Dietary Habit and Nutritional Status on the Severity of Covid-19 Patients

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Every challenging work needs self efforts as well as guidance of elders especially those who are very close to our hearts.

My humble effort to my beloved parents ,my loving son and my husbands. Whose affection, love and encouragement and prays of day and night make me able to reach such success and honour.

Along with all hard working and respected Teachers.

CERTIFICATION

This M Phil thesis entitled **"Dietary Habit and Nutritional Status on the Severity of Covid-19 Patients"** was supervised by Professor Dr. Khaleda Islam and is submitted to Examination Committee 2023 for evaluation.

This is an original piece of research work.

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ABSTRACT

Background: Nutrition plays a vital role in promoting health and preventing disease and the relationship between nutritional status and COVID-19 severity has yet to be well established. Malnutrition and obesity have been shown to worsen clinical outcomes and increase morbidity, mortality, and complication rates.COVID-19 is a disease characterized by an inflammatory syndrome, leading to reduced food intake and increased muscle catabolism, therefore patients with COVID-19 are at high risk of malnutrition, which makes prevention of malnutrition and nutritional management key aspects of care.

Objectives: To evaluate the dietary habit and nutritional status on the severity of Covid-19 treatment.

Material and Methods: This cross-sectional randomized study was carried out in Covid-19 unit of Holy Family Red Crescent Medical College. A total of 384 diagnosed Covid-19 patients were enrolled in this study, categorized into severe/critical (n=139) and mild/ moderate (n=245) for management. Their dietary habit and nutritional status, biochemical, clinical findings and all the socio-demographic profiles were assessed. Statistical analyses of the results were obtained by using window based computer software devised with Statistical Packages for Social Sciences (SPSS-22).

Results: In this study it was found that 86.7% of the patients aged less than or equal to 60 years with an average ,82.8% patients were male and 33.1% of the patients education was degree level. About 39.6% patients income was 35000 BDT and above and 31.8% patients income was 31.8%. Most of the patients lived in the city area (75%), were married (81.50%) and the majority (55.99%) worked between 8-12 hours weekly. The mean BMI was 29.17±3.99kg/m2 in severe/critical and 25.35±3.13kg/m2 in mild/moderate COVID-19 group, which was significantly higher in severe group. Uncontrolled diabetes mellitus, uncontrolled HTN and uncontrolled bronchial asthma were significantly ($p<0.05$) higher in patients with critical symptoms.

All patients had taken rice in both groups .Vegetables, green leafy vegetables, spices, condiments and herbs, fish/shellfish eggs, milk and milk product taken were significantly ($p<0.05$) lower in COVID-19 severe group. More than three fourth (78.4%) patients had taken beverages (sugary foods) in severe/critical and 167(68.2%) in mild/moderate

COVID-19 group, which was statistically significant between two groups. Miscellaneous (salty foods) taken was significantly ($p<0.05$) higher in COVID-19 severe/critical group.

Conclusion: Our findings suggest that a healthy diet is associated with lower risk of developing COVID-19 and if occurred, showed less severe symptoms. It can be inferred that public health interventions to improve nutrition and address social determinants of health may be important for reducing the burden of the COVID-19 pandemic.

Keywords: Nutrition, COVID-19 severity, malnutrition, obesity, nutritional management

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LIST OF ABBREVIATION

BMI	Body Mass Index
CI	Confidence interval
COVID-19	Coronavirus-19
GBD	Global Burden of Disease
HDU	High dependency unit
ICU	Intensive care unit
INFS	Institute of Nutrition and Food Science
NRS	Nutrition risk screening
OR	Odds ratio
RRR	Relative risk ratio
SD	Standard deviation
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

CHAPTER I
INTRODUCTION

1.1 BACKGROUND

According to the 2016 Global Burden of Disease Study, diet is the second most significant risk factor in determining mortality and disability-adjusted life-years throughout the globe(GBD 2016 Risk Factors Collaborators, 2017). Therefore, there will be serious short-term and long-term consequences to any disturbance in nutritional intake. On the other hand, therapeutic benefits from better dietary habits may be shown in populations with and without clinical symptoms.

Particularly in the context of viral infections, immunological and physiological state are shaped by a complex and multilayered interplay between habitual and temporal dietary intake, collective dietary consumption pattern, and health condition (Rodriguez-Morales et al., 2020). Links may also be present in corona virus infections (COVID-19). An impaired immune response to respiratory virus infections may occur under conditions of either severe calorie restriction or excessive overfeeding (de Araujo Morais et al. 2021). In addition, new studies show that certain dietary categories may reduce the severity of SARS-CoV-2 infection (Bae and Kim, 2020). In addition, the COVID-19 epidemic has caused major changes in people's eating patterns and the quality and accessibility of food in their communities (Rodriguez-Leyva and Pierce, 2021). The population's immunological response to COVID-19 infection may be affected by these variations, which vary from area to region and even from person to person (Lamarche et al. 2021).

Promoting health and warding off illness are two of nutrition's primary functions. A clear causal link between malnutrition and severe COVID-19 has not yet been demonstrated. Immune function is compromised and pro inflammatory cytokines including interleukin 6 (IL-6) and tumor necrosis factor-alpha are abnormally secreted in malnourished patients (Youssef et al. 2022). Researchers also found that poor nutrition and obesity are associated with a higher risk of death, morbidity, and complications in the clinic.

Patients with COVID-19 are at significant risk of malnutrition since the condition is associated with an inflammatory state that decreases appetite and increases muscle catabolism (Haraj et al. 2021). Atypical symptoms may manifest in the elderly and the immune compromised. Dyspnea, fever, gastrointestinal issues, and exhaustion are all symptoms that may be caused by COVID-19, but they can also be caused by pregnancy itself or complications during pregnancy (Chen et al. 2020). Patients who have been cured of the virus often have substantial impairments, including those affecting their respiratory, cardiovascular, neurological, neurocognitive, and musculoskeletal systems, despite having lost weight and been weaker during weeks spent in critical care. The long-term treatment these deficits need has a negative impact on their diet, increasing the likelihood that they may become malnourished (Sohrabi et al. 2020; Haraj et al. 2021; Zhu et al. 2020).

Patients who have recovered from COVID-19 have lost weight and often suffer with respiratory, cardiovascular, and neurological deficits, even after receiving intensive care. Their nutritional health is negatively impacted by the need for lengthy therapy due to these deficits, and they are at a high risk of being malnourished as a result (Zhu et al.

2020; Harajet al. 2021). The elderly, patients with co-morbidities, and those with weakened immunity are at a higher risk for deterioration and mortality from COVID-19(Chen et al., 2020). In addition, a healthy immune response is heavily dependent on the person's dietary state. There is mounting evidence that links hunger to negative health effects including lowered immunity (Richardson et al. 2020).

For the sake of patient treatment, the six COVID-19 syndromes are categorized as follows in the National Guidelines for the Clinical Management of Corona virus Disease 2019 (Covid-19), 2020:

Very mild: a minor case of influenza (ILI), Lung infection, somewhat severe (CRB 65 score 0), Including but not limited to: severe pneumonia, sepsis, ARDS and septic shock are among the most serious emergencies. All patients of respiratory distress, as per the recommendations, must be hospitalized for additional testing and assessment. Uncomplicated viral infections of the upper respiratory tract can cause non-specific symptoms in patients, such as fever, lethargy, cough (with or without sputum production), sore throat, nasal congestion, anorexia, malaise, headache, and a lack of appetite. On occasion, patients may also report feeling sick and throwing up.

As with any acute episode of metabolic attack, the identification and early therapy of nutritional deficiencies in patients with COVID-19 must be included into the overall therapeutic plan (Sohrabi et al. 2020). A number of methods have been presented for measuring nutritional health.

Patients hospitalized with COVID-19 undergo the same nutritional therapy techniques as those hospitalized for other acute diseases (Van Zanten et al. 2019; Barazzoni et al. 2020). When treating COVID-19, a high-calorie, high-protein diet is used to avoid worsening in individuals who were not undernourished to begin with. A high-calorie, high-protein diet with oral nutritional supplements between meals will be suggested in the event of moderate under nutrition. Early enteral feeding with a nasogastric tube should be advised for patients with severe under nutrition (consumed portions of less than 50 percent of total calories) (Thibault et al. 2020).

Therefore, as with any acute condition of metabolic aggressiveness, the nutritional diagnosis and early nutritional treatment of COVID-19 patients must be included into the entire therapeutic plan. In order to mitigate some of the serious effects of COVID-19 infection—like the pro-inflammatory cytokine storm—nutrition should be prioritized, according to studies looking into preventative and control approaches (Butler and Barrientos, 2020; Cena and Chieppa, 2020).

Haraj et al. (2021) found that 14.6% of patients displayed under nutrition despite individualized dietary plans, vitamin D, and trace element supplementation. Patients with lymphopenia and a prolonged intensive care unit stay (>5 days) need special consideration.

However, experimental evidence on the nutritional condition of COVID-19 infected individuals has been obtained via a number of investigations. Forty-two percent of COVID-19 patients admitted to hospitals were malnourished (Bedock et al. 2020). Similar results were also obtained in another study (39 percent of COVID-19 infected

individuals displayed malnutrition) (Allard et al. 2020). Sixty-seven percent of COVID-19 infected patients admitted to the intensive care unit (ICU) showed signs of malnutrition (Bedock et al. 2020). About a quarter of COVID-19 patients were moderately malnourished, and about a fifth were severely mal nourished. There was no correlation between nutritional status and either the severity of COVID-19's clinical symptoms or the frequency with which they occurred, as reported by Bedock et al. (2020)(Allard et al. 2020).Patients with COVID-19 infection who were not in the intensive care unit and who did not get enough amounts of energy and protein from their meals had a greater death risk than those who received acceptable quantities (Formisano et al. 2021; Damayanthi and Prabani, 2021).

The clinical outcomes of one hundred healthy and one hundred COVID-19-infected pregnant women were compared depending on their trace element status in a ground-breaking study (Anuk et al. 2021).Serum copper and magnesium levels were higher, but zinc levels were lower in infected pregnant women throughout the first and third trimesters. Infected women had a significant reduction in the zinc:copper ratio of their serum. In patients with COVID-19, this ratio was linked with disease severity. According to Quilliot et al., (2021), malnutrition is a strong predictor of a bad outcome and should be addressed as soon as possible.

According to Chen et al. (2020), patients' nutritional state affects immune function, and it is predicted that a high nutritional status would decrease the incidence and improve the prognosis of COVID-19. This retrospective study aimed to determine whether or not the total nutrition risk screening (NRS) score was connected with inflammation, protein

reserve, baseline immunological condition, hospital length of stay, or overall prognosis in patients with COVID-19.

Although vitamin D deficiency has been linked to different respiratory tract infections (Bae and Kim, 2020; Griffin et al., 2021; Lanham-New et al., 2020), the nature of this link remains unknown. It is yet unclear if this connection also holds for swine influenza virus COVID-19, even if it is a direct one.

Low vitamin D levels were often seen in critically sick, obese, elderly patients with COVID-19, as discovered by Goncalves and colleagues (Goncalves et al. 2020). They reasoned that low vitamin D levels in this group may make them more vulnerable to corona virus infection. Patients with COVID-19 who were hospitalized to a tertiary hospital in Italy were also discovered to have vitamin D deficits (Cereda et al. 2021). An increased risk of mortality among African Americans may be attributable to vitamin D deficiency, as shown by Kohlmeier's state-by-state Mendelian randomization research, which found a greater incidence of COVID-19 deaths in the northern states (Kohlmeier, 2020). Given the potentially enormous number of confounding factors, the conclusion that "vitamin D adequacy denies the virus an easy footing and so limits development of the epidemic" is, at best, questionable.

The opposite has also been documented. Results from the COVID-19 study found no association between vitamin D insufficiency, moderate deficiency, or severe deficiency with clinical symptoms or outcomes (Cereda et al. 2021). Instead, after accounting for any confounding variables, a strong positive connection was established between growing vitamin D levels and decreased in-hospital mortality (Cereda et al. 2021).

Further investigation into the link between vitamin D levels and these outcomes is necessary to determine whether or not vitamin D helps prevent or treat COVID-19 infections.

A national quarantine in response to a pandemic may cause some people to modify their eating habits, as seen by their gaining or losing weight, according to research by Sidor and Rzymski (2020). Knowing that COVID-19 and other illnesses are more severe in people with greater body mass indexes, it is important to devise a plan to mitigate the negative consequences of a restricted diet while in lockdown. Also concerning is a trend toward further weight loss in already-underweight people. Also, it's crucial to underline the need of actively creating countermeasures to this trend. More study is needed to determine whether the COVID-19-related lockout contributed to the long-term reinforcing of unhealthy eating patterns and the resulting health problems. 14.8 percent of patients had a poor nutritional condition, and 65.9 percent were at risk of under nutrition, according to the research conducted by Haraj et al. (2021). The mean body mass index was 25.2% kg/m2, 61% of participants lost weight, and 24% lost more than 10% of their starting weight.

