 million adults were suffering from obesity [1]. In the European Union (EU), the estimated prevalence of pre-obesity and obesity reached 59% in adults, and of obesity 23% [2]. In Romania, the estimated prevalence of overweight is 31.1% and of obesity is 21.3% according to data from the study Obesity in Romania (ORO) which included a representative sample of the adult population. The prevalence of obesity is 9.9% in the 18–39 age group, 30.1% in the 40–59 age group, 41.6% in the 60–79 age group and decreases to 24.1% in the ≥80 age group. Obesity is more common in men (23.0% vs. 20.3% in women) and in rural areas (25.7% vs. 19.7% in urban areas). The highest prevalence rates of obesity are recorded in Moldova and Muntenia-Oltenia (23.8% and 21.3%, respectively) [3].

The consequences of excess body weight are well-recognized. Obesity-associated comorbidities can be categorized into cardiometabolic – insulin resistance and type 2 diabetes, dyslipidemia, hypertension, cardiovascular and cerebrovascular diseases, nonalcoholic fatty liver disease/nonalcoholic steatohepatitis, infertility;

mechanical – obstructive sleep apnea, gastroesophageal reflux, osteoarthritis; malignancy and mental health issues, which are major contributors to premature mortality and lower quality of life and life expectancy in people with obesity [1, 4, 5].

Moreover, pre-obesity/overweight and obesity fuel social inequalities at all ages. Children with obesity have lower school performances and are less likely to access higher education, show lower life satisfaction and are up to three times more likely to be bullied. At adult age, individuals with overweight/obesity and associated chronic diseases have lower access to being employed or, if employed, are more likely to be absent or less productive. In the EU28, it is also shown that citizens in the lowest income group are more likely to be obese compared to those on the highest incomes, entrenching inequality [2].

Another major concern for governments and societies is obesity costs. In 2016, it was estimated that in the EU the total yearly cost of adult obesity was 70 billion Euro, which included direct healthcare costs and lost productivity and about 7% of the national budget are spent every year on treating diseases associated with obesity [5].

Since the COVID-19 outbreak in March 2020, enormous pressure was put on healthcare and political systems which had to develop a rapid and complex reaction not only regarding the provision of medical care but also with respect to the organization of support from non-medical sources, legislation, or citizens' rights and duties [6]. Very soon, it became clear that obesity is one of the main risk factors for severe forms of SARS-CoV-2 infections and for mortality due to COVID [7]. The collision of the two pandemics – obesity and COVID-19, created the opportunity to revisit the national, regional, and global plans to tackle obesity and was a powerful driver for various organizations to shed a stronger light on the obesity problem.

On World Obesity Day Europe, 4 March 2021, the European Commission (EC) published a dedicated brief on primary prevention of obesity in which obesity was recognized as "*a chronic relapsing disease, which in turn acts as a gateway to a range of other non-communicable diseases, such as diabetes, cardiovascular diseases and cancer.*" The policy EC recommendations on the prevention of pre-obesity and obesity include national guidelines for nutrition and physical activity, food and menu labeling, public awareness campaigns, and mobile apps to help people make healthier lifestyle choices [5].

On August 17, 2021, World Health Organization (WHO) also issued a document called WHO *Discussion Paper: Draft recommendations for the prevention and management of obesity over the life course, including potential targets* which encourage countries to develop comprehensive plans for obesity prevention and for providing a continuum of care through integrated health services including diagnosis, treatment, rehabilitation, and management.

Weight loss and maintenance are associated with prevention or control of comorbidities, the better quality of life and less premature mortality in people with obesity. The three main pillars in successful weight management are lifestyle and behavior interventions, anti-obesity medication, and metabolic surgery. Weight loss programs using diet and exercise, produce a weight loss of 5–7% on average, and pharmacotherapy adds another 5% weight loss to lifestyle interventions. Four anti-obesity drugs are currently approved for use in Europe [8]: liraglutide 3 mg, a glucagon-like peptide 1 analog (GLP-1); orlistat, a selective inhibitor of pancreatic lipase; the combination of bupropion, a nonselective inhibitor of dopamine and norepinephrine transporters and naltrexone is an opioid receptor antagonist; and setmelanotide, a melanocortid-4 receptor agonist with an indication in genetic forms of obesity (pro-opiomelanocortin [POMC] deficiency or leptin receptor [LEPR] deficiency). Semaglutide 2.4 mg, a weekly GLP-1 analog, has recently received a positive opinion from the European Medicine Agency and a market authorization from the EC is pending. The mean weight loss obtained using these drugs is 5.4, 3.8, 4.8, 12.5–25, and 12.4% of initial weight for liraglutide,

