

# Preventive measures for obesity pandemic during COVID-19 quarantine; choosing the right diet

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## Abstract

Until recently, obesity was one of the greatest public health issues. At the moment, the world is counting deaths from COVID-19, and raging obesity pandemic is not in the focus. While the quarantine is the mainstay of COVID-19 prevention, it also opposes obesity prevention. Obesity is a risk factor for severe COVID-19 infection. Treatment of obesity during quarantine is challenging; trying to lose weight without the opportunity for outdoor activity or access to fresh and healthy foods may lead to frustration, depression and overeating. Therefore, we propose that patients should focus on preventing new weight gain instead of losing weight. It can be achieved by practicing indoor physical exercise together with adequate diet. The diet should be opposite from, "Western diet pattern" and include foods easily obtainable during quarantine; with longer shelf life, but also rich in anti-inflammatory and immune-modulatory bioactive compounds. These characteristics of the diet make it simple to implement during quarantine, it helps in the process maintaining weight and supports immune system-all what is required to possibly reduce the risk of severe COVID-19 infection. The anti-inflammatory properties from given diet have beneficial role, especially in obese patients, as they have low grade chronic inflammation which additionally may worsen clinical course of COVID-19 infection.

**Keywords:** Obesity; COVID-19; Pandemic; Quarantine; Anti-Inflammatory diet

## Introduction

Prior to the COVID-19 outbreak, obesity was one of the greatest public health issues.<sup>1</sup> Obesity is associated with cardiovascular diseases, diabetes type 2, metabolic syndrome and cancer.<sup>1,2</sup> Currently, the world is counting deaths from COVID-19, removing the focus from obesity. However, is COVID-19 pandemic more important than the obesity pandemic?

While COVID-19 fatality is well-known, deaths arising from obesity. Overweight and obesity are the fifth leading risks of death globally, with at least 2.8 million adults dying each year as a result of being obese.<sup>2</sup> In the last year since its appearance, there have been 1.2 million deaths attributable to COVID-19 (updated on November the 1st, 2020).<sup>3</sup> What happened with obesity treatment during COVID-19 pandemic? Studies have shown increase in unhealthy, high calorie food consumption, as well as reduced physical activity

among all age groups.<sup>4,5</sup> Obesity incidence is rising and obese people are at risk for severe COVID-19 infection.<sup>6,7</sup>

## Severe covid-19 infection associated with obesity

So far, it became clear that obesity is a risk factor for severe COVID-19 infection. Several studies indicated that great proportion of patients with severe COVID-19 infection was overweight and obese and that obese patients were more likely to be admitted to intensive care unit. Some metaanalyses even reported about mortality from COVID-19 among overweight: 21.6% in a population with BMI>25 kg/m<sup>2</sup> and 7.1% among patients with BMI<25 kg/m<sup>2</sup>.<sup>7-11</sup>

The pathogenesis of the fatal connection between COVID-19 and obesity arises from several mechanisms. One of them is obstructive pulmonary pattern with impaired ventilation which is presented in obese. Moreover obesity is a state of chronic low grade inflammation; there is an abnormal secretion of adipokines and cytokines, with increased leptin, IL-6, and TNF- $\alpha$  (pro-inflammatory) and decreased adiponectin (anti-inflammatory). There is an attenuated adaptive immune response to infection with weakened reaction of T and B cells. All these immunological perturbations adversely affect the host defence from the virus.<sup>12,13</sup>

## Why is quarantine worsening obesity?

The quarantine is the mainstay of COVID-19 prevention but it is not the method for obesity prevention as it significantly reduces opportunities for physical activity, enhances the sedentary lifestyle, snacking and eating ultra-processed foods.<sup>4,6,14</sup> It also brings social distancing that easily leads to depression which in turn shifts people into comfort habits and into high calorie, "comfort foods" and overeating.<sup>5,15</sup>

This shift to unhealthy foods in the times of quarantine contributes to the neglected spreading of obesity pandemic.<sup>14</sup> Moreover, food plays an important role in health and immunity and should not be used for comfort or for boredom as it mostly is when we are confined to our homes.<sup>4,14,15</sup>

Most of the western world live by the so called "Western diet pattern" which is rich in saturated fat, animal proteins, free sugars, refined carbohydrates, processed foods and it is low in unsaturated fatty acids, dietary fibres, micronutrients and fresh fruits and vegetables. This type of diet is pro-inflammatory, it weakens our immunity and response to the infections, it contributes to the development of many chronic diseases and is associated with difficulties losing weight.<sup>16,17</sup>