According to the National Guidelines for the Clinical Management of Corona virus Disease 2019 (Covid-19) (2020), patients with mild or moderate symptoms should be treated at home while those with severe or life-threatening symptoms should be hospitalized. Moderate patients will get the same care as mild patients (ILI). However, the same broad-spectrum oral antibiotics used to treat simple cases of community-acquired pneumonia should be given to this patient (CAP). Hospitalization is necessary

for patients with severe symptoms or confirmed instances of COVID-19. In order to properly care for these individuals, it is imperative that adequate precautions be taken right once to avoid the spread of illness. A lot of the time, patients with serious diseases require oxygenation support. Treatment of a patient with sepsis and/or shock may be necessary in a high dependency unit (HDU) or intensive care unit (ICU), depending on the severity of the illness and the treating doctors' clinical assessment. Intubation and mechanical ventilation are required if individuals develop acute respiratory distress syndrome.

Researching how the COVID-19 pandemic could influence people's eating habits and how food might effect the epidemiology of the COVID-19 epidemic is crucial in light of the positive and negative connections of nutrition with sickness and death (Rodriguez-Leyva and Pierce, 2021). Because there are currently no vaccines planned for the prevention of COVID-19, it is tempting to speculate that certain food items, such as functional foods or nutraceutical extracts from foods, may help to mitigate the spread of the virus, as well as its potential for causing illness and even death (Butler and Barrientos, 2020; Aman and Masood, 2020; Bold et al. 2020).

The current study aims to assess the impact of nutritional status and dietary patterns on the intensity of Covid-19 therapy, taking into account the most up-to-date research data.

1.2 JUSTIFICATION OF THE STUDY

The recent spread of Corona Virus is now the world's biggest health concern. Having a healthy diet and enough nutrients is crucial for viral resistance. Age, sex, health, lifestyle, and medicines are just few of the variables that might alter an individual's dietary preferences. Personal dietary habits have been employed as a buffer against instability during the current COVID-19 epidemic. The immune system may be affected by factors such as optimal nutrition, nutritional status, and food consumption. Therefore, improving one's immune system is essential if one is to have any hope of enduring in the present. In order to keep the body in fighting shape against the infection, a healthy diet is essential. Recommendations for diet management are voluntary, while guidelines for food safety management and good food practices are not. The aim of this research is to better understand the eating patterns, nutritional condition, and co morbidities of COVID-19 hospitalized patients in Dhaka, Bangladesh.

1.3 RESEARCH QUESTION

What are the co-morbidities, nutritional status & dietary habit of covid-19 patients admitted in a selected hospital of Dhaka city?

1.4 STUDY OBJECTIVES

General Objective

To find out the dietary habit and nutritional status on the severity of Covid-19 Treatment.

Specific Objectives:

1. To evaluate the association between socio-demographic and family history with severity of Covid-19 treatment
2. To determine the association between blood group, Cause of infection and BMI status with severity of Covid-19 treatment
3. To see the association between food stuff with 7 days food consumption
4. To assess the association between dietary habit in present day with severity of Covid-19 treatment

CHAPTER TWO: REVIEW OF LITERATURE

CHAPTER II

LITERATURE REVIEW

2.1 Historical background

Today, a corona virus epidemic is unfolding all across the globe . Wuhan, Hubei, China was the first to experience the CoV-2 outbreak late in 2019. The World Health Organization changed its nomenclature from 2019 nCoV to CoVID-19 in February of 2020. (Moynihan et al. 2015). Due to the rapid increase in the number of patients infected with severe acute respiratory syndrome corona virus (SARSCoV-2), healthcare providers throughout the world have been struggling to keep up (Moynihan et al., 2015; Ylmaz and Gokmen, 2020). Major health, social, and economic costs have resulted from the 2019 corona virus disease (COVID-19) pandemic (Rodriguez-Leyva et al. 2021).

2.2 General consideration

The corona virus illness 2019 (COVID-19), first discovered in China, will have a devastating impact on health and economies throughout the world when it spreads around the world at the end of 2019 and into 2020(Rodriguez-Leyva et al. 2021). This trend is anticipated to continue until at least 2021, maybe into 2022.

This year's corona virus (COVID-19) might cause multi-organ failure due to complications such interstitial pneumonia and respiratory distress syndrome (Rodriguez-Martin, and Meule, 2015). Noninvasive breathing, such as CPAP or NIV, or endotracheal

intubation may be necessary for patients with COVID-19 pneumonia during the acute phase (Wu et al. 2020). Further, COVID-19 seems to influence a variety of organs, including the heart and kidneys, and to create arterial impairments that promote thrombosis (Peuhkuri et al. 2012). Animal-to-human transmission likely started this pandemic, and severe atypical pneumonia is the leading cause of mortality. Quarantine measures have been put into place all around the world in an attempt to stop the spread of CoVID-19 and reduce the pressure on healthcare systems, which has been declared a pandemic by the World Health Organization.

The experimental data on the nutritional condition of COVID-19 infected individuals comes from a number of investigations. Forty-two percent of COVID-19 patients admitted to hospitals were malnourished (Bedock et al. 2020). Another research found very comparable findings (39% of COVID-19 infected individuals displayed malnutrition) (Allard et al. 2020). Sixty-seven percent of COVID-19 infected patients admitted to the intensive care unit (ICU) showed signs of malnutrition (Bedock et al. 2020). Twenty-four percent of COVID-19 patients showed signs of moderate malnutrition, while eighteen percent showed signs of severe malnutrition. However, neither the clinical manifestations of COVID-19 infection nor the severity of COVID-19 were shown to be significantly related to a person's nutritional state (Allard et al. 2020). Patients with COVID-19 infection who were not in the intensive care unit and who did not get enough amounts of energy and protein from their meals had a greater death risk than those who received acceptable quantities (Formisano et al. 2021; Damayanthi,2021).

2.3 Dietary attributes

Given the positive and negative links between food and sickness and death, investigating how the COVID-19 pandemic may affect people's eating habits and how diet may affect the epidemiology of the COVID-19 pandemic is important. The 2016 Global Burden of Disease Study found that diet was the second most important risk factor in determining mortality and disability-adjusted life-years in the globe(GBD, 2017). Therefore, there will be serious short-term and long-term consequences to any disturbance in nutritional intake. On the other hand, therapeutic benefits from better dietary habits may be shown in populations with and without clinical symptoms.

Boredom may set in due to the disruption of normal activities brought on by quarantine. Studies have shown that people who are bored tend to consume more, whether it be more fats, carbs, or proteins (Makino et al. 2010). And it might be distressing to be constantly reminded of the epidemic while under quarantine. As a result, individuals under stress tend to turn to sweet comfort foods for a dietary bailout (Garcia et al. 2009). Craving encompasses the emotional (strong want to eat), behavioral (searching for food), cognitive (thinking about food), and physiological (salivation) components of this desire (Thurnham, 1997). As an aside, women seem to be more prone to food cravings than males.

2.4 Types of food and lifestyle

The need for carbohydrates stimulates the release of serotonin, which has a calming effect. Carbohydrate-rich meals may be used as a kind of self-medication against stress.

How much a need for carbohydrates raises one's mood is directly related to the meals' glycemic index. Consuming a diet high in saturated fats, added sugars, and processed foods has been linked to an increased risk of developing obesity, a chronic inflammatory state that is often complicated by cardiovascular disease, diabetes, and lung disease, all of which have been linked to an increased risk of more severe complications from CoVID-19 (Chandra, 1992). The stress of being quarantined may disrupt a person's sleep, which in turn can raise their stress levels and lead to unhealthy binge eating. That's why, for a restful night's sleep, supper should consist of foods that either naturally contain serotonin and melatonin or promote their production. Both melatonin and serotonin may be found in a wide range of plant parts, from roots to leaves to fruits to seeds, including almonds, bananas, cherries, and oats. Tryptophan, a building block for serotonin and melatonin, may also be present in some meals. Milk and other dairy products are rich in the sleep-inducing amino acid tryptophan. Tryptophan also suppresses neuropeptide Y, the most potent of the hypothalamic orexigenpeptides, and hence plays a role in regulating satiety and calorie intake via serotonin (Muscogiuri et al. 2017). Vitamin C may be found in red peppers, oranges, strawberries, broccoli, mangoes, lemons, and other fruits and vegetables, whereas beta carotene is most prevalent in sweet potatoes, carrots, and green leafy vegetables. Spinach, broccoli, nuts, seeds, and vegetable oils (particularly soybean, sunflower, maize, wheat germ, and walnut) are other good places to receive vitamin E from.

The highest concentration of zinc per serving is found in oysters, but you can also acquire zinc from chicken, beef, nuts, pumpkin seeds, sesame seeds, beans, and lentils. The Mediterranean Diet has all of the aforementioned elements and might be an ideal eating

plan to stick to while quarantined. Traditional Mediterranean dishes use olive oil, fresh produce, legumes high in protein, fish, and whole grains, with very small quantities of red wine and red meat (Moynihan et al. 2015).

2.5 Impact of food and stress on immunity

Yogurt, a milk product, may increase natural killer cell activity and decrease the likelihood of catching a cold beyond its sedative effects (TeVelthuis et al. 2010). The increased intake of macronutrients during quarantine may be accompanied by a deficiency in micronutrients, similar to what occurs in obesity (Wang et al., 2020), which is commonly associated with impaired immune responses, especially cell-mediated immunity, phagocyte function, cytokine production, secretary antibody response, antibody affinity, and the complement, making one more susceptible to viral infections (Velavan and Meyer, 2020). Thus, it is essential to pay special attention to one's diet during this time, ensuring that one consumes a well-balanced diet rich in minerals, antioxidants, and vitamins. When compared to a placebo, anti-oxidants boost the immune system's response to influenza vaccination by increasing the number of T-cell subsets, boosting lymphocyte responsiveness to mitogen, boosting interleukin-2 production, and boosting natural killer cell activity (FAQ, 2020).

2.6 Demographic factors and the risk in COVID-19 patients:

A comparison of the demographics of co-morbid and non co-morbid patients indicated certain distinctions. About half (n = 467) of the research participants had several medical conditions, as noted in the study's SI. Co-morbid patients had a higher hospitalization rate

overall (12.6%). (Ganguli et al. 2022). Also, the severity of the illnesses may have been affected by co-morbidity. While both groups of patients had a preponderance of moderate symptoms, those with concomitant conditions were more likely to have severe symptoms. The median age of patients without co-morbid conditions was 31 10.7 years, significantly younger than the median age of patients with co-morbid conditions (45 12.8 years). It's important to point out that male patients and those living in metropolitan areas predominated. However, a larger proportion of urban patients had severe symptoms and needed a greater rate of hospitalization compared to those of rural residence, and this was true independent of gender and co-morbidity status. A person's nutritional status may be affected by things including their way of life, age, health, sex, and medicine (Rodriguez-Martin and Meule, 2015). An individual's ability to weather a period of instability has been measured by their nutritional state during the current COVID-19 pandemic (Ylmaz and Gokmen, 2020). Gene expression, cell activation, and the change of signaling molecules are all ways in which adequate nutrition and dietary nutrient consumption affect the immune system. As an added bonus, the immunological responses of the body are shaped by the gut microbiome, which is affected by the foods we eat (Rodriguez-Martin and Meule, 2015). Since this is the case, it seems that boosting one's immune system is the only long-term strategy for survival. Protecting immunological function requires a diet rich in zinc, iron, vitamins A, B12, B6, C, and E. Today, keeping a balanced diet has become more difficult due to the spread of the COVID-19 virus (Ma et al. 2017).

2.7 Impact of public health measures in food intake

According to a recent research conducted in Canada, college students' dietary and energy intake dropped dramatically during the epidemic, but their alcohol consumption skyrocketed (Bertrand et al. 2021). In general, the frequency with which all dietary categories were consumed dropped throughout the epidemic. Both a decline in physical activity and an increase in sedentary behavior were seen. While 7-15% of respondents in a Dutch research indicated pandemic-related behaviors prone to under nutrition by missing warm meals, 20-32% reported overeating, particularly via snacking (Visser et al. 2020). There may be regional differences in the prevalence of these shifts in dietary behavior. More than four thousand Croatians participated in research that found they cooked more often and ate more vegetables, beans, and seafood during the lockdown caused by the COVID-19 epidemic (Pfeifer et al. 2020).

Because people were locked up or quarantined from the public because of the epidemic, their nutritional health suffered much more than usual because of their isolation (Visser et al. 2020). During confinement, 10% of participants in a Belgian research reported financial difficulties purchasing a balanced food (Pfeifer et al. 2020). There was a general trend away from eating fruits and vegetables and toward eating more sugary beverages, bread, and salty snacks (Vandevijvere et al. 2020; Huber et al. 2020). Better food choices brought on by exercising in quarantine had a positive influence on mental health (Amatori et al. 2020). However, it cannot be overstated how many reports have shown a decline in fitness routines throughout the epidemic. Predictable and unhealthy weight gain has occurred throughout the epidemic as a direct consequence of bad dietary habits

and a lack of exercise (Sulejmani et al. 2021). The effects of the pandemic on people's health might be significantly altered by these dietary shifts. Infection and death rates owing to COVID-19 were favorably connected with increased diet of fruits and sugar-sweetened drinks and adversely correlated with consumption of beans and legumes, according to data gathered by the Globe Health Organization from nations throughout the world (Soldavini et al. 2021).

