



## International Journal of Home Science

ISSN: 2395-7476  
IJHS 2021; 7(1): 269-273  
© 2021 IJHS  
www.homesciencejournal.com  
Received: 02-04-2021  
Accepted: 21-04-2021

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### Eating habits and lifestyle changes during COVID-19 pandemic: A review

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**DOI:** <https://doi.org/10.22271/23957476.2021.v7.i1d.1208>

#### Abstract

The COVID-19 pandemic has caused massive impact on human health, bringing sudden lifestyle changes, through social distancing and isolation causing social and economic concerns. Enhancing public health during this pandemic requires not only knowledge from the medical and biological sciences, but also of all human sciences related to lifestyle, social and behavioural studies, including dietary habits and lifestyle. There is currently no drug approved for which efficacy on the virus has been proved. The only approach against this virus is to reduce its spread with measures such as isolation and quarantine, social distancing, use of mask and hand washing. Quarantine has proved to be effective in combating the spread of the virus; however, it has inevitably led to a radical change in the lives of people. This review article aimed to investigate the immediate impact of the COVID-19 pandemic lockdown on eating habits and lifestyle changes and their possible correlation with increase in body weight.

**Keywords:** COVID-19, lockdown, eating behavior, physical activity, body weight, sleep, stress

#### Introduction

On December 12th 2019, a new coronavirus (SARS-Cov2) emerged in Wuhan, China, sparking a pandemic of acute respiratory syndrome in humans (COVID-19). It was supposed that in December 2019, SARS-CoV-2 apparently transit from animals to humans at the Huanan seafood market and rapidly spread from Wuhan City of Hubei, Province of China, to the rest of the world (Wang *et al.*, 2020) [26]. Due to the growing case notification rates at Chinese and international locations, on the 30th January 2020, the WHO Emergency Committee declared a global health emergency (Velavan and Meyer, 2020) [25]. In order to contrast and contain the spread of the new coronavirus disease 2019 (COVID-19), near the end of March 2020, the Indian Government too decided for a complete lockdown.

The lockdown due to COVID-19 pandemic caused major interruption to our physical and social environments, and on our food habits. Different aspects of our lifestyle have been affected by COVID-19 pandemic and its consequences. The two major influences of lockdown were staying at home (which includes digital-education, smart working, limitation of outdoors and in-gym physical activity) and stockpiling food, due to the restriction in grocery shopping. In addition, the interruption of the work routine caused by the quarantine resulted in boredom. There was sudden and radical change observed in the habits and lifestyles of the population, with a drastic reduction of any form of socialization. Physical distancing and self-isolation strongly impacted citizens' lives, affecting in particular eating habits and everyday behaviours. The COVID-19 pandemic has drastically affected daily lives of millions of people around the world. The concept of isolation is practically new for the general public, and has influenced social, economic and psychological threads of our life (Brooks *et al.*, 2020) [10]. The pandemic represents a massive impact on human health, causing sudden lifestyle changes, through social distancing and isolation at home, with social and economic consequence. The changes in our habits including socializing, physical work, eating and entertainment, has witness rise in anxiety and depression among people. The psychological impact of quarantine has also been associated with post-traumatic stress, confusion and aggression (Zohn Rosen *et al.*, 2020) [31]. Hearing or reading continuously about the COVID-19 from media can be stressful. Stress leads subjects toward overeating, especially 'comfort foods' rich in sugar, defined as "food craving" (Yilmaz and Gokmen, 2020) [28]. It can also potentially lead to an increased consumption of highly processed foods, which tend to be high in fats, sugars and salt.

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The current knowledge about COVID-19 indicates that the immune system of an individual plays a crucial role in setting the severity of the disease. SARS-CoV-2 virus efficiently infects the cells in the lower respiratory system, and this induces a fast local immune response, which damages this vital and fragile part of the body. Good nutrition is required to build a strong immunity system to fight back. Limited access to fresh foods may compromise opportunities to continue eating a healthy and varied diet. Nonetheless, even with few and limited ingredients, one can continue eating a diet that supports good health. For optimal health, it is also important to remain physically active. Diet also influence the quality of sleep, research indicates that good sleepers have higher adherence to the Mediterranean diet (MD) and lower body mass index (BMI) compared to poor sleepers (Muscogiuri *et al.*, 2020) [19]. The aim of the review was to highlight the role of the first COVID-19 lockdown in determining lifestyle changes, both in eating habits and physical activity and their possible correlation with increase in weight.