https://doi.org/10.46389/rjd-2021-1067

orlistat, bupropion/naltrexone, setmelanotide, and semaglutide, respectively.

The most effective treatments for achieving weight loss are bariatric interventions. The achieved weight loss depends on the procedure type: by-pass procedures 14–20 units of the basal metabolic index (BMI) lost, a gastric band with 8–12 units, and gastric sleeve 10–18 units. Additionally, comorbidities are dramatically influenced post-metabolic surgery (e.g. remission of diabetes and/or hypertension, obstructive sleep apnea, decrease in cardiovascular events, and mortality) [8, 9].

Current international and European guidelines recommend the use of lifestyle, drugs, and surgery according to BMI and waist circumference and presence of comorbidities, with pharmacotherapy being recommended for BMI≥30 kg/m^2 or ≥27 kg/m^2 with comorbidities and surgery if BMI is > 40 kg/m^2 or > 35 kg/m^2 with comorbidities, or if BMI >30 kg/m^2 with type 2 diabetes on an individual basis [8]. Nevertheless, experts in the field of obesity raised the idea that in order to reduce the burden of adiposity-related comorbidities, there is a need for a better alignment between staging systems taking into account the presence and severity of comorbidities and weight loss treatment guidelines which still use BMI thresholds to recommend strategies choice [4, 10]. A proposed staging system to be used with this scope is Edmonton Obesity Staging System (EOSS) which incorporates the presence of risk factors/comorbidities, and levels of physical symptoms, functional limitations, and well-being [11].

Risk of obesity (RO) score – a new proposal for obesity staging

In agreement with the idea that obesity care should be better tailored to the risk of obesity and that access to medication and metabolic surgery should be made available with lower or no personal costs for high-risk categories of persons with obesity, we propose here a new obesity staging based on three criteria: A (Anthropometric), B (Burden of disease, based on EOSS staging) and C (Cardiovascular risk, according to the European Society of Cardiology (ESC) levels of cardiovascular risk). For each criterion, a score of 1–3 or >3 will be attributed, and the final score will be the sum of the three subscores (Figure 1).

Antropometric criteria (**A**) (BMI: kg/m^2; waist: cm) Female/Male	**B**urden of disease- EOSS (**B**)	**C**ardiovascular criteria (**C**) (ESC: 2021)
30 – 34,9 + waist ≥ 88 /102 **1 point**	Stage 1 **1 point**	Moderate CV risk **1 point**
35 – 39,9 **2 points**	Stage 2 **2 points**	High CV risk **2 points**
≥ 40 **3 points**	Stages 3 and 4 **3 points** or **> 3 points if additional risks***	Very high CV risk **3 points**

*see comments on additional risks in text

RO risk stratification:
Low: < 3 points
Moderate: 3 – 5 points
Severe: 6 – 9 points
Very severe: >9 points

Figure 1: RO score.
EOSS=Edmonton Obesity Staging System; CV=cardiovascular; ESC=European Society of Cardiology.

Comments on the application of RO score

1. The ABC system staging provides an indicative method for calculating the risk of obesity. It must be supplemented by clinical and biological markers or risk-enhancing diseases. These are:
   - Family history: the presence of adiposity in the family (grade 1 relatives)
   - Personal history: 1. the onset of obesity in childhood adolescence; 2. Repeated weight loss with repeated relapses; 3. Use of drugs: insulin, sulfonylurea, tiazolindiones, psychotropic drugs; 4. diabetes (especially type 2) and the severity of diabetes complications
   - Eating disorders: night eating, binge eating, bulimia, chronic overeating
   - Severity of insulin resistance correlated with polycystic ovary syndrome, non-alcoholic steatohepatitis and metabolic syndrome.
   - Severity of sleep apnea syndrome and respiratory failure
   - Severe mobility disorders (osteo-articular and/or muscular disorders)
   - Professions that prevent from performing healthy lifestyle
   - Low economic status