Isolation, lockdown, and social withdrawal may help slow the progression of the sickness, but they have serious negative consequences for the person. Restricting oneself to one's house has serious consequences for one's health, including modifications to one's diet, sleeping schedule, and level of physical activity. It would encourage inactive lifestyles, which are detrimental to both mental and physical health and also increase the likelihood of weight gain (Wu et al. 2020). Unhealthy food patterns, decreased appetite, and loss of pleasure from eating have all been linked to emotional distress, including worry and panic. Maintaining a healthy immune system with a well-rounded diet can help you fight off the illness (Muscogiuri et al. 2020). At this time, Vitamin C is the only substance that has been shown to effectively cure or prevent viral infections by 'boosting' the immune system (Garcia et al. 2009). Water-soluble vitamins, of which vitamin C is one, are crucial to maintaining a healthy immune system.

2.8 Dietary habit and nutritional status

Because there are currently no vaccines planned for the prevention of COVID-19, it is tempting to speculate that certain food items, such as functional foods or nutraceutical extracts from foods, may help to mitigate the spread of the virus, as well as its potential for causing illness and even death (Rodriguez-Leyva et al. 2021). These authors suggest that a wide range of natural compounds and nutraceuticals, including ketogenic diets, tea bioactives, zinc and other micronutrients, Chinese medicinal herbs, resveratrol, silvestrol, lycorine, garlic, flavonoids, fresh fruits and vegetables, nuts, unsaturated fats, and so on, can protect against COVID-19 infection; however, there is only anecdotal evidence to support these claims (Bold et al. 2020). Possible negative effects on COVID-19 findings include use of concentrated juices, sugary beverages, saturated fats, obesity, malnutrition, and cachexia. None of these studies, to the best of my knowledge, have really tested the hypotheses (Virgens et al. 2020).

Natural products have played an important part in the defense against infectious illness since ancient times. Because of their efficacy in preventing several types of microbial infection, they are being advocated for use in the prevention of COVID-19 (Aman and Masood, 2020; Gasmi et al. 2021). Tea and coffee are popular beverages because they are believed to boost the immune system via their high levels of antioxidants (Ackaln and Sanlier, 2021). In COVID-19 instances, tea has been identified as a bioactive modulator of innate immunity (Chowdhury and Barooah, 2020). Although coffee has been shown to have beneficial effects in the treatment of a variety of disorders, its role in the recovery from COVID-19 has yet to be determined (Belaroussi et al. 2020; Kennedy et al. 2021). It

is worth keeping in mind that the antibacterial, antiviral, antioxidant, and vitamin/mineral content of tea, honey, and pickles suggests that they may have some effect on COVID-19.

Higher intakes of grains, fish, meat, fruits, and vegetables were related with lower severity and hospitalization rates, as reported by Ganguli et al. (2022). Despite the lack of conclusive evidence, it is possible that eating rice can help protect you against severe complications brought on by COVID-19. Various studies recommend carbohydrate-rich diets for COVID-19 patients because of the intimate molecular relationship between carbs and immune system components (Kumbhar et al. 2021). Protein, which is included in both fish and meat, may be responsible for the decreased frequency and severity of medical emergencies. In line with prior research, this finding (Batiha et al. 2021; Fan et al. 2020). Vitamin C is only one of several immune-boosting nutrients found in fruits and vegetables (Carr and Maggini, 2017). Because of this, most dietary recommendations for preventing COVID-19 emphasize the consumption of vegetables and fruits (Jayawardena and Misra, 2020).

2.9 Factors that may increase the risk in COVID-19 patients

Patients with COVID-19 may be at a higher risk of experiencing a severe illness or death if they are elderly (>60 years old) or have co-occurring medical conditions (Akbar and Gilroy, 2020; Richardson et al. 2020). Vulnerability to this severe illness cannot be solely attributed to advanced age or co-morbidities. Further, it seems that people's preexisting dietary choices are connected to the wide range of COVID-19 symptoms (Butler and Barrientos, 2020; Hull et al. 2020). However, the reasons why some individuals are more susceptible than others are not well understood.

Obviously, those who are nutritionally stable are better able to resist illness of any kind. Alam et al. (2021) have conducted a thorough study of the therapeutic potential of robust dietary therapies in the fight against COVID-19. Briefly, Abdulah and Hassan (2020) found that a greater consumption of fruits and sugar-sweetened goods and a lower intake of legumes/beans had a favorable and negative influence on infection and death rates, respectively, throughout the world. Several studies predicted that nutritional management/supplement/interventions might be seen as a therapeutic gun against pandemics (Brugliera et al. 2020; Cobre et al. 2021; Moscatelli et al. 2021; Singh et al. 2020). The intensity and length of COVID-19 have recently been linked to a number of lifestyle factors, including greater levels of physical activity and certain dietary patterns, such as eating plant-based diets, fruits, and chicken (Kim et al. 2021; Merino et al. 2021; Salazar-Robles et al. 2021; Tavakol et al. 2021). While humans share certain commonalities in their eating habits, there are also significant differences across and even within civilizations. Although diverse spices are considered to be hidden jewels of

multiple therapeutic components and associated health benefits, all the investigations described above mostly focused on the normally less spicy Western and Mediterranean diets (Sharif et al. 2018).

Therefore, it is vital to understand how dietary habits, such as the use of spices, affect COVID-19 susceptibility, hospitalization risk, and recovery. In this case, researchers have the option of taking into account a wide variety of predictors, including the dietary preferences of sick individuals before to infection, the severity of their symptoms, and so on. There is little question that the Bangladeshi diet is a very nuanced topic. With this in mind, it's important to zero in on specifics, such how often you eat and what kinds of foods you eat, as well as the proportions of carbs, proteins, and fats in your diet. Furthermore, the biological attribution of age and gender differences were taken into account to determine their relationship with the severity of COVID-19 and the need for hospitalization (Hu et al. 2021; Kushwaha et al. 2021). There is no known way to completely eliminate the COVID-19 infection rate, however the numerous beneficial predictors may assist to alleviate patients' suffering and shorten their lives.

Natural products have played an important part in the defense against infectious illness since ancient times. Because of their efficacy in preventing several types of microbial infection, they are being advocated for use in the prevention of COVID-19 (Aman and Masood, 2020; Gasmi et al. 2021).

Tea and coffee are popular beverages because they are believed to boost the immune system via their high levels of antioxidants (Ackaln and Sanlier, 2021). In COVID-19 instances, tea has been identified as a bioactive modulator of innate immunity

(Chowdhury and Barooah, 2020). Although coffee has been shown to have beneficial effects in the treatment of a variety of disorders, its role in the recovery from COVID-19 has yet to be determined (Belaroussi et al., 2020; Kennedy et al., 2021). There were also reports of the strong therapeutic efficacy of black caraway seeds and pickles, both of which are well recognized for their anti-microbial properties (Chakraborty and Roy, 2018; Forouzanfar et al. 2014). It is worth keeping in mind that the antibacterial, antiviral, antioxidant, and vitamin/mineral content of tea, honey, and pickles suggests that they may have some effect on COVID-19.

CHAPTER THREE:

METHODOLOGY

CHAPTER III

METHODOLOGY

3.1 Study design

It is a hospital based observational Cross- sectional study

3.2 Place of Study

Institute of Nutrition and Food Science (INFS), University of Dhaka

3.3 Study period

The study was conducted from 17thMay 2020 to 18thNovember 2020.

3.4 Study population

Target population of this study were adult residents of Dhaka city (aging:16-65 years) who were admitted in a selected tertiary hospital with Covid-19 infection.

3.5 Sampling method

Convenient sampling technique was used to include all available respondents. Data collection for dietary habits was done by: Seven days food frequency questionnaire (FFQ) method

3.6 Enrollment criteria

***3.6.1 Inclusion criteria*:**

- Patients who were admitted with SARS COV-2 associated infection during the COVID 19 pandemic.
- Respondents who were capable of communicating independently and capable of giving informed verbal consent to this study.

3.6.2 Exclusion criteria:

- Patients who were admitted for less then 5 days.
- Patients who refused to participate in the study.
- Patients who were admitted in the ICU.
- Subjects with mental disorders.

3.7 Sample size

The following formula will be used to calculate the sample size.

n=(z^2∝pq)/d^2

Where,

n = Desired sample size

= the normal standard deviate (level of statistical significance) which is set at 1.96 that corresponds to 95% of confidence level.

P = anticipated population proportion. (0.50)

q = 1- 0.50 = 0.50

d = degree of absolute precision, usually at 5%

For 95% level of confidence and 5% errors (to be allowed), the target sample size for p 50% set at:

n = ((1.96)^2 (0.50)(0.50))/((0.05)^2)

= 384.16

3.8 Data collection

- Data was collected through a structured questionnaire.
- The questionnaire was pre-tested among 20 participants and then the questionnaire was modified accordingly.
- The purpose of pre-testing was to determine ,if the questions were well understood and if it generated necessary data to address the objectives of the study
- No changes were made to the questionnaire after the pre-test.

3.9 Data Management and Analysis

IBM SPSS Statistics for Windows, version XXII (IBM Corp., Armonk, N.Y., USA) was used to conduct statistical analysis. The unpaired t-test was used to analyze the data, and the quantitative variables were reported as mean standard deviations. Frequencies, percentages, and the results of a Chi-square test were utilized to illustrate the quantitative data presented in a cross tabulation. A statistically significant difference was defined as an odds ratio below 0.05 with a 95% confidence range.

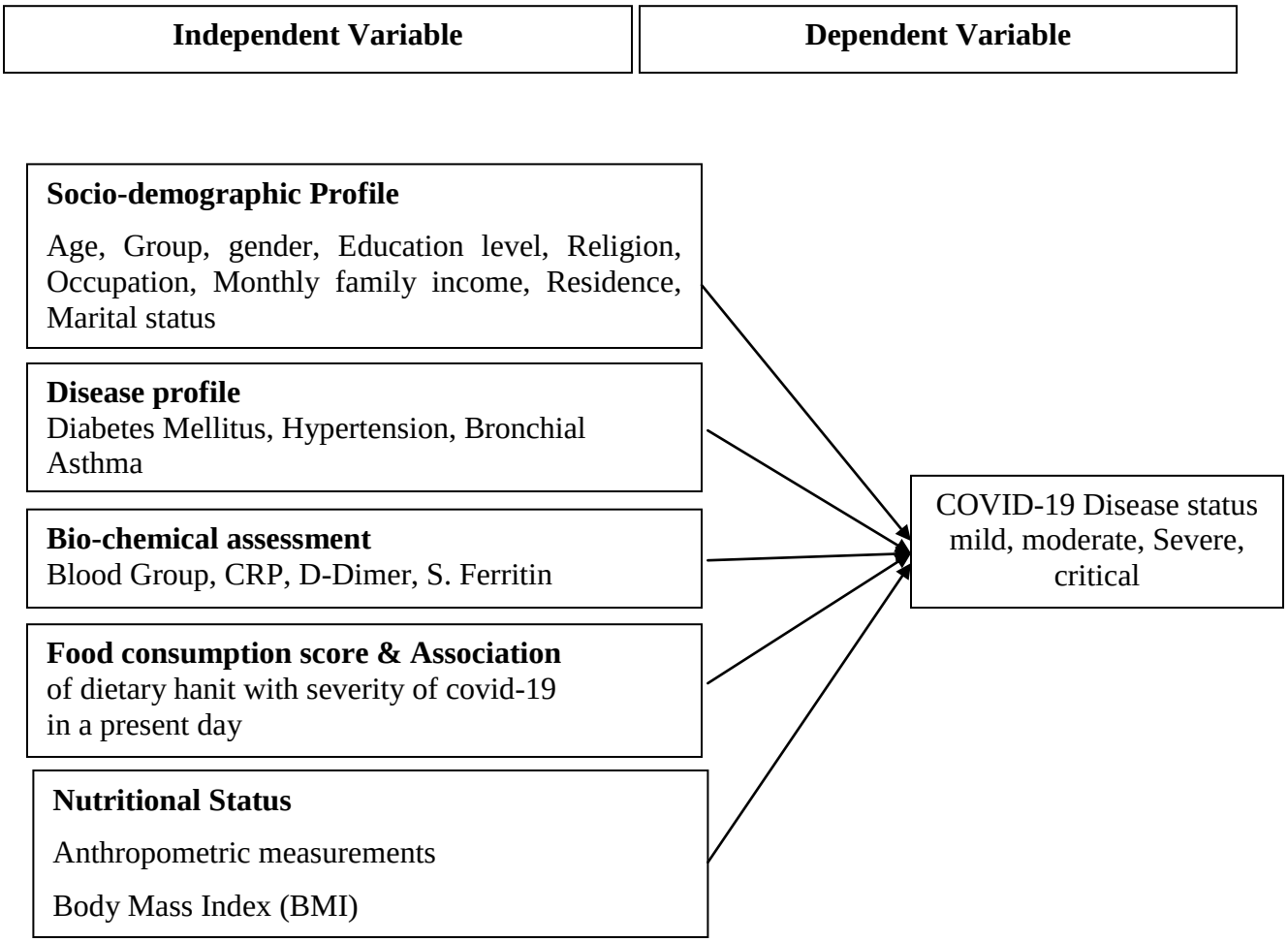
3.10 Ethical Considerations

- Each subject was notified about the purpose of the study.
- Subjects were assured about their right to refuse to participate in the study, and about confidentiality of the gathered information
- The data collection team was also warned about maintaining privacy of the respondents.