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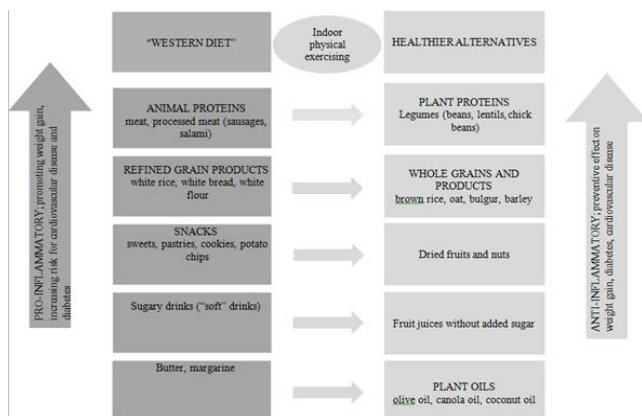
# Mini Review

## Treatment of obesity during quarantine-preventing weight gain

It is well known that the fundamental approach to treating obesity is a lifestyle change.<sup>18</sup> However, guidelines for the treatment of obesity are not applicable during quarantine; outdoor aerobic activity is not advised and recommended healthy (mostly Mediterranean) diet is quite unreachable as fresh fruits, vegetables and fish are hard to obtain during quarantine.<sup>4,14</sup> So how to approach treating obesity in these new times when two main resources (diet and activity) are out of reach?

Trying to lose weight without the opportunity for outdoor activity or access to adequate foods may lead to frustration, depression and overeating.<sup>4,5,14</sup> So the first step is to accept that during circumstances of quarantine patients do not have to force themselves to lose weight; preventing new weight gain should be the goal. Maintaining weight may be achieved through replacement of “western diet pattern” with healthier alternatives (Figure 1). In addition, indoor workout also plays a role.<sup>4,5</sup>

**Figure 1:** Choosing the right diet: “western diet” vs. anti-inflammatory diet.



We propose a diet that includes foods easily obtainable during quarantine, with longer shelf life but also rich in anti-inflammatory and immune-modulatory bioactive compounds (vitamins, minerals, phytosterols, and polyphenols). This kind of diet supports immune system and it is associated with prevention of obesity.<sup>19,20</sup> Special accent is on foods rich in antioxidants as these have anti-inflammatory properties that oppose to chronic low grade inflammation present in obesity (Figure 1).<sup>21</sup>

Foods rich in antioxidants such as fruits, vegetables, legumes, nuts, seeds, vegetable oils and whole grains, are at the same time valuable ingredients for prevention of obesity.<sup>19,22</sup> Yet, one of the problems during quarantine is obtaining fresh fruits and vegetables, so we suggest juices and dried fruits instead. The antioxidant capacity of juice has similar values to those of the whole fruit. Also juices contain plenty of vitamins A, C, folate and potassium (Ta-

ble 1).<sup>22</sup>

Dried fruits are another way to include more fruit in the diet since the processing doesn't affect too much the content of health promoting phytochemicals. Recent studies have shown that dried fruits have low to moderate glycaemic index, compared to fresh fruit. Dried fruits contain many bioactive compounds (phenolic acids, flavonoids, phytoestrogens, and carotenoids) which have strong antioxidant activity (Table 1).<sup>22,23</sup>

**Table 1:** The anti-inflammatory diet and its bioactive compounds

Food	Anti-Inflammatory and Bioactive Compounds
Fruit juices	Vitamins A and C, folate, potassium
Dried fruits	Phenolic acids, flavonoids, phytoestrogens, carotenoids
Nuts	MUFA, PUFA, tocopherols, phytosterols, carotenoids, phenolic compounds, copper, iron, zinc, selenium, thiamine, riboflavin and pyridoxine
Legumes	PUFA, polyphenols, folate, zinc, calcium
Whole grains	Polyphenols, carotenoids, zinc, selenium, copper, iron, B vitamins, vitamin E
Extra virgin olive oil	MUFA, PUFA, phytosterols, polyphenols, pigments, tocopherols

**Note:** MUFA=Monounsaturated fatty acids, PUFA=Polyunsaturated fatty acid

Furthermore, instead of eating unhealthy, calorie-dense and nutritionally poor snacks, we suggest nuts.<sup>16</sup> Nuts are an excellent source of quality fats (unsaturated fatty acids; monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA)).<sup>23,24</sup> They are rich in fat soluble bioactive compounds (tocopherols, phytosterols, carotenoids), but also contain valuable phenolic compounds (flavonoids, phenolic acids and tannins) as well as fibres, non-sodium minerals (i.e. copper, iron, zinc, selenium) and water soluble B vitamins (thiamine, riboflavin and pyridoxine).<sup>23</sup> Unsaturated fatty acids reduce pro-inflammatory cytokines and protect the cells from oxidative stress.<sup>21,24</sup> Polyphenols, phytosterols and plant pigments like carotenoids are not considered essential nutrients, but are proven to have strong anti-inflammatory impact and many beneficial health effects.<sup>15,22</sup> Minerals like zinc and selenium are one of the strongest antioxidants present in food (Table 1).<sup>20</sup> All these components are associated with decreased inflammation in the body and may have a role in prevention of many chronic diseases such as diabetes, cardiovascular diseases, Alzheimer and obesity.<sup>21,24</sup>