   In this sense, we specify that the presence of multiple and severe comorbidities increases the score from the criteria B to> 3 (unquantifiable?!) resulting in an aggravation of the RO score.
2. Pre-obesity was not included in the anthropometric criteria in the RO score. Based on clinical judgment and the presence of criteria in the other two categories, RO score can be also applied for patients with pre-obesity and central adiposity.

To facilitate the use of RO score, in Table 1 we present a brief version of EOSS [10] and in Table 2 the summary of recommendations for cardiovascular risk categories in individuals with comorbidities and in apparently-healthy individuals according to the 2021 ESC Guidelines for Cardiovascular Prevention [11].

To be incorporated in clinical practice, the RO score will be tested in a pilot study to prove scientific validity and its possible role in the orientation of specific strategies for weight loss and for reducing the burden of obesity-related comorbidities. It will be included as the main instrument of obesity risk staging in the upcoming set of recommendations for the care of persons with obesity in Romania [*Hâncu N. Poiană C, Bala C, Roman G, on behalf of the Romanian Federation of Diabetes, Nutrition and Metabolic Diseases and the Romanian Society of Endocrinology. Recommendations for the comprehensive care of adults with obesity in Romania, under publishing*].

Table 1: Edmonton obesity staging system [adapted from ref.10].

Stage	Description
1	Presence of obesity-related subclinical risk factors (e.g., borderline hypertension, impaired fasting glucose, elevated liver enzymes, etc.), mild physical symptoms/psychopathology/ functional limitations and/or mild impairment of well-being
2	Presence of established obesity-related chronic disease (e.g., hypertension, type 2 diabetes, sleep apnea, osteoarthritis, etc.), moderate limitations in activities of daily living and/or well-being
3	Established end-organ damage such as myocardial infarction, heart failure, diabetic complications, incapacitating osteoarthritis, significant psychopathology, significant functional limitations and/or impairment of well-being
4	Severe (potentially end-stage) disabilities from obesity-related chronic diseases, severe disabling psychopathology, severe functional limitations and/or severe impairment of well-being

https://doi.org/10.46389/rjd-2021-1067

Table 2: Cardiovascular risk categories according to the 2021 ESC Guidelines for Cardiovascular Prevention [adapted from ref. 11].

Patients with comorbidities.

Risk category	Description
Very high	• Patients with established ASCVD • Patients with DM with established ASCVD and/or severe TOD • Severe CKD
High	• Patients with DM without ASCVD and/or severe TOD, not fulfilling moderate risk criteria • Moderate CKD • Familial hypercholesterolemia associated with markedly elevated cholesterol levels
Moderate	• Patients with well controlled short-standing DM (e.g. <10 years), no evidence of TOD and no additional ASCVD risk factors

ASCVD = atherosclerotic cardiovascular disease; TOD=target-organ damage; CKD = chronic kidney disease; DM = diabetes mellitus.

Apparently healthy people (without established ASCVD, diabetes mellitus, CKD, familial hypercholesterolemia).

	<50 years	50–69 years	≥70 years
Very high (%)	≥7.5	≥10	≥15
High (%)	2.5–<7.5	5–<10	7.5–<15
Low-to-moderate (%)	<2.5	<5	<7.5

According to Systematic Coronary Risk Estimation (SCORE) 2 and Systematic Coronary Risk Estimation 2-Older Persons (SCORE 2-OP) risk charts for 10-years risk for fatal and non-fatal (myocardial infarction, stroke) cardiovascular disease available at https://u-prevent.com/calculators/score2 and https://u-prevent.com/calculators/score2OP

Conclusions

Obesity is a chronic, multi-systemic and frequently relapsing disease with severe consequences on the increasing burden of other non-communicable diseases and high economic and societal costs. This new staging of obesity risk – RO score is sought to add insights into an individualized approach to obesity management.

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https://doi.org/10.46389/rjd-2021-1067