3.11 Quality Control & Quality Assurance

- For maintaining quality control and quality assurance of this study, designed questionnaire was developed according to objectives of study.
- For the feasibility approximate standard questionnaire was tested before going to actual data collection from the field.
- Designed questionnaire was developed according to objectives of study.
- Supervision of questionnaires.
- Regular check the questionnaire for completeness.
- Re-interview or recheck 5% respondent.
- Proper process was followed for the data cleaning, data collection, data management.

3.12 CONCEPTUAL FRAMEWORK



CHAPTER FOUR: RESULT

CHAPTER IV

RESULT

Study patients were distributed based on Covid-19 treatment severity, it was found that, 119(31.0%) were mild, 126(32.8%) were moderate, 91(23.7%) were severe, 48(12.5%) were critical in figure 1.

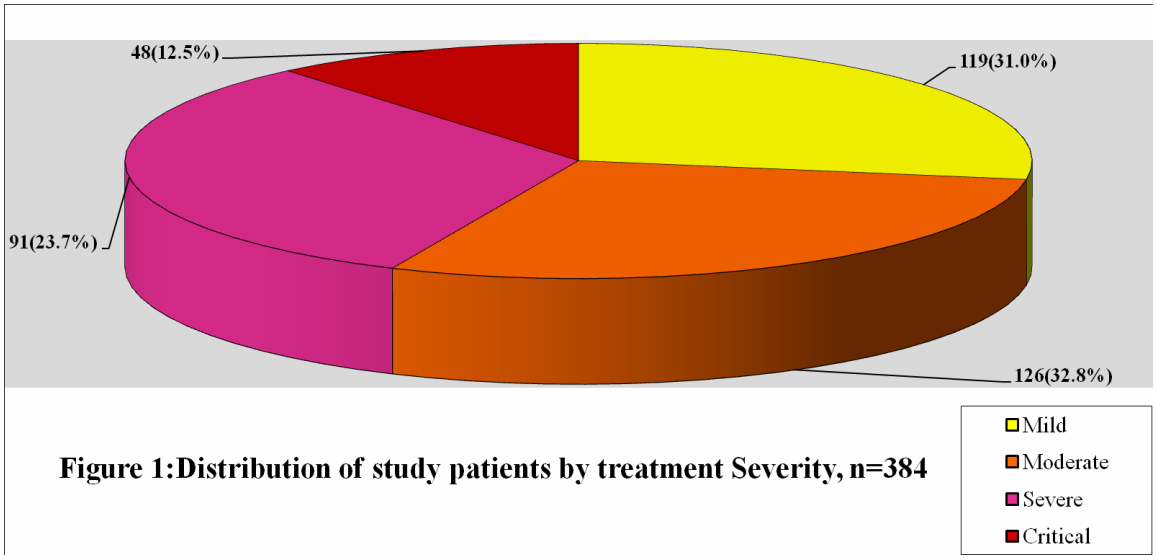


Figure 1:Distribution of study patients by treatment Severity, n=384

4.1Socio-demographic data

It was observed that almost half (45.3%) patients belonged to age young adults <40 years followed by 159(41.4%) belonged middle-aged adults 40-59 years and 51(13.3%) old adults >60. The mean age was 42.85±13.82 years with ranged from 14 to 65 years. Majority (82.8%) patients were male and 66(17.2%) were female. Three fourth (75.0%) patients came from urban area and 96(25.0%) from rural area. The mean number of family member was 7.06±1.22 ranged from 2 to 12. Majority (81.5%) patients were married, 59(15.3%) were unmarried in table I.

Table I

Distribution of the study patients by socio-demographic profile (n=384)

Socio-demographic profile	Number of patients (n)	Percentage (%)
Age		
Mean±SD	42.85±13.82	
Range (min-max)	14-65	
Young adults <40	174	45.3
Middle-aged adults 40-59	159	41.4
Old adults >60	51	13.3
Gender		
Male	318	82.8
Female	66	17.2
Number of family member		
Mean±SD	7.06±1.22	
Range (min-max)	2-12	
Marital status		
Married	313	81.5
Unmarried	59	15.3
Divorced/Seperated	2	0.5
Widow	10	2.6

Figure 2 showing that more than one third (39.6%) patients monthly family income were 35000 and above followed by 31.8% were 26000-35000 TK, 22.1% were 16000-25000 and 6.5% family income 5000-15000 TK.

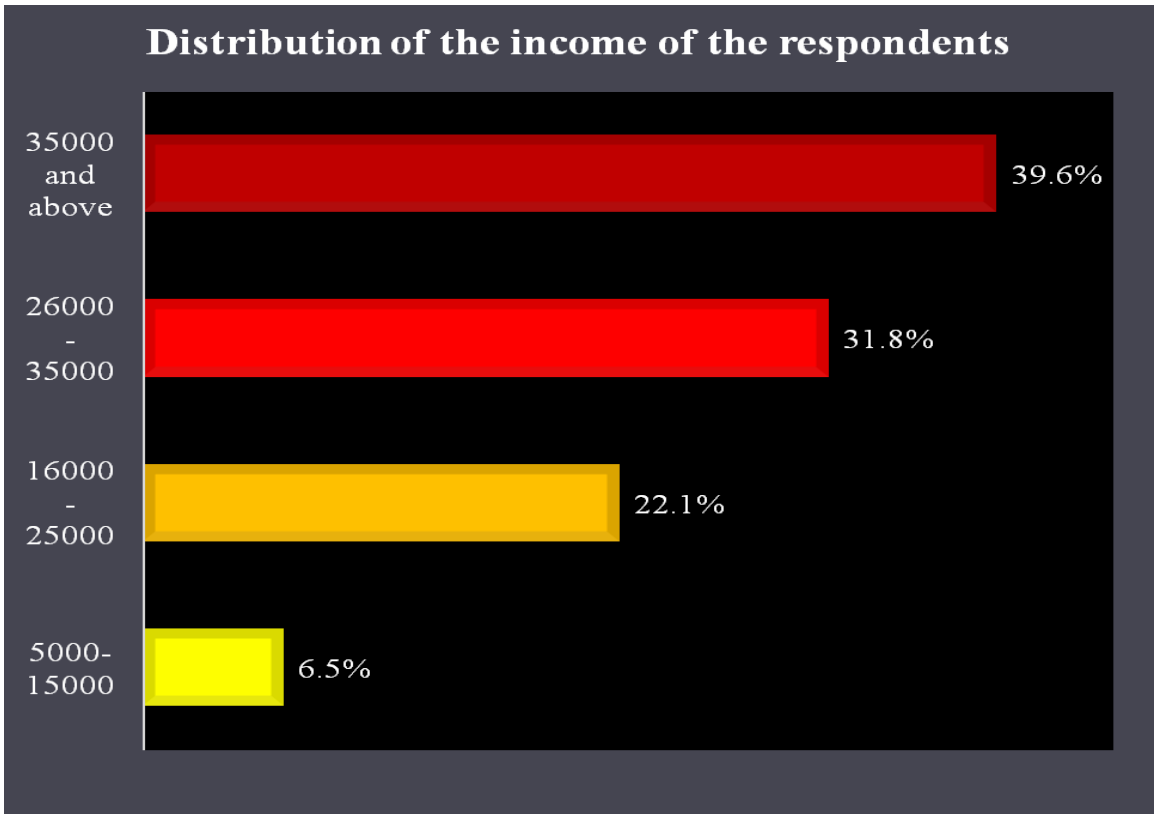


Figure 2:Monthly family income of COVID-19 patients (n=384)

Figure 3 showing thatone third (33.1%) of patients completed their graduation, 98(25.5%) post Graduate, 95(24.7%) HSC, 54(14.1%) SSC, 9(2.3%) primary and 1(0.3%) was illiterate.

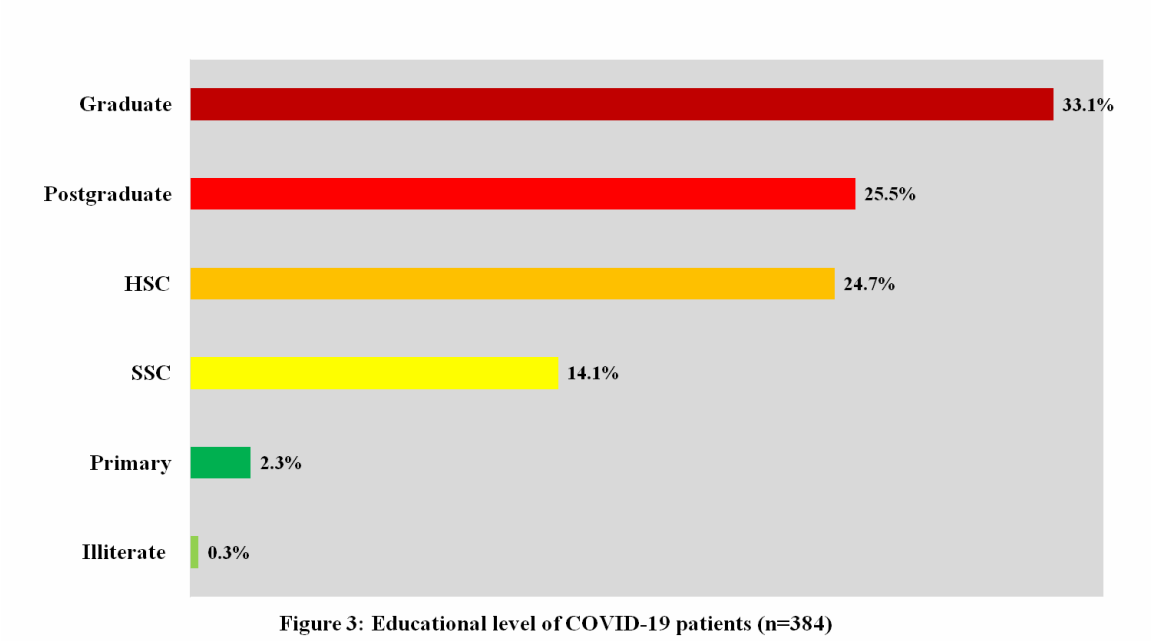


Figure 3: Educational level of COVID-19 patients (n=384)

Figure 4 showing that most (42.7%) of patients were Govt. service holder followed by 17.7% private service, 14.8% businessman, 10.2% housewife, 7.3% retired, 3.4% student, 2.6% others and 1.3% were labor.

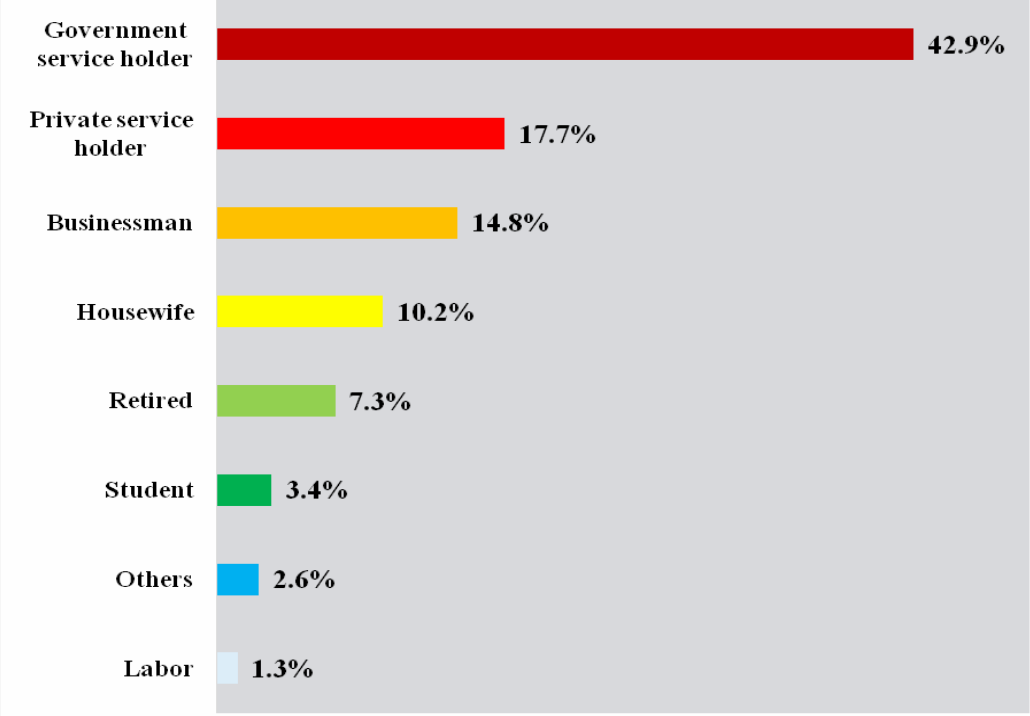


Figure 4: Occupational level of respondents (n=384)

Figure 5 showing that more than half (56.0%) of patients working duration were 8-12 hours, 138(35.9%) were <8 hours and 31(8.1%) were >12 hours.