An adequate substitute for frequent consumption of meat and meat-processed products, are legumes which

combined with grains ensure a good balance of essential aminoacids. Legumes provide diet with complex carbohydrates (cellulose, hemicellulose and pectin), soluble fibres and resistant starch (which is not metabolized in the small intestine and reduces the amount of glucose released into the blood). They also contain essential vitamins, polyphenols (flavonoids, isoflavones and lignans) and cholesterol free proteins.<sup>21,22</sup> With the exception of soybeans and chickpeas, legumes generally contain only about 5% of energy as fat (which are predominantly essential fatty acids like linoleic acid,  $\alpha$ -linolenic acid, and also  $\omega$ -3 FA (PUFA)).<sup>21,22</sup> As far as micronutrients are concerned, legumes are a good source of folate, zinc and calcium (Table 1).<sup>22</sup> Considering the specified components of legumes, their consumption is associated with reduced cardiovascular risk, improved blood glucose control, and better weight management.<sup>15,21,22</sup>

A healthier alternative to refined grains (white bread, white pasta) are whole grains and their products.<sup>25,26</sup> Whole grains with their specific composition help increase satiety, reduce transit time and glycaemic response, and improve faecal bulking. The bran and germ contain numerous bioactive compounds with antioxidant activity, such as minerals, trace elements (Zn, Se, Cu and Fe), vitamins (B and E), carotenoids, polyphenols and alkylresorcinols.<sup>25,26</sup> Grains also have longer shelf life and large epidemiological studies have demonstrated that frequent consumption of whole grain cereals have a strong effect on prevention of obesity.<sup>25</sup>

Furthermore, instead of using butter or lard for food preparation (which are both rich in saturated fatty acids that are known to stimulate an inflammatory response in the body), we recommend using olive oil, or to be more specific extra virgin olive oil (EVOO). EVOO is rich in bioactive components: MUFA (especially oleic acid), PUFA (essential linoleic acid ( $\omega$ -6) and linolenic acid ( $\omega$ -3), phytosterols, polyphenols, pigments, tocopherols, squalene, triterpenic acids and dialcohols (Table 1).<sup>16,27</sup> Studies have shown that these bioactive compounds reduce the pro-inflammatory cytokines and increase anti-inflammatory cytokines in overweight and obese.<sup>15,28</sup> It also prevents the onset of cardiovascular diseases and may play a role in prevention of cancer.<sup>28</sup>

### Discussion

Nevertheless, exercise is inevitable in order to lose weight.<sup>18</sup> As it is not advisable to practice outdoor and leaving homes is only for health or alimentary purposes, we recommend indoor physical activity. Indoor aerobic activities as fast running, walking and cycling are not accessible for majority of people (as most do not have stationary bikes or treadmills) but there are other possibilities: video or app-guided exercising, workout with fitness ball and strength exercises.<sup>4,6</sup> People can use some basic things found at home as stairs for climbing or only a little bit of empty floor for dancing.<sup>6</sup> At the end it all comes to

one thing-motivation of an individual to reach the goal.

### Conclusion

Treatment of obesity during quarantine is challenging. The concept should be preventing new weight gain instead of losing weight. It could be achieved with adequate diet and indoor exercising. The diet should be opposite from fatty, salty and sugary "western diet" and rich in anti-inflammatory bioactive compounds. These anti-inflammatory properties have beneficial effect especially in obese patients who have chronic low grade inflammation which may adversely affect immune response to the virus. Taking into account the dynamics of all the pandemics in the history so far, the COVID-19 will eventually reach its end. Meanwhile, obesity pandemic is raging and the question is what are we attempting to confront it and are we ready for the consequences?

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### Conflicts of Interest

Gloria Leksic declares no conflict of interest. Irena Karas declares no conflict of interest. Zeljko Krznaric declares no conflict of interest. Maja Baretic declares no conflict of interest.

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### Authorship

G Leksic devised the main conceptual ideas and wrote the manuscript together with I Karas. Z Krznaric and M Baretic supervised and guided the concept and writing of the manuscript.

### Ethical Standards Disclosure

Not applicable to this manuscript

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