### Methodology

This study was conducted between October 2020 and March 2021. The research articles were searched on various database using keywords like COVID-19, pandemic, lockdown, isolation, quarantine, eating habits, sedentary lifestyle and physical activity. Articles on database PubMed, Google Scholar, Research gate centers and public institutes related to covid-19, quarantine and lifestyle changes were searched to identify studies.

The studies were selected based on the following eligibility criteria: (1) full text of the article had to be available in English language (2) surveillance studies on population's habits and (3) the questionnaire had to include information on the lifestyle changes, eating habits, physical activity performance and weight status during lockdown. The absence of information on the lifestyle change in the study was an exclusion criterion. Based on these criteria, 15 studies were selected. The research articles were classified on the basis of topics like eating behavior, physical activity, sleep pattern, body weight, anxiety and depression.

### Results

The results of the reviewed studies have been discussed as lifestyle changes which include changes in eating habit, physical activity and body weight, sleep pattern, stress and anxiety.

#### Lifestyle changes during COVID-19

Coronavirus disease 2019 (COVID-19) has rapidly spread globally, forcing authorities to impose protective measures including confinement to flatten curves of casualties resulted in sudden lifestyle and eating habit changes (Ali *et al.*, 2020, Galali, 2021) [2, 14]. Quarantine and self-isolation is the only way to prevent the spread of this deadly disease, causing anxiety and stress among people. Social isolation and loneliness are associated with development of major chronic diseases, mainly related to unhealthy lifestyle, stress and anxiety. Survey studies on subjects who had been quarantined reported a high prevalence of psychological distress and disorder symptoms. These included emotional disturbance, depression, stress, low mood, irritability, insomnia, and post-traumatic stress (Jeong, 2016) [17].

There is no doubt that during times of confinement, food accessibility and availability had been affected, which in turn affects diet quality (Scarmozzino and Visioli, 2020) [23]. The

imposed possibility of reduced income, job losses and anxiety about an uncertain future might lead the population to cut down expenditure including their expenses for food, making them go for more palatable and possibly unhealthy options (Andreeva *et al.*, 2020) [4]. Diet can affect many areas, but most importantly it can affect immune status in the short term, a time during which heightened activity should be at its best.

#### Eating Habits

Research has shown trends toward unfavorable dietary behaviours during the lockdown such as increased caloric intake, more frequent snacking, reduced consumption of fresh fruits and vegetable, and weight gain (Andreeva *et al.*, 2020; Calder, 2020; Zachary *et al.*, 2020) [4, 11, 29].

**Snacking and weight gain:** Eating habits has also changed a lot due to COVID-19 especially during the lockdown. Appetite and extra meals or snacks were introduced. Consequently, the perception of weight gain is prevalent among the participants (Galali, 2021) [14].

Galali (2021) [14], in his study in Iraq disclosed that more than one of third of participants had perception of weight gain. This could be associated with increase in appetite and introduction of one meal or snack during lockdown since nearly similar percentage of participants declared that they increased appetite and number of meals or snacks.

Similar findings were shared by Ali *et al.*, 2020 [2] and Attina *et al.*, 2020 [6], in their study in UAE and Italy respectively. The researchers revealed that the percentage of participants consuming five or more meals per day increased from 2.1% before the pandemic to 7% during the pandemic and participants had perception of weight gain which is again related to change of appetite and introduction of extra meals.

As people were at home all the time, snacking and munching in between work increased a lot. Changes in snacking patterns are revealed in a study conducted in Middle East and North Africa region by Ali *et al.*, 2021. The researchers shared that the percentage of participants consuming five or more meals per day increased from 2.2% before the pandemic to 6.2% during the pandemic. But a positive change was also observed and it was that the percentage of participants skipping meals decreased from 64.4% before the pandemic to 45.1% during the pandemic. Among those who reported skipping meals, 60.8% stated that lack of time was the main reason before the pandemic and 37.9% stated that lack of appetite was the main reason for skipping meals during the pandemic (Ali *et al.*, 2021) [3]. Because of lockdown, and work from home set up, people had time to have proper meals at proper timings, which would have helped them to improve their health. So, lockdown has altered the eating habits by increasing the number of meals due to munching but for some it has worked positively and has helped in improving their health.