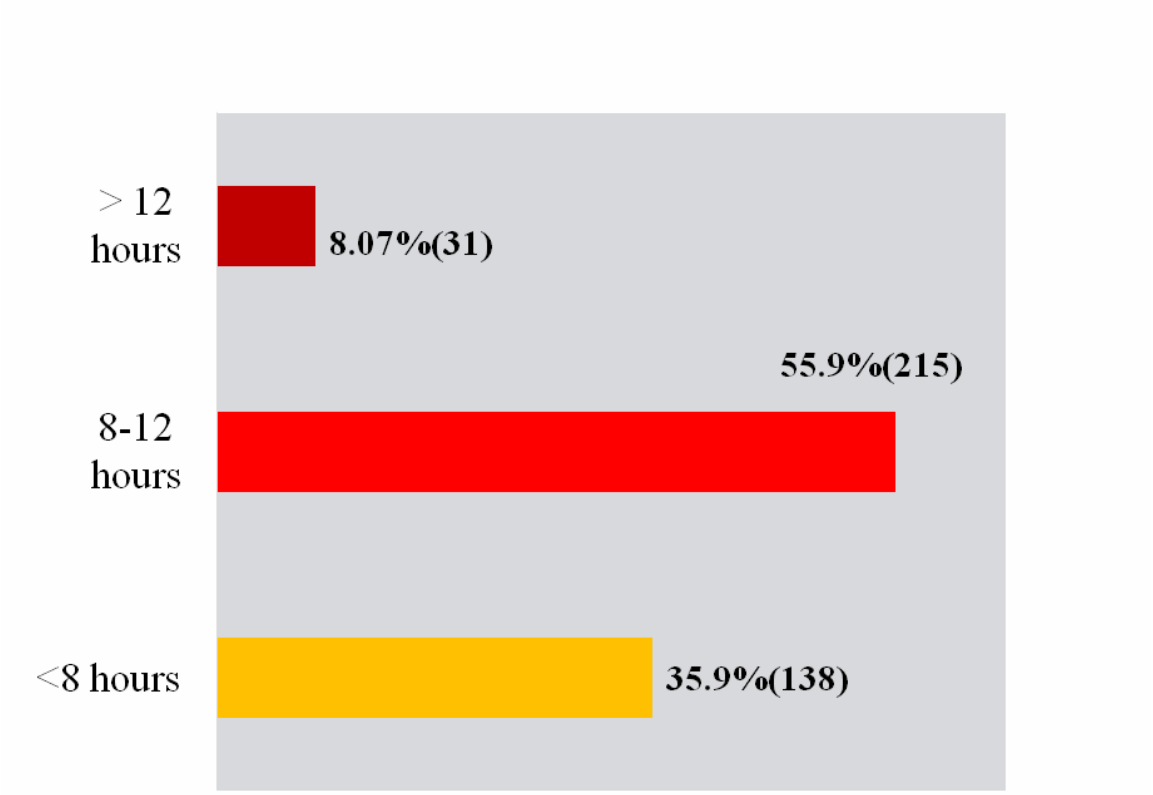


Figure 5: Typical working duration/Day of respondents(n=384)

4.2Cause of infection

Nearly half (46.8%) patients were going outside for job/work in severe/critical and 107(43.7%) in mild/moderate COVID-19 group. The difference was not statistically significant (p>0.05) between two groups in table II.

Table II

Association of causes of infection with the severity of Covid-19 patients (n=384)

Cause of infection	**Severe/Critical (n=139)**		**Mild/Moderate (n=245)**		***p* value**
	n	**%**	**n**	**%**	
Visiting abroad	2	1.4	3	1.1	0.939_{ns}
Going outside for work	65	46.8	107	43.7	
Affected from a family member	28	20.1	53	21.8	
Unknown	44	31.7	82	33.4	
Total	139	100.0	245	100.0	

ns=nothing significant
p value reached from Chi-square test

4.3Anthropometric and Biochemical assessment

In male patients, almost one third (30.0%) patients belonged to age 14-39 years in BMI <18.5 kg/m^2, 40(34.2%) in 18.5-24.9 kg/m^2 and 107(41.6%) in ≥25 kg/m^2. In female, two (20.0%) patients belonged to age 40-59 years in BMI <18.5 kg/m^2, 16(6.2%) in 18.5-24.9 kg/m^2 and 21(17.9%) in ≥25 kg/m^2. The difference was statistically not significant (p>0.05) between two groups (Table III).

Table III

Distribution of patients based on age, gender and BMI (n=384)

Genders	**BMI (kg/m^2)**						***p* value**
	<18.5		**18.5-24.9**		**≥25**		
	n	**%**	**n**	**%**	**n**	**%**	
Male							
Age (in years)							
14-39	3	30.0	40	34.2	107	41.6	
40-59	2	20.0	34	29.1	90	35.0	0.928ns
≥60	0	0.0	12	10.3	30	11.7	
Female							
Age (in years)							
14-39	2	20.0	4	3.4	9	3.5	
40-59	2	20.0	16	6.2	21	17.9	0.781ns
≥60	1	10.0	5	1.9	6	5.1	

ns=not significant

p value reached from Chi-square test

The mean BMI was 29.17±3.99 in severe/critical and 25.35±3.13in mild/moderate COVID-19 group. The difference was statistically significant ($p<0.05$) between two groups (Table IV).

Table IV

Distribution of the study patients by BMI (n=384)

BMI	**Total (n=384)**	**Severe/Critical (n=139)**	**Mild/Moderate (n=245)**	***p* value**
Mean± SD		29.17±3.99	25.35±3.13	0.013[s]
Range (min, max)		21.8,37	17,34.1	

s= significant

p value reached from t-test

Almost three fourth (74.1%) of patients had high CRP level in sever/critical and 47(19.2%) in mild/moderate COVID-19 group. Almost two third (61.8%) of patients had high D-DIMER level in sever/critical and 57(23.2%) in mild/moderate COVID-19 group. Almost three fourth (73.3%) of patients had high ferritin level in severe/critical and 86(35.1%) in mild/moderate COVID-19 group. The differences of CRP and D-DIMER level were statistically significant ($p<0.05$) between two groups (Table V).

Table V

C-Reactive Protein (CRP), D-Dimer and Sr. Ferritin level of Covid-19 patients (n=384)

	Severe/Critical (n=139)		**Mild/Moderate (n=245)**		***p* value**	**Reference Range**
	n	**%**	**n**	**%**		
CRP Level						
High (n=150)	103	74.1	47	19.2	0.001^{s}	0.0-5.0 mg/dL
Normal (n=234)	36	25.9	198	80.8		
D-DIMER Level						
High (n=143)	86	61.9	57	23.2	0.001^{s}	<0.5 mg/L
Normal (n=241)	53	38.1	188	76.7		
Ferritin Level						
High (n=261)	102	73.4	159	64.9	0.086^{ns}	8-388 ng/mL
Normal (n=123)	37	26.2	86	35.1		

s= significant

ns= not significant

p value reached from Chi-square test

4.4 Blood groups

Almost one third (30.2%) patients blood group were B+ in severe/critical and 102(41.7%) in mild/moderate COVID-19 group. The difference was statistically significant ($p<0.05$) between two groups (Table VI).

Table VI

Association between severity of Covid-19 and blood group of the patients (n=384)

Blood group	**Severe/Critical (n=139)**		**Mild/Moderate (n=245)**		***p* value**
	n	**%**	**n**	**%**	
Positive trait (+ve)					
A+	36	25.9	55	22.4	
B+	42	30.2	102	41.7	
AB+	17	12.2	16	6.5	
O+	29	20.9	51	20.8	0.019[s]
Negative trait (-ve)					
A-	4	2.9	2	0.8	
B-	5	3.6	7	2.9	
AB-	5	3.6	2	0.8	
O-	1	0.7	10	4.1	
Total	139	100.0	245	100.0	

s= significant

p value reached from Chi-square test

4.5Clinical Findings

Almost half (41.8%) of patients had uncontrolled diabetes mellitus in sever/critical and 12(4.9%) in mild/moderate COVID-19 group. Nine (6.5%) of patients had uncontrolled HTN in sever/critical and 4(1.6%) in mild/moderate COVID-19 group. Almost half (49.6%) of patients had dyspnoea in sever/critical and 5(2.0%) in mild/moderate COVID-19 group. The differences of disease profile were statistically significant ($p<0.05$) among the group (Table VII).

Table VII

Distribution of the study patients by disease profile (n=384)

Disease profile	**Severe/Critical (n=139)**		**Mild/Moderate (n=245)**		***p* value**
	n	**%**	**n**	**%**	
Diabetes Mellitus					
Uncontrolled Diabetes Mellitus	58	41.8	12	4.9	
Controlled Diabetes Mellitus	28	20.1	52	21.2	0.001[s]
Non-Diabetic	53	38.1	181	73.9	
Hypertension					
Uncontrolled HTN	9	6.5	4	1.6	
Controlled HTN	43	30.9	25	10.2	0.001[s]
Non HTN	87	62.6	216	88.2	
Bronchial Asthma					
Dyspnoea (Uncontrolled)	69	49.6	5	2.0	
Controlled Asthma	12	8.6	43	17.6	0.001[s]
Non asthmatic	58	41.7	197	80.4	

s= significant
p value reached from Chi-square test

4.6 Dietary Intake Related Findings

All patients had eaten cereal in daily. More than half (53.9%) patients had eaten Fish/Meat/Egg in daily, 98(25.5%) in 5-6 times per week, 52(13.5%) in 3-4 times per week, 23(6.0%) in 1-2 times per week and 4(1.0%) in not last week. More than half (59.9%) patients had eaten milk/dairy food in daily, 48(12.5%) in 5-6 times per week, 38(9.9%) in 3-4 times per week, 22(5.7%) in 1-2 times per week, 19(4.9%) in not last week and 27(7.0%) in never. Almost one third (30.7%) patients had eaten pulse and nuts in daily, 113(29.4%) in 5-6 times per week, 79(20.6%) in 3-4 times per week, 41(10.7%) in 1-2 times per week, 30(7.8%) in not last week and 3(0.8%) in never. More than half (51.0%) patients had eaten vegetables in daily, 48(12.5%) in 5-6 times per week, 30(7.8%) in 3-4 times per week, 76(19.8%) in 1-2 times per week, 51(13.3%) in not last week and 19(4.9%) in never. More than half (56.3%) patients had eaten fruit in daily, 54(14.1%) in 5-6 times per week, 38(9.9%) in 3-4 times per week, 32(8.3%) in 1-2 times per week, 24(6.3%) in not last week and 20(5.2%) in never. Majority (91.6%) patients had eaten fats and oils in daily, 28(7.2%) in 5-6 times per week and 4(1.0%) in 3-4 times per week. More than three fourth (79.4%) patients had eaten sugar/beverages in daily, 10(2.6%) in 5-6 times per week, 17(4.4%) in 3-4 times per week, 12(3.1%) in 1-2 times per week, not found in not last week and 40(10.4%) in never. Majority (89.0%) patients had eaten condiments/others in daily, 42(10.9%) in 5-6 times per week, 37(9.6%) in 3-4 times per week and not taken in 1-2 times per week & never (Table VIII).

Table VIII

Distribution of Respondents by their average food intake in last 7 days (n=384)

Food stuff	Daily		5-6 times per week		3-4 times per week		1-2 times per week		Not last week		Never	
	n	%	n	%	n	%	n	%	n	%	n	%
Cereal	384	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Fish/Meat/Egg	207	53.9	98	25.5	52	13.5	23	6.0	4	1.0	0	0.0
Milk/dairy food	230	59.9	48	12.5	38	9.9	22	5.7	19	4.9	27	7.0
Pulse and nuts	118	30.7	113	29.4	79	20.6	41	10.7	30	7.8	3	0.8
Vegetables	196	51.0	48	12.5	30	7.8	76	19.8	51	13.3	19	4.9
Fruit	216	56.3	54	14.1	38	9.9	32	8.3	24	6.3	20	5.2
Fats and oils	352	91.6	28	7.2	4	1.0	0	0.0	0	0.0	0	0.0
Sugar/Beverages	305	79.4	10	2.6	17	4.4	12	3.1	0	0.0	40	10.4
Condiments/Others	342	89.0	42	10.9	37	9.6	0	0.0	0	0.0	0	0.0

Figure 6 showing that most (78.3%) of patients had taken acceptable high food consumption (>52) followed by 15.1% taken acceptable low food consumption, 4.7% taken borderline consumption and 1.9% taken poor consumption.

