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Obesity and Anxiety in COVID-19 Disease: Possibilities of Prevention with Hygienic-Dietary Interventions

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Abstract

Purpose: Obesity, stress, poor adherence to dietary rules and lack of exercise during the necessary distancing measures to limit the spread adversely affect the course of COVID-19 disease, according to available medical literature. The purpose of our study is to detect how the above factors increase the severity of the disease and to suggest options for addressing this critical problem.

Methods: We conducted a bibliography review of 50 articles, from studies related to obesity, stress, nutrition and COVID-19 Disease in the Databases (PubMed, Embassy, MEDLINE and Cochrane) and we selected, finally, 17 articles that matched and harmonized with our research question.

Results: During lockdowns, Obesity and less disposition to perform physical exercise, increases vulnerability of COVID-19 patients, as produces and exacerbates anxiety, depression, panic attacks, post-traumatic stress, psychotic symptoms and suicidal ideations. The above findings are due in part to social determinants of human health status. The Mediterranean diet seems to outperform the Western diet but there is a need for more research. The recommendations that result from studies and benefit the patient with COVID-19 disease consist in the application of a hypo caloric diet that improves metabolic health and respiratory function with adequate intake of micronutrients and fiber, vitamins. Also necessary is the intake of trace elements such as Copper, Zinc which limits the reproduction of the virus and Omega-3 lipids. Moderate aerobic exercise is recommended, which decreases inflammatory cytokines and enhances the immunity response. Treating stress with relaxation techniques, behavioral psychotherapy and medication when needed is crucial.

Conclusion: Drastic measures are needed to regulate the weight of citizens, with hygienic and dietary measures, by strengthening the idea of exercise and systematic aerobic activity, which will be extremely beneficial for the prevention of COVID-19 and will benefit even more the most vulnerable groups-citizens with increased vulnerability due to multi-disease. Finally, it is necessary to preserve the mental health of citizens and to develop psychosocial interventions that will strengthen the mental and social health of the most vulnerable groups during the COVID-19 pandemic.

Keywords: Obesity • Stress • COVID-19 disease • Healthy-dietary misures

Introduction

Obesity, as presented in the international literature, is the main aggravating factor produced for COVID-19 disease. In the USA, 48% of hospitalized patients are obese, while in France 68% of patients with COVID-19 disease in ICU have a BMI>30. In a Systemic Review and Post-Analysis of Jun, Yang et al, it was found from an initial review of 180 articles (PubMed, Embassy, WOS, Cochrane) where the 9 articles were finally selected, that the heaviest COVID-19 disease is associated with a higher BMI than the milder disease of people with normal BMI (WMD=2.67, 95% CI (1.52-3.82)); Other ris factors related to the severity of COVID-19 disease are advanced age, MS2, Immunosuppression, Autoimmune Diseases, AH, Acute Coronary Syndromes.

In a retrospective study analyzing body mass index stratified by age in COVID-19 positive symptomatic patients, presented in major New York hospitals, patients with a BMI of ≥35 and age <60 years were 2.2 (95% CI, 1.7–2.9; P<0001) and respectively 3.6 (95% CI,

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2.5-5.3; P<0.001) are more likely to be hospitalized in intensive care units, compared to patients in the same age group (age <60 years) but with a BMI<35. The scale of the BMI of the population in this study appears to be representative of the USA, where 37% of residents have a BMI of >30. COVID-19 hospitalized in ICU, 47.6% had BMI>30 and 28.2% had BMI>35 . A total of 85 patients (68.6%), required mechanical ventilation and of these 85.7% were with BMI>35.

The biological mechanisms that characterize obesity and promote the development of its complications affect the severity of Covid-19 disease and these are, the chronic hyper-inflammatory reaction and manifestation of the cytokine storm, such as IL-6, IFN-c, TNF-a, in which the RAA axis is also stimulated and excess ATI is produced, phagocytes accumulate and acquired immunity is reduced. Intraendothelial damage coexists due to increased stiffness, chronic oxidative stress and no metabolism disorder, proathirogenic condition, vasoconstriction and thus permanent heart damage such as LV hypertrophy, OEM manifestation, AF, cardiomyopathy are installed. In addition, a prothrombotic environment is created by increasing prothrombotic agents and reducing antithrombotic components, over activation of platelets and enhancing leukocyte adhesion. ACE2 is also expressed more in the increased fat tissue of the obese, so that they have an increased number of fat cells expressing ACE2 receptors, which facilitates the binding of the virus pin proteins to ace-2 receptors. In the obese also, the action of NKs, CD8s and THE IFN response is reduced. Finally, fatty tissue produces IL-6 which in turn promote the cytokine storm, while the cellular immunity of B and T lymphocytes decreases leptin (pro-inflammatory adipocin) and decreases adiponectin (anti-inflammatory action).

Respiratory function is often deteriorated, with damage to gas exchange, lung functional capacity is impaired (ERV, FC and RSC reduction), airway resistance is increased, lung compensating mechanisms with reduced flexibility are weakened, which favors the increased need for interventional mechanical support in patients with critical COVID-19 disease. In the kidneys, obesity in a patient with SARS-CoV-2 virus causes dysfunction and reduction of foot cells, hypertrophy of the glomers, glomeration, proteinuria and ESRD, reduces EGFR and increases FF. The above changes give obese patients a "phenotype" of COVID-19 disease, characterized by Myocarditis and endothelitis, possible manifestation of VTE, SARS and ARDS Multi-Organic Deficiency. Obesity also disrupts a person's metabolic homeostasis, predisposes to the appearance of MS2, Insulin resistance, AH, Dyslipidemia, factors that also burden the outcome of COVID-19 disease, while increasing the risk of developing multiple chronic conditions such as XN and Cardiovascular disease, where apriori, make the person more vulnerable to complications of COVID-19.