**Intake of high carbohydrates food:** Galali (2021) [14], in his study in Iraq, also stated that the consumption of homemade and home-prepared foods (fruits, vegetables, homemade pizza and sweets, hot beverages, dairy products and yogurt, legumes, white meat) was increased. In contrast, there was a reduction in delivered food products (pizza, burger and package sweets), processed meat, canned fish, and alcoholic intake. It is a positive change that people had reduced their dependence on processed food products, but the food prepared at home too was most of the rich in calories and with little or no physical activity, so it led to weight gain. Work from home, online classes and confinement inside the home

for many days led to boredom and people started munching during work. Though, most of the people were relying on home cooked food only, which is an indicator of better health, but at home sweets and high calorie foods like deserts and savory snacks were prepared and consumed. So, enthusiastic consumption of experimental self-cooked food delicacies to kill boredom together with reduced physical activity, led to increased body weight.

Ali *et al.*, 2020<sup>[2]</sup> also observes a significant increase in the percentage of participants consuming mostly homemade meals during the pandemic, as outside food was not readily available. Excess of free time, motivated people to explore their culinary ability to preparing food “traditional recipes” and enjoying it with their family. The studies conducted by Andreeva (2020)<sup>[4]</sup> in United States; Bhutani and Cooper, (2020)<sup>[9]</sup> in Italy; Attina (2020)<sup>[6]</sup> in France and Ashkanani & Husain (2020)<sup>[5]</sup> in Kuwait indicate that an increase in caloric intake together with low physical activity led to weight gain during the current COVID-19 home confinement. Also, use of mobile phones, social media increased when people started staying at home. Questionnaires regarding Ali *et al.*, 2020<sup>[2]</sup>, samples were asked about the most common source of information for health and nutrition updates, 69.1% and 67.8% of participants reported relying on social media applications. Similar results were seen in a study conducted in Africa by Ali *et al.*, 2021<sup>[3]</sup>. Social media applications were the most common resource of information for both health and nutrition updates, thereby increasing the total individual screen time. At times, random and unscientific information via articles or videos on social media can be misleading and inducing wrong food choices. To improve immunity and prevent Coronavirus infection people started consuming excess of homemade spice decoction drinks like *kadha* and other preparations that may increase inflammation in the body. However, three Italian studies reported that hydration was better accomplished during the restriction period with a general increase in water consumption.

**Fruits and Vegetable consumption:** COVID-19 has a great impact on eating patterns of people. WHO recommends drinking water instead of sugar-sweetened beverages, Limit or avoid alcoholic beverages for adults and strictly avoid these in young people. Ensure plenty of fruits and vegetables, and limit the intake of salt, sugar and fat.

During the lockdown, there was limited access to fresh food causing reduction in variety of food groups intake. Instead, people consumed more processed convenient foods products like bread jam, bread butter, bakery products and other packed food items which can be high in energy and low in nutrients. This was a more common practice among youngsters living alone (Hobbs, 2020; Galali, 2021)<sup>[16, 14]</sup>. 70% reviewed studies showed an increased in the intake of sweets, salty snacks, sweet beverages and alcohol. However, few studies indicated that marginal increase in the consumption of healthy foods, such as fruits and vegetables, extra virgin olive oil and legumes.

Whereas, an Italian surveillance studies on population’s habits found during the COVID-19 lockdown, 37.4% and 35.8% of the study population declares to eat more or less healthy food (fruit, vegetables, nuts and legumes), respectively. 18–30year age group people resulted to have a higher adherence to the Mediterranean Diet (MD) when compared to the younger and the elder population (Di Renzo *et al.*, 2020)<sup>[12]</sup>. The intake of wine was not associated with a higher adherence to the MD before or during the confinement. Wine is a well-known

component of the MD and its moderate intake has been traditionally associated with COVID-19 risk reduction. However, the lack of quantitative data about alcohol intake before and during the COVID-19 confinement, prevents author from making direct comparisons with them (Santi-Cano *et al.*, 2021).

### Physical activity and body weight

Quarantine was associated with stress and depression leading to unhealthy diet and reduced physical activity. During quarantine governments prohibited the great majority of outdoor exercise and social activities (e.g. going to the gym), resulting in a reduction of physical activity (Galali *et al.*, 2021)<sup>[14]</sup>. Factors like complete lockdowns, closure of sport facilities and parks, and overall movement restrictions have reduced the ability to engage in physical activity. This was accompanied with an increase in sedentary behaviours related to quarantine, including distance learning and telework (Hall *et al.*, 2020).