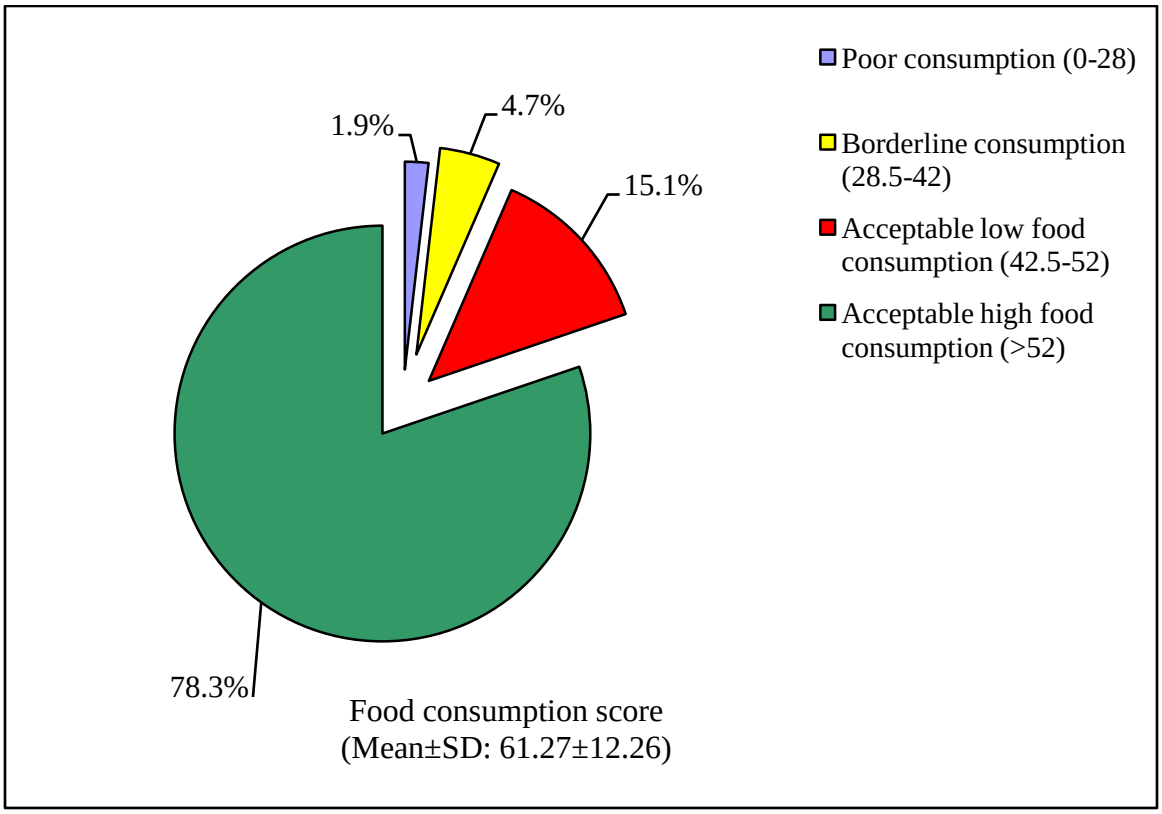


Figure 6: Pie chart showing distribution of the study patients by their food consumption score

Majority (83.4%) of patients had taken acceptable high food consumption (>52) in sever/critical and 185(75.5%) in mild/moderate COVID-19 group. The differences was not statistically significant (p>0.05) between two groups (Table IX).

Table IX

Distribution of the study patients by food consumption score (n=384)

Food consumption score	**Severe/Critical (n=139)**		**Mild/Moderate (n=245)**		***p* value**
	n	**%**	**n**	**%**	
Poor consumption (0-28)	3	2.1	4	1.6	0.059^{ns}
Borderline consumption (28.5-42)	8	5.8	10	4.1	
Acceptable low food consumption (42.5-52)	12	8.7	46	18.8	
Acceptable high food consumption (>52)	116	83.4	185	75.5	

ns= not significant

p value reached from Chi-square test

All (100.0%) of patients had taken cereal in both groups severe/critical and mild/moderate COVID-19 group. More than one fourth (28.8%) patients had taken pulse and legumes in severe/critical and 78(31.8%) in mild/moderate COVID-19 group. Almost two third (64.0%) patients had not taken vegetables in severe/critical and 117(47.8%) in mild/moderate COVID-19 group. No vegetables taken had 1.95 times significantly increase risk to developed severity of COVID-19 with (95% CI 1.24 to 3.00). Almost three fourth (71.2%) patients had taken green leafy vegetables in severe/critical and 97(39.6%) in mild/moderate COVID-19 group. Green leafy vegetables had 0.26 times significantly decrease risk to developed severity of COVID-19 with (95% CI 0.17 to 0.41). More than half (52.5%) patients had taken starchy roots, tubers in severe/critical and 143(58.4%) in mild/moderate COVID-19 group. More than half (53.2%) patients had taken nuts and seeds in severe/critical and 119(48.6%) in mild/moderate COVID-19 group. More than three fourth (78.4%) patients had taken spices, condiments and herbs in severe/critical and 233(95.1%) in mild/moderate COVID-19 group. Spices, Condiments and Herbs had 0.19 times significantly decrease risk to developed severity of COVID-19 with (95% CI 0.09 to 0.37). More than half (54.7%) patients had taken fruits in severe/critical and 140 (57.1%) in mild/moderate COVID-19 group. More than one fourth (26.9%) patients had taken fish, shellfish in severe/critical and 208(84.9%) in mild/moderate COVID-19 group. Fish, Shellfish had 0.07 times significantly decrease risk to developed severity of COVID-19 with (95% CI 0.04 to 0.11). Majority (87.8%) patients had taken meat poultry in severe/critical and 199(81.2%) in mild/moderate COVID-19 group. Meat poultry had 1.66 times significantly increase risk to developed severity of COVID-19 with (95% CI 0.08 to 3.16). Almost half (45.3%) patients had

taken egg in severe/critical and 167(68.2%) in mild/moderate COVID-19 group. Egg had 0.58 times significantly decrease risk to developed severity of COVID-19 with (95% CI 0.25 to 0.59). More than one third (38.1%) patients had taken milk and milk products in severe/critical and 126(51.4%) in mild/moderate COVID-19 group. Milk and milk products had 0.58 times significantly decrease risk to developed severity of COVID-19 with (95% CI 0.37 to 0.91). Majority (90.6%) patients had taken fats and oils in severe/critical and 226(92.2%) in mild/moderate COVID-19 group. More than three fourth (78.4%) patients had taken beverages (sugary food) in severe/critical and 196(80.0%) in mild/moderate COVID-19 group. Beverages (sugary food) had 1.79 times significantly increase risk to developed severity of COVID-19 with (95% CI 1.12 to 2.88). Almost half (41.0%) patients had taken miscellaneous(Salty foods) in severe/critical and 74(30.2%) in mild/moderate COVID-19 group. Miscellaneous(Salty foods) had 1.61 times significantly increase risk to developed severity of COVID-19 with (95% CI 1.02 to 2.54) (Table X).

Table X

Association of dietary habit with severity of Covid-19(n=384)

Dietary habit	**Severe/Critical (n=139)**		**Mild/Moderate (n=245)**		**OR (95% CI)**	***p* value**
	n	**%**	**n**	**%**		
Cereal						
Yes	139	100.0	245	100.0	-	-
No	0	0.0	0	0.0		
Pulse and Legumes						
Yes	40	28.8	78	31.8	0.87 (0.53-1.40)	0.532^{ns}
No	99	71.2	167	68.2	1	
Vegetables						
No	89	64.0	117	47.8	1.95 (1.24-3.00)	0.002^{s}
Yes	50	36.0	128	52.2	1	

Green leafy vegetables						
Yes	99	71.2	97	39.6	0.26 (0.17-0.41)	0.001[s]
No	40	28.8	148	60.4	1	
Starchy roots, Tubers						
Yes	73	52.5	143	58.4	0.79 (0.51-1.23)	0.267[ns]
No	66	47.5	102	41.6	1	
Nuts and Seeds						
Yes	74	53.2	119	48.6	1.21 (0.78-1.66)	0.379[ns]
No	69	46.8	126	51.4	1	
Spices ,Condiments and Herbs						
Yes	109	78.4	233	95.1	0.19 (0.09-0.37)	0.001[s]
No	30	21.6	12	4.9		
Fruits						
Yes	76	54.7	140	57.1	0.90 (0.59-1.38)	0.639[ns]
No	63	45.3	105	42.9		
Fish, Shellfish						
Yes	38	26.9	208	84.9	0.07 (0.04-0.11)	0.008[s]
No	101	73.1	37	15.1	1	
Meat poultry						
Yes	122	87.8	199	81.2	1.66 (0.08-3.16)	0.096[ns]
No	17	12.2	46	18.8	1	
Eggs						
Yes	63	45.3	167	68.2	0.38 (0.25-0.59)	0.001[s]
No	76	54.7	78	31.8	1	
Milk and milk products						
Yes	53	38.1	126	51.4	0.58 (0.37-0.91)	0.012[s]
No	86	61.9	119	48.6	1	
Fats and oils						
Yes	126	90.6	226	92.2	0.70 (0.34-1.43)	0.335[ns]
No	15	9.3	19	7.8	1	
Beverages (sugary food)						
Yes	109	78.4	196	80.0	1.79 (1.12-2.88)	0.014[s]
No	30	21.6	49	20.0	1	
Miscellaneous(Salty foods)						
Yes	57	41.0	74	30.2	1.61 (1.02-2.54)	0.032[s]
No	82	59.0	171	69.8	1	

s= significant
ns= not significant
p value reached from Chi-square test

CHAPTER FIVE: DISCUSSION

CHAPTER V

DISCUSSION

The major objective of the study was to find out the dietary habit, nutritional status, co-morbidities and severity of COVID-19 patients. The study was conducted among 384 patients which represents their socio demographic profile, causes of infection, anthropometric and biochemical assessments, food consumption score and association of dietary habits with severity of COVID-19 category and treatment. It was a cross sectional study in which patients were distributed based on Covid-19 treatment severity, it was found that, 119(31.0%) were mild, 126(32.8%) were moderate, 91(23.7%) were severe, 48(12.5%) were critical. In this study, regarding the distribution of the study patients by socio-demographic profile, It was observed that almost half (45.3%) patients belonged to age young adults <40 years followed by 159(41.4%) belonged middle-aged adults 40-59 years and 51(13.3%) old adults >60. The mean age was 42.85±13.82 years with ranged from 14 to 65 years. Majority (82.8%) patients were male and 66(17.2%) were female. One third (33.1%) of patients completed their graduation, 98(25.5%) post Graduate, 95(24.7%) HSC, 54(14.1%) SSC, 9(2.3%) primary and 1(0.3%) was illiterate. More than one third (39.6%) patients monthly family income were 35000 and above. Three fourth (75.0%) patients came from urban area and 96(25.0%) from rural area. The mean number of family member was 7.06±1.22 ranged from 2 to 12. Majority (81.5%) patients were married, 59(15.3%) were unmarried. Most (42.7%) of patients were Govt. service holder. More than half (56.0%) of patients working duration were 8-12 hours, 138(35.9%) were <8 hours and 31(8.1%) were >12 hours.

Similar demographics were seen in a research conducted in Bangladesh by Hossain et al. (2021), which found that out of 486 patients, 306 (62.9 percent) were male and 180 (47.1 percent) were female, with a mean age of 53.47 13.86. A third of all patients were between the ages of 51 and 60. Twenty-five percent of patients required treatment in an

intensive care unit; fifty one percent to seventy percent of patients had tomographic lung involvement; and nineteen point three percent of patients died from their illness. According to Ali et al., (2021), the average age at which asymptomatic individuals were evaluated was 35 years, compared to 37 years for symptomatic cases ($p = 0.004$). Our findings show that males (60.12 percent) were more likely to be impacted than females (39.88 percent).About 19% of the patients were asymptomatic, whereas 62% of the symptomatic cases had co-occurring disorders. The most common chronic diseases in both groups were diabetes mellitus, high blood pressure, and asthma caused by allergic reactions to dust and pollen. Males made up 65.39 percent of COVID-19 cases, while females made up 34.61 percent, and the mean age of infected and recovered patients was 39.47 17.59 years and 36.85 18.51 years, respectively, as reported by Kushwaha et al (2021). Higher rates of COVID-19 infection and mortality may be seen in men and the elderly because to the risk factors, co-morbid diseases, and biological variations that vary with gender and age.