And it is worth noting that political decisions to strengthen the means of preventing the spread of the virus in the community, such as distancing, lockdown and self-isolation, cause considerable socio-economic disruption and weaken the psychosocial health of the individual, which promotes chronic stress and modification of basic eating behaviors. Increased intake of saturated fats is observed, which alter energy homeostasis and worsen obesity and the metabolic disorders that follow.

Obesity increases the vulnerability (Frailty) of patients with COVID-19 disease, since it creates anxiety, depression, post-traumatic stress, panic attacks, psychotic symptoms, suicidal ideation and worsens pre-existing chronic mental illnesses, conditions that are nevertheless observed in non- obese people, during Lockdown. In addition, during Lockdown, physical exercise and mood are limited. This, increases weight more, reduces muscle strength and muscle mass, blunts immune response and lung function.

Methods

We conducted a bibliography review of 50 articles, from studies related to obesity, stress, nutrition and COVID-19 Disease in the Databases (PubMed, Embassy, MEDLINE and Cochrane) and we selected, finally, 17 articles that matched and harmonized with our research question [1-17].

Results

The above findings are due to a certain extent also to social determinants of the state of human health, such as the lack of knowledge about a still unknown disease and about the adoption of good health care attitudes, economic ramifications, dramatic changes in everyday life and labour standards, the impact of social networks and SMEs, where false news and untenable information are often disseminated. Ideas of insecurity about the health system and confusion in the feasibility of preventive measures a source of news that contradicts (masks), the imposition of new models of social relations, the fear and anxiety of the disease itself to maintain the health of the family, lack of sleep. There are also difficulties in accessing both often expensive healthy foods due to poverty, as well as in the provision of care by the National Health System as well as education deficits in relation to health promotion and disease prevention. Women are considered more vulnerable , the age groups from 21 to 40 years, while the educated, the poor, those with chronic co-morbidities and the inhabitants of less developed countries suffer the most.

With regard to proper nutrition and the ideal energy balance, the recommendations resulting from studies that benefit the patient with COVID-19 disease, consist of the application of a hypocaloric diet that improves metabolic health and respiratory function with adequate intake of micronutrients and fiber, vitamins such as vitamin D that reduces the risk of infection with infections, reduces pro-inflammatory cytokines , the proliferation of viruses and enhances immunity, vitamin C, which improves respiratory wheezing. Also necessary is the intake of trace elements such as copper, Zinc which restricts the reproduction of the virus and improves respiratory and gastrointestinal symptoms, the intake of Omega 3 lipids presenting antithrombotic, anti-inflammatory, antioxidant action and of course the avoidance of eating Saturated Fats (SFAs). Potentially the diet has a leading role in the physical condition and progression of the disease since it produces anti-inflammatory and immunoregulatory actions and ensures the integrity of the immune response.

The Western diet is characterized by increased intake of saturated and trans fats, which have lipotoxic effect and activate natural immunity, where through the activation of phagocytes, it causes the production of pro-inflammatory ingredients such as TNF-a, IL1 and

IL-6 etc. Also saturated fats, promote the entry of microphages, neutrophils and tree phagocytes into the pulmonary alveoli. In addition, acquired immunity and the function of B and T cells are suppressed and oxidative stress increases. This led to B cell apoptosis and reduces their immune response.

The Mediterranean diet seems to outweigh the Western diet but there is a need for more research. Ingredients with antithrombotic, antioxidant and anti- inflammatory actions are needed to stop the coronavirus. Finally, it is important that weight loss increases the effectiveness of vaccinations.

Individual cardiorespiratory fitness is improved by regular exercise, which reduces total mortality as well as mortality among the obese. Moderate aerobic exercise enhances immune response, reduces inflammatory cytokines, increases IL-10, increases adiponectin reduces leptin and increases insulin sensitivity, while intense exercise weakens immune response if endogenous cortisol release increases. In addition, fitness partially neutralizes the ACE-2 receptor in the cell membrane, weakens the ability to pair the virus's S protein with the ACE-2 receptor of cell membranes, and reduces the ATI, which is a pro-inflammatory and prothrombotic agent. Also the treatment of stress with relaxation techniques, behavioral psychotherapy and pharmaceutical intervention when needed are of key importance.

Conclusions

A reasonable purpose for tackling the disease pandemic and regulating its severity is to horizontally address the aggravating factors for the disease as well as to enhance the metabolic and mental health of the population to reduce morbidity and mortality as well as to control more effectively the proper management of global health resources and their fair redistribution as well as to avoid loss of life from severe COVID-19 disease.

Obesity is a critical aggravating factor for the dramatic progression of COVID-19 disease. The severity of the disease is proportional to the increase in BMI. Drastic measures are therefore needed to regulate the weight of citizens, with health- monitoring measures, by strengthening the idea of exercise and systematic aerobic activity, which will be extremely beneficial for the prevention of severe COVID-19 disease while further benefiting the most vulnerable groups of citizens with increased vulnerability due to multi-morbidity. Finally, it is necessary to safeguard the mental health of citizens and to develop psychosocial interventions that will strengthen the psycho-mental and social health of the most vulnerable groups during the COVID-19 pandemic.

Author contributions

All authors have read and approved the manuscript.

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