

Possible Nutritional Interventions in COVID 19

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BACKGROUND

At the end of 2019, a new viral pandemic evolution totally surprised all services worldwide. This pandemic hit has a huge interference with three global crises: governance, economics, and migration (1). It is a new coronavirus infection, “COVID-19” (which is the acronym of “coronavirus disease 2019”), first reported to the WHO Country Office in China on the 31st of December 2019 and detected in Wuhan, the largest metropolitan area in China’s Hubei province (2), COVID-19 outbreak situation on 6 April 2020 was with more than 1 175 000 confirmed cases, more than 65 000 deaths and already reported in 209 countries (3). This new coronavirus belongs to the Orthocoronavirinae subfamily of the Coronaviridae family (order Nidovirales) and it is a positive-stranded RNA virus with a crown-like appearance under an electron microscope, SARS-CoV-2 belonging to the beta CoVs human category. It is sensitive to ultraviolet rays and heat and is inactivated by lipid solvents including ether (75%), ethanol, chlorine-containing disinfectant, peroxyacetic acid and chloroform (except for chlorhexidine) (4) Genomic analyses suggest that SARS-CoV-2 probably evolved from a strain found in bats. The mammalian host between bats and humans is not well known; also, it is not certain whether this intermediary really exists (5). The pathogenic mechanism inducing pneumonia is complex. The virus is capable of producing an excessive immune reaction in the host; for some patients, the disaster starts from a ‘cytokine storm’ with tissue damage (one of the protagonists is IL6) (6).

Keywords: COVID-19, nutritional intervention, symptoms, prevention, treatment, healthy lifestyle, rehabilitation.

CONTENT

The clinical expression of the COVID-19 infections is based on a variety of symptoms. The most evident symptoms in terms of frequency are fever, malaise, dry cough, sore throat, shortness of breath and dyspnea (7). Other possible symptoms are diarrhea, nasal congestion, muscle pain, anosmia, pain in chest, hemoptysis, etc. The Chinese authors found over 72 000 cases, of which

16 186 (22%) suspected cases, 10 567 (15%) diagnosed cases, and 889 (1%) asymptomatic cases (8). They had 62% confirmation (viral nucleic acid test). Fatality rate (on confirmed cases) was 2.3%; 49% of deaths were with comorbidities such as cardiovascular disease, diabetes, chronic respiratory disease, and oncological diseases, and 23% were aged over 70 years. They classified the disease as mild (81%) (non-pneumonia and mild pneumonia); severe (14%), with symptoms like dyspnoea, respiratory frequency

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≥ 30 /min, blood oxygen saturation (SpO_2) $\leq 93\%$, PaO_2/FiO_2 ratio or P/F [the ratio between the blood pressure of oxygen (partial pressure of oxygen, PaO_2) and the percentage of supplied oxygen (fraction of inspired oxygen, FiO_2)] < 300 , and/or lung infiltrates $> 50\%$ within 24 to 48 hours; and critical (5%), consisting in respiratory failure, septic shock, and/or multiple organ dysfunction (MOD) or failure (MOF) (9). Acute respiratory distress syndrome (ARDS) can be the final evolution of disease with mild expression ($200 \text{ mm Hg} < PaO_2/FiO_2 \leq 300 \text{ mm Hg}$), moderate ($100 \text{ mm Hg} < PaO_2/FiO_2 \leq 200 \text{ mm Hg}$) or very severe ($PaO_2/FiO_2 \leq 100 \text{ mm Hg}$). Also, in some cases they have a septic shock. Treatment is adaptive to disease severity. There are no specific antiviral treatments and still no current vaccines. Major cases are responding to symptomatic treatment (paracetamol), oxygen therapy. Next step is short time of non-invasive ventilation, and severe cases are receiving mechanical ventilation (usually refractory cases to oxygen therapy) and finally extracorporeal membrane oxygenation ECMO (10).

The list of other possible therapies is long. We have to identify the scientific fake news in this domain. The proposals are: lopinavir/ ritonavir (400/100 mg every 12 hours), chloroquine (500 mg every 12 hours), and hydroxychloroquine (200 mg every 12 hours) and alpha-interferon (e.g., 5 million units by aerosol inhalation twice per day). Other proposals are redemsvir and tolicizumab. From one day to the next we know more and more about this disease. Risk factors such as smoking and vaping are now being studied. Even if obesity is not too often mentioned in-between the risk factors, it is clear that the impact on lung function added to other chronic respiratory or cardiovascular diseases and diabetes mellitus can change the prognostic of these cases and must be added to the important already known comorbidities. We need more studied for this fatal combination with COVID-19.

Medical nutrition therapy in COVID-19 should consider the following aspects: caloric intake, macronutrients, pathway for feeding and healthy microbiome. Oral feeding is preferred, but in severe cases it will be replaced by enteral nutrition.