According to Abdulsalam et al. (2021), 50.0% of the sample population was married, and undergraduates made up the biggest occupational category (39.6 percent). Similar to our research, most of the participants (53.2% of the total) came from middle class backgrounds. According to Jordan et al. (2021), 71% of respondents had bachelor's degrees or more, with those holding a high school diploma or A-level certificate coming in second (15 percent). The three most common responses were "worker," "civil servant," and "college student" (29, 28, and 28 percent , respectively). Our findings are consistent with those of a research by Nkire et al. (2021), which found that the vast majority of respondents had completed some kind of higher education, were now working, were married, cohabiting, or in a committed relationship, and were homeowners (65.7 percent).

In addition, Hossain et al. (2022) reported that in Bangladesh, urban areas (urban vs. rural: AOR = 1.451, 95 percent CI = 1.165, 1.806; p = 0.001) and wealthier families (25,000 BDT vs. >50,000 BDT: AOR = 0.727, 95 percent CI = 0.540, 0.979; p = 0.036) were associated with lower rates of HIV infection. According to Huang et al. (2021), SARS-CoV-2 is more contagious than influenza, and the effective reproduction rate (Rt) of the virus is likely higher in major metropolitan areas owing to increased chances for viral reproduction. This claim may be consistent with our research results on the significant frequency of severe COVID-19 among city-dwelling individuals.

Mutambudzi et al. (2021) found that the risk of severe COVID-19 was greater among healthcare professionals, social and education workers, and other vital employees compared to the general population. Among the more specific categories, those working in medical assistance, social care, and transportation were the most at risk. The majority of asymptomatic instances, according to a research by Ali et al. (2021), were found in households with four or more members.

Patients in the severe/critical COVID-19 group were almost as likely as those in the mild/moderate COVID-19 group to go outdoors for job/work (46.8 percent vs. 107 (43.7 percent), respectively). The p value was not significantly different from 0.05, hence there was no discernible difference between the groups. Our findings are consistent with those of a research conducted in Bangladesh by Islam et al. (2020), who found that young working professionals and individuals are the most common carriers of COVID-19.

Regarding the correlation between age, gender, and BMI, it was found that among male patients, 30.0% were between 16 and 39 years old with a BMI of 18.5kg/m2 or less,

34.22% were between 18.5kg/m2 and 24.9kg/m2, and 41.6% were above 25kg/m2. Similar to our findings, Gao et al. (2021) reported that among 6,910,695 SARS-CoV-2-positive patients (mean BMI 26.78 [SD 5.59]), 13,503 (0.20%) were hospitalized, 1,601 (0.02%) were admitted to an intensive care unit, and 5,479.0 (0.08%) died. They also discovered a linear rise in the probability of severe COVID-19 leading to hospital admission and mortality at a BMI of above 23, as well as a linear increase in the risk of admission to an ICU throughout the whole BMI range that was not linked to increased risks of associated illnesses.

Of the women who were treated, 21 (17.9%) had a body mass index (BMI) below 25kg/m2 , 2 (10.0%) were between the ages of 40 and 59 and had a BMI of 18.5 kg/m2 or less, and 16 (6.2%) had a BMI between 18.5kg/m2 and 24.9kg/m2. Among the group, there was no statistically significant difference ($p>0.05$). Hossain et al. (2022) found that female participants made up 45.1% of the total. The average body mass index (BMI; mean SD) was 22.77 4.11 (mean difference = 0.753; p 0.001). According to the results of a multinomial logistic regression study, there was a statistically significant difference between men and women [male vs. female: adjusted relative risk ratio (RRR) = 1.448; 95% confidence interval (CI) = 1.022, 2.053; p = 0.037].

Extreme/critical cases had a mean BMI of 29.173.98, whereas mild/moderate cases averaged 25.353.13. With a p-value of less than 0.05, the difference between the two groups could be seen. Patients with a body mass index (BMI) 30 kg/m2 were shown to have a 2.35-fold risk (OR = 2.35, 95 percent CI = 1.64-3.38, P 0.001) for critical COVID-19 and a 2.68-fold risk for COVID-19 mortality (OR = 2.68, 95 percent CI = 1.65-4.37, P

0.001). Patients with obesity and age > 60 years had a substantially elevated risk of critical COVID-19 (OR = 3.11, 95 percent CI = 1.73-5.61, P 0.001) and COVID-19 mortality (OR = 3.93, 95 percent CI = 2.18-7.09, P 0.001), according to subgroup analysis findings. The findings of a meta-analysis indicated that age significantly influenced the correlation between body mass index and COVID-19 mortality (Coef. = 0.036, P = 0.048). Critical COVID-19 was linearly associated with BMI (Pnon-linearity = 0.242) and mortality was linearly associated with BMI (Pnon-linearity = 0.116) in a random-effects dose-response meta-analysis. Every increase of 1 kg/m2 in BMI was associated with a 9% higher risk of catastrophic COVID-19 (OR = 1.09, 95% CI = 1.04-1.14, P 0.001) and a 6% higher risk of death (OR = 1.06, 95% CI = 1.02-1.10, P = 0.002). They also found that the severity of COVID-19 and the risk of death were both linearly related to the subject's body mass index. In addition, the probability of critical COVID-19 and in-hospital mortality of COVID-19 was considerably elevated in those with a body mass index (BMI) of 30 kg/m2 or above

.In this study, regarding the C-Reactive Protein (CRP), D-Dimer and Sr. Ferritin level of Covid-19 patients. It was observed that almost three fourth (74.1%) of patients had high CRP level in sever/critical and 47(19.2%) in mild/moderate COVID-19 group. Almost two third (61.8%) of patients had high D-DIMER level in sever/critical and 57(23.2%) in mild/moderate COVID-19 group. Almost three fourth (73.3%) of patients had high ferritin level in severe/critical and 86(35.1%) in mild/moderate COVID-19 group. The differences of CRP and D-DIMER level were statistically significant ($p<0.05$) between two groups.

In this study, the distribution of the study patients by blood group, showed that almost one third (30.2%) patients' blood group were B+ in severe and 102(41.7%) in mild/moderate COVID-19 group. The difference was statistically significant ($p<0.05$) between two group. In a study, Rana et al (2021) found that blood group A (odds ratio, 1.53; CI, 1.40–1.66; $p < 0.001$) and B (odds ratio, 1.15; CI, 1.06–1.24; $p < 0.001$) is observed to be significantly associated with COVID-19 susceptibility, whereas blood group O (odds ratio, 0.65; CI, 0.59–0.71; $p < 0.001$) and AB (odds ratio, 0.66; CI, 0.59–0.71; $p < 0.001$) have low risk of COVID-19 infection which is almost comparable to our study.

In this analysis, we looked at how patients with different diseases were distributed across the research. Nearly half of patients with severe/critical COVID-19 had uncontrolled diabetes mellitus, whereas only 12 patients with mild/moderate COVID-19 had uncontrolled diabetes mellitus. The COVID-19 severe/critical group comprised nine patients (6.5%) with uncontrolled HTN, whereas the COVID-19 mild/moderate group had four (1.6%). In the severe/critical COVID-19 group, almost half of patients (49.5%) and 5(2.0%) in the mild/moderate COVID-19 group exhibited dyspnea. The statistical significance of the group differences in illness profiles was $p<0.05$.

In this study, distribution of respondents by their average food intake in last 7 days. It was observed that all patients had eaten cereal in daily. More than half (53.9%) patients had eaten Fish/Meat/Egg in daily, 98(25.5%) in 5-6 times per week, 52(13.5%) in 3-4 times per week, 23(6.0%) in 1-2 times per week and 4(1.0%) in not last week. More than half (59.9%) patients had eaten milk/dairy food in daily, 48(12.5%) in 5-6 times per

week, 38(9.9%) in 3-4 times per week, 22(5.7%) in 1-2 times per week, 19(4.9%) in not last week and 27(7.0%) in never. Almost one third (30.7%) patients had eaten pulse and nuts in daily, 113(29.4%) in 5-6 times per week, 79(20.6%) in 3-4 times per week, 41(10.7%) in 1-2 times per week, 30(7.8%) in not last week and 3(0.8%) in never. More than half (51.0%) patients had eaten vegetables in daily, 48(12.5%) in 5-6 times per week, 30(7.8%) in 3-4 times per week, 76(19.8%) in 1-2 times per week, 51(13.3%) in not last week and 19(4.9%) in never. More than half (56.3%) patients had eaten fruit in daily, 54(14.1%) in 5-6 times per week, 38(9.9%) in 3-4 times per week, 32(8.3%) in 1-2 times per week, 24(6.3%) in not last week and 20(5.2%) in never. Majority (91.6%) patients had eaten fats and oils in daily, 28(7.2%) in 5-6 times per week and 4(1.0%) in 3-4 times per week. More than three fourth (79.4%) patients had eaten sugar/beverages in daily, 10(2.6%) in 5-6 times per week, 17(4.4%) in 3-4 times per week, 12(3.1%) in 1-2 times per week, not found in not last week and 40(10.4%) in never. Majority (89.0%) patients had eaten condiments/others in daily, 42(10.9%) in 5-6 times per week, 37(9.6%) in 3-4 times per week and not taken in 1-2 times per week & never..

Rice eaters, according to a research by Watanabe and Inuma (2020) in Japan, have a unique composition of gut microbiota that boosts their inherent protection against viral infection. Asia has lower infection rates than the West, and this trend may be attributable to dietary differences. To combat the COVID-19 pandemic, national efforts should include promoting healthier agricultural policies and diets, notably via the increased use of brown rice and rice bran. It seems that the antiviral effects of a diet heavy on rice and fish outweigh those of a diet heavy on bread and meat in the West. There is a lot of

evidence that eating brown rice and rice bran may help you live a longer, healthier life (Watanabe et al. 2020).

The weekly average consumption of the food categories during the COVID-19 was published by Ruiz-Roso et al. (2020). During lockdown, these patients greatly increased their consumption of dairy products, vegetables, snacks, and sugary meals, with sugary foods and snacks being the most apparent. Percentages of patients who consumed sugary meals, snacks, veggies, and dairy products on a daily or weekly basis were the most informative dietary patterns. What about the other food categories? (fruit, meat, fish and eggs, cereal, nut, legumes and sugar-sweetened beverages).

According to Hossain et al. (2022), during the COVID-19 pandemic in Bangladesh, a multinomial logistic regression analysis indicated that consuming bigger meals/snacks had a substantial influence on obesity.

There is some evidence from a number of studies to suggest that one's diet may affect the likelihood of contracting COVID-19, the intensity of symptoms, and the length of time spent sick. Previous research on the link between food and COVID-19 is lacking (Kim et al. 2021). Plant-based diets are rich in nutrients, especially phytochemicals (polyphenols, carotenoids), vitamins, and minerals, all of which are important for a competent immune system, and fish is an important source of vitamin D and omega-3 fatty acids, both of which have anti-inflammatory properties, as they reported.

Haskaraca et al. (2021), who surveyed 1000 people across multiple cities in Turkey, found that the vast majority (77%) continued eating the same amount (or more) of red

meat, poultry, and fish despite the COVID-19 pandemic. However, 10%, 8%, and 3% of respondents said their consumption of red meat, poultry, and fish had increased, respectively. There was also a decline in the intake of red meat (13%), chicken meat (11%), and fish (31%). There was a decline in both red and white meat consumption due to cost considerations, whereas fish consumption fell due to accessibility issues.

Researchers Darand et al. (2021) found that a diet moderate in total dairy and high in low-fat dairy products reduced the risk of contracting COVID-19 by 37% and acted as a protective factor against the virus.

It has been reported by Jordan et al (2021) that since the beginning of the pandemic, people have been less likely to consume a wide variety of vegetables, including "dark green leafy vegetables" (16.8%), "provitamin A rich vegetables" (13.4%), "starchy vegetables" (12.2%), "legumes" (15.2%), and "other vegetables" (6.2%).

Among 2970 participants from 18 nations, Ismail et al. (2021) found that 6.2% ate five or more meals per day, down from 2.2% before the pandemic (P 0.001), and that 48.8% did not eat fruits on a regular basis.

After taking into consideration other healthy habits, social determinants of health, and viral transmission parameters, Merino et al. (2021) found that a healthy diet was still related with a decreased incidence of COVID-19 and severe COVID-19. Nutrition quality may have a direct role in COVID-19 susceptibility and development, since the combined risks linked with poor diet and socioeconomic hardship were larger than the risks associated with each category alone. Their research suggests that socioeconomic

determinants of health, as well as efforts to enhance nutrition and metabolic health, may be crucial in lessening the impact of this epidemic.

The participants in this research were split up according to their food intake scores. Patients were found to have an acceptable high food consumption rate of 78.3% (>52), a low food consumption rate of 15.1%, a borderline consumption rate of 4.7%, and a bad food consumption rate of 1.94%. In the severe/critical COVID-19 group, 83.4% of patients had taken an acceptable high food consumption (>52), whereas in the mild/moderate group, 75.5% of patients had done so. There was no statistically significant difference ($p>0.05$) between the two groups.