According to a study conducted in UAE by Abusnana *et al.*, 2017<sup>[1]</sup>, the prevalence of overweight and obesity in the UAE even before COVID-19 was high and has increased over time. Researcher mentioned that physical activity was already less even before the lockdown, but quarantine induced a further reduction of physical activity and an increase in the sitting time, spending more time on screens especially in case of students, leading to an increase in metabolic diseases.

Galali (2021)<sup>[14]</sup> in his study in Iraq showed that number of people exercise during COVID-19 and frequency of outbreak was decreasing. Besides that, due to lockdown and joblessness, the sleeping hours were increased. These could explain that pandemics can make public more sedentary and less active particularly outdoors sport. However still, there were people who could find opportunities to do exercise at home particularly functional training (30.5%) and treadmill (4.4%). Physical activity was on decline during the lockdown, but there were some people who made proper use of that extra time. As mentioned by Ali *et al.*, 2020 in his study in UAE, participants who reported performing physical activity more than three times per week, 29.9% lost weight and 49.5% maintained their weight.

### Sleep

Muscoguirri *et al.*, (2020)<sup>[20]</sup> and Ali *et al.*, (2020)<sup>[2]</sup> in their studies in UAE, pointed out that quarantine-related stress translated into sleep disturbances and poor quality sleep that further worsen stress and increase food craving, and sleep disturbances were also more common during the pandemic compared to before. Consequently, 30.9% of the surveyed participants reported feeling lazy and less energized during the pandemic, compared to only 4.7% before the pandemic. Also, it was mostly affected in females and needs to be further evaluated since it can be linked with multiple endocrine functions, as well risk for obesity and depression.

As most of the people turned lethargic during lockdown and were not doing much physical work, they were suffering from sleep issues. But, there were some people who could utilize their time in a better way and they started exercising in that extra time and lost some weight or maintained weight, which helped them to stay healthy and also kept them away from stress of the pandemic.

### Stress and Anxiety

During the COVID-19 pandemic higher levels of anxiety, stress and depression have been observed among individuals



(Benedek *et al.*, 2020; Wang *et al.*, 2020; Badrfam & Zandifur, 2020)<sup>[8, 26, 7]</sup>. The boredom caused by reduction or loss of work and media reports on coronavirus makes life stressful. Boredom or stress can lead to emotional, overeating and high energy food craving and ultimately adversely affect well-being (Feather, 1997; Gao *et al.*, 2020; Moynihan *et al.*, 2015)<sup>[13, 26, 18]</sup>.

Attina *et al.*, (2020)<sup>[6]</sup> and Gao *et al.*, (2020)<sup>[15]</sup> in their study in Italy and China respectively opined that over two thirds of participants used social media as a main source for health updates. Similar opinion was shared by Xiao *et al.* 2020<sup>[27]</sup>, in their study in China. Researchers mentioned that studies have shown negative and harmful effect of misinformation overload “infodemic” on the mental health of individuals. They found a significant negative correlation between anxiety levels and sleep quality and suggested the use of tele psychiatry consultation as an important therapeutic strategy. This was supported by Zhou *et al.*, 2020<sup>[30]</sup> in his study in Australia. Researchers mentioned that the use of telehealth has been shown to be useful in providing support to patients and is appropriate for the delivery of mental health services to people to deal with the stress and anxiety.

### Conclusion

Lockdown during COVID-19 was a difficult phase for all of us. Multiple factors influenced the extent of psychological impact of the outbreak including unknown means of virus transmission, future unpredictability, food insecurity, restricted healthcare, media misinformation, and quarantine (Todisco & Donini, 2020; Rajkumar, 2020)<sup>[24, 21]</sup>. Consequently, the psychological stress affected the dietary habits as well, some started stress eating and some even skipped meals, resulting a detrimental effect on health and body weight gain. However, higher adherence to Mediterranean diet, home cooked food, decreased consumption of processed food and family time can be considered as positive aspects of COVID-19 pandemic. In conclusion, the data unanimously show an effect of the quarantine on the eating habits, physical activity, sleep pattern and stress and anxiety.

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