- Caloric intake & macronutrients Chinese handbook (11) elaborated by doctors

who worked with this disease recommends that energy supply should be 25-30 kcal/kg body weight/day. The macronutrients proportion is favourising proteins, with an intake of 1-1.2 g/kg bw/day, carbohydrates remaining at the usual 45-50%. This will be applied for mild and moderate cases. Severe cases will require enteral nutrition pathway.

- Oral feeding / Enteral nutrition pathway: Zhejiang experience is showing that for patients prognosis it will be important to evaluate early nutrition risk, gastrointestinal function, and aspiration risk and to establish the moment when enteral nutrition support is required. For critically ill patients, important gastrointestinal damage could be observed, accompanied by gastroparesis, abdominal distension and diarrhea. During tracheal intubation, a post-pyloric feeding will be done. Pre-digested short peptide preparation will be recommended. If the intestinal function is still good, high caloric, whole protein products will be selected. Optimal glycaemic control should be monitored for diabetic patients. Temporarily, parenteral nutrition may be used for patients with abdominal distension or at high aspiration risk. Translation from parenteral nutrition to oral feeding will be realised step by step, according to condition improvement.
- Healthy microbiome importance. A healthy microbiome could be extreme important in the fight with the viral enemy, both in prevention and in the disease development. Microbiota, the community of microorganisms that includes bacteria, fungi, parasites and viruses reside in human gastrointestinal tract and is unique to each person. This community comprises trillions of microbes, with a ratio 1:1 human *versus* bacterial cells, specific for the low gastrointestinal tract. When an imbalance in the prevalence of different microbial species can be described in the intestinal niche, we define a dysbiosis (12). Stress-induced dysbiosis (and the subsequent impaired intestinal barrier and bacterial translocation) has been

proposed as a key molecular mechanism that stimulates innate immune activity and contributes to the association between chronic psychological stressors and systemic inflammation in humans, the relation with future respiratory disease predisposition is obvious (12).

There are gut permeability changes induced by microbes, which could be the link between dysbiosis and systemic inflammation. When the gut barrier is impaired (leaky gut), the translocation of microbial metabolites is increased, and even the microbes from the gastrointestinal tract could migrate to adjacent tissues leading to endotoxemia and increased inflammatory response at tissue level. But probiotics could restore this barrier integrity and metabolic function, too (13). At molecular level, bacterial components binding to receptors are triggering an antigen-specific response, that stimulates the adaptive immune system (14). The clear mechanism is not yet defined, but the modulation role in immunity performed by microbiome is more and more in attention. A healthy microbiome is essential for an adequate response of the body to a viral infection. For that reason, a healthy pattern, mainly the Mediterranean model, should be recommended in prevention and also in mild or moderate cases of COVID-19. This will ensure optimal fiber intake, with SCFA production, that can ensure a good proportion of healthy bacteria in the gut. Probiotics or antibiotics, individualized by case, could be prescribed in order to preserve the intestinal flora and to reduce the chances of bacterial translocation at intestinal level and possible gut derived infection. Only in a few hospitals intestinal flora analysis could be performed and dysbiosis discovered earlier. But typical gastrointestinal symptoms such as diarrhea and abdominal pain, which have been observed in COVID-19 patients, are in relation with the viral infection of the intestinal mucosa or even with antiviral and anti-infectious therapy (11). Reports coming from Chinese doctors involved in the treatment show that these patients

have a broken intestinal balance, with a significant decrease in *Lactobacillus* and *Bifidobacterium* (15). As it is well known, this microecological imbalance, characterizing the so-called leaky gut, could lead to a secondary bacterial infection, suggesting the importance of a nutritional support that will ensure the optimal microecology modulation. Probiotics may support the correct nutritional intervention. As main preventive lifestyle measures, a healthy lifestyle, with caloric intake adapted to needs based on the Mediterranean model and feasible physical exercises during isolation and social distance may be useful.

After SARS-CoV-2 infection, during viral clearance and after, pulmonary rehabilitation measurements (16) based on 4S principles – safe, simple, save, satisfy – will guide patients to perform respiratory muscle training, efficient methods for cough, sneeze, expectoration, digestive function rehabilitation, how to restart light physical exercises, including mindfulness (17) in psychological rehabilitation.

COMMENTS

We know from one day to other more about this disease. The risk factors such as smoking and vaping are now studied. Even if obesity is not too often mentioned in-between the risk factors, it is clear that the impact on lung function added to other chronic respiratory or cardiovascular diseases and diabetes mellitus can change the prognostic of this cases and must be added to the important already known comorbidities. We need more studies for this fatal combination with COVID-19.

In conclusion, with a lot of hope that after the COVID-19 outbreak, more energy will be spent in prevention and in real practicing healthy lifestyle, as a tool to prevent, promote and enjoy healthiness, foreseeing doctors becoming more and more role models in their communities. □

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