In this study, regarding the association of dietary habit with severity of Covid-19. All (100.0%) of patients had taken cereal in both groups severe/critical and mild/moderate COVID-19 group. More than one fourth (28.8%) patients had taken pulse and legumes in severe/critical and 78(31.8%) in mild/moderate COVID-19 group. Almost two third (64.0%) patients had not taken vegetables in severe/critical and 117(47.8%) in mild/moderate COVID-19 group. No vegetables taken had 1.95 times significantly increase risk to developed severity of COVID-19 with (95% CI 1.24 to 3.00). Almost three fourth (71.2%) patients had taken green leafy vegetables in severe/critical and 97(39.6%) in mild/moderate COVID-19 group. Green leafy vegetables had 0.26 times significantly decrease risk to developed severity of COVID-19 with (95% CI 0.17 to 0.41). More than half (52.5%) patients had taken starchy roots, tubers in severe/critical and 143(58.4%) in mild/moderate COVID-19 group. More than half (53.2%) patients had taken nuts and seeds in severe/critical and 119(48.6%) in mild/moderate COVID-19

group. More than three fourth (78.4%) patients had taken spices, condiments and herbs in severe/critical and 233(95.1%) in mild/moderate COVID-19 group. Spices, Condiments and Herbs had 0.19 times significantly decrease risk to developed severity of COVID-19 with (95% CI 0.09 to 0.37). More than half (54.7%) patients had taken fruits in severe/critical and 140 (57.1%) in mild/moderate COVID-19 group. More than one fourth (26.9%) patients had taken fish, shellfish in severe/critical and 208(84.9%) in mild/moderate COVID-19 group. Fish, Shellfish had 0.07 times significantly decrease risk to developed severity of COVID-19 with (95% CI 0.04 to 0.11). Majority (87.8%) patients had taken meat poultry in severe/critical and 199(81.2%) in mild/moderate COVID-19 group. Meat poultry had 1.66 times significantly increase risk to developed severity of COVID-19 with (95% CI 0.08 to 3.16). Almost half (45.3%) patients had taken egg in severe/critical and 167(68.2%) in mild/moderate COVID-19 group. Egg had 0.58 times significantly decrease risk to developed severity of COVID-19 with (95% CI 0.25 to 0.59). More than one third (38.1%) patients had taken milk and milk products in severe/critical and 126(51.4%) in mild/moderate COVID-19 group. Milk and milk products had 0.58 times significantly decrease risk to developed severity of COVID-19 with (95% CI 0.37 to 0.91). Majority (90.6%) patients had taken fats and oils in severe/critical and 226(92.2%) in mild/moderate COVID-19 group. More than three fourth (78.4%) patients had taken beverages (sugary food) in severe/critical and 196(80.0%) in mild/moderate COVID-19 group. Beverages (sugary food) had 1.79 times significantly increase risk to developed severity of COVID-19 with (95% CI 1.12 to 2.88). Almost half (41.0%) patients had taken miscellaneous(Salty foods) in severe/critical and 74(30.2%) in mild/moderate COVID-19 group. Miscellaneous(Salty

foods) had 1.61 times significantly increase risk to developed severity of COVID-19 with (95% CI 1.02 to 2.54).

The research conducted by Ismail et al. (2021) included data from 2,970 people in 18 different nations. Over 30% of people said they gained weight during the epidemic; 6% ate five or more meals daily compared to 2% before the pandemic (P .0001); 48% didn't eat fruits on a regular basis; and 2% reported feeling sick more often. They commented on the findings that demonstrated an increase in the number of meals taken daily during the COVID-19 pandemic compared to before the pandemic. During the pandemic, the number of people eating five or more meals per day rose from 2% before the outbreak to 6% (P .0001). In addition, the proportion of people who went without food fell from 64.4% before the epidemic to 45.1% during it (P 0.01). Sixty-eight percent of individuals who reported missing meals before to the pandemic cited a lack of time as the primary reason, whereas 39% cited a lack of appetite as the primary reason for meal skipping during the epidemic. 74% of participants reported consuming fewer than eight cups of water per day during the pandemic, despite the fact that the data revealed an increase in meal frequency.

Ylmaz and Gökmen (2020) found that when people are bored or stressed, they tend to eat more, particularly comfort foods that are heavy in fat, sugar, salt, and calories.

In addition to protein, Alschuler et al. (2022) found that eating meals rich in vitamins and minerals and avoiding those that may further deplete these nutrients aid in nutritional convalescence. Vegetables and fruits are rich in phytochemicals such those that have anti-inflammatory and antioxidant properties and are essential for a healthy diet.

Improved lung function has been linked to a diet higher in fruits and vegetables, which has been shown to decrease airway inflammation and oxidative stress while simultaneously lowering levels of TNF, C-reactive protein, and inflammatory cytokines (Ilari et al. 2021The USDA divides produce into many groups, including dark green vegetables, red/orange vegetables, legumes, starchy vegetables, other vegetables (including iceberg lettuce, onions, green beans), and fruit(Alschuler et al. 2022).

From the 1,042 people who participated in the research, 995 gave specifics about how many vegetables they ate each day, according to Jordan et al. (2021). Twenty-seven percent of these people reported an age-unrelated shift in the amount of vegetables they ate. From 25% in the most recent 4 weeks to 8% in the most recent 12 weeks, the percentage of respondents who reported a change declined with increasing timeframes beginning with the interview. Although "living environment" as a whole was not having a major bearing on people's propensity to eat their vegetables.

As far as the intake of vegetables and nuts, whole grain cereals (i.e. bread, pasta, rice), and legumes are concerned, Grant et al (2021) indicated that dietary habits in conformity with the guidelines of the Mediterranean Diet were regularly followed. About a quarter of participants said they often drank sugary drinks, and the vast majority said they avoided added fats like butter and margarine in favor of olive oil. Nearly half of the sample reported eating habits that deviated from the Mediterranean Diet's guidelines, such as eating red meat more than once a week or not getting enough of the recommended amount of whole grain cereals. Adding sugar to beverages and eating sweets and pastries three or more times a week were also noted as being prevalent practices.

Some restaurants may have just opened, but eating in close quarters with people poses a health risk; ordering takeaway or delivery is a safer choice that still supports neighborhood eateries (Harvard Medical School, 2020). The Centers for Disease Control and Prevention (CDC) reports that the meal itself is not likely to spread the COVID-19 virus. It's more probable that being in close touch with the individual who delivers the meal will be dangerous. It is imperative that restaurants and delivery services adhere to the regulations set out by their respective regional health authorities on the cleanliness of their kitchens and the frequent testing of their staff for COVID-19.

Many scientists have argued that a pandemic setting would be ideal for evaluating dietary interventions for infectious illnesses. Fruits, vegetables, whole grains, low-fat dairy products, and healthy fats (i.e. olive oil and fish oil) are recommended, as is limiting sugary beverages and high-calorie, high-salt meals, as is maintaining a healthy weight, according to the findings of previous review studies (Hibino and Hayashida, 2022). Specifically, they analyzed the therapeutic relevance of functional food constituents as complementary medicines that may be useful in the prevention or treatment of COVID-19.

62% of participants in Jordan et al(2021) .'s research said they did not notice a difference in their overall food intake. When comparing the percentages of individuals who saw a rise and those who saw a drop over time, the former was much larger (23 vs. 15 percent). It was the ones who reported going into lockdown who saw the largest shift in their food supply. Both a reduction and an increase in food intake were seen.

Our findings are consistent with those of Rodriguez-Leyva and Pierce (2021), who found that COVID-19 significantly impacted certain groups via changed eating patterns. It is important not to minimize the acute impacts and possibly long-term negative consequences that social isolation and lockdowns have had on eating patterns during the COVID-19 epidemic.

CHAPTER SIX: CONCLUSION

CHAPTER VI

CONCLUSION

6.1 Conclusion

While there is a wealth of information on COVID-19, little is known about how the virus impacts quality of life due to changes in dietary behavior or how nutrition could influence the treatment of the virus. The prevalence of COVID-19 infection and death might be influenced by dietary treatments. After controlling for other healthy behaviors, social determinants of health, and measures of viral transmission, our results show that a healthy diet is related with a decreased incidence of COVID-19 and severe COVID-19. It seems from this research that public health interventions targeting poor nutrition and metabolic health, as well as the social determinants of health, may help mitigate the severity of this pandemic. COVID-19 may have had a major impact on certain populations, as seen by shifts in eating habits.

6.2 LIMITATIONS

- As it was a cross-sectional study, and sample size was small with a high attrition rate, it did not estimate the causal inference on the variables of interest.
- As the data were collected at the same time, it was not possible to make a temporal relationship between exposure and outcome.
- Only one hospital (HFRCMCH) was involved, so the study cannot be a representative of the overall situation existed in Bangladesh.
- Difficulties in data collection and analyses due to high rate of Covid-19 based mortality during that period (2020) in Bangladesh at the time of data collection.

6.3 RECOMMENDATIONS

- Further multi-centers population-based survey are very much intended to reach a strong consensus.
- The recommendations provide an up-to-date, evidence-based approach to the full range of issues related to the formulation strategies to the ensure cost-effective diet to cope with the pandemic of Covid-19 as well as identifying evidence gaps for further research.
- Further research works are needed to evaluate the clarity of the essential food-habit and other life-style factors to boost up the immune system

CHAPTER SEVEN: REFERENCES

REFERENCES

Abdulah, D.M. and Hassan, A.B., 2020. Relation of dietary factors with infection and mortality rates of COVID-19 across the world. *The journal of nutrition, health & aging*, 24, pp.1011-1018.

Abdulsalam, N.M., Khateeb, N.A., Aljerbi, S.S., Alqumayzi, W.M., Balubaid, S.S., Almarghlani, A.A., Ayad, A.A. and Williams, L.L., 2021. Assessment of dietary habits and physical activity changes during the full COVID-19 curfew period and its effect on weight among adults in Jeddah, Saudi Arabia. *International Journal of Environmental Research and Public Health*, *18*(16), p.8580.

Acı kalı n, B. and Sanlier, N., 2021. Coffee and its effects on the immune system. *Trends in Food Science & Technology*, 114, pp.625-632.

Akbar, A.N. and Gilroy, D.W., 2020. Aging immunity may exacerbate COVID-19. *Science*, 369(6501), pp.256-257.

Alam, S., Bhuiyan, F.R., Emon, T.H. and Hasan, M., 2021. Prospects of nutritional interventions in the care of COVID-19 patients. *Heliyon*, 7(2), p.e06285.

Ali, M.R., Hasan, M.A., Rahman, M.S., Billah, M., Karmakar, S., Shimu, A.S., Hossain, M.F., Maruf, M.M.H., Rahman, M.S., Saju, M.S.R. and Hasan, M.R., 2021. Clinical manifestations and socio-demographic status of COVID-19 patients during the second-wave of pandemic: A Bangladeshi experience. *Journal of infection and public health*, *14*(10), pp.1367-1374.

Allard, L., Ouedraogo, E., Molleville, J., Bihan, H., Giroux-Leprieur, B., Sutton, A., Baudry, C., Josse, C., Didier, M., Deutsch, D. and Bouchaud, O., 2020. Malnutrition: percentage and association with prognosis in patients hospitalized for coronavirus disease 2019. *Nutrients*, *12*(12), p.3679.

Alschuler, L., Chiasson, A.M., Horwitz, R., Sternberg, E., Crocker, R., Weil, A. and Maizes, V., 2022. Integrative medicine considerations for convalescence from mild-to-moderate COVID-19 disease. *Explore*, *18*(2), pp.140-148.

Aman, F. and Masood, S., 2020. How Nutrition can help to fight against COVID-19 Pandemic. *Pakistan Journal of Medical Sciences*, *36*(COVID19-S4), p.S121.

Amatori, S., Donati Zeppa, S., Preti, A., Gervasi, M., Gobbi, E., Ferrini, F., Rocchi, M.B., Baldari, C., Perroni, F., Piccoli, G. and Stocchi, V., 2020. Dietary habits and psychological states during COVID-19 home isolation in Italian college students: the role of physical exercise. *Nutrients*, 12(12), p.3660.

Anuk, A.T., Polat, N., Akdas, S., Erol, S.A., Tanacan, A., Biriken, D., Keskin, H.L., MoralogluTekin, O., Yazihan, N. and Sahin, D., 2021. The relation between trace element status (zinc, copper, magnesium) and clinical outcomes in COVID-19 infection during pregnancy. *Biological trace element research*, *199*(10), pp.3608-3617.

Bae, M. and Kim, H., 2020. The role of vitamin C, vitamin D, and selenium in immune system against COVID-19. *Molecules*, *25*(22), p.5346.

Barazzoni, R., Bischoff, S.C., Breda, J., Wickramasinghe, K., Krznaric, Z., Nitzan, D., Pirlich, M. and Singer, P., 2020. ESPEN expert statements and practical guidance for nutritional management of individuals with SARS-CoV-2 infection. *Clinical nutrition*, *39*(6), pp.1631-1638.

Batiha, G.E.S., Alqarni, M., Awad, D.A., Algammal, A.M., Nyamota, R., Wahed, M.I., Shah, M.A., Amin, M.N., Adetuyi, B.O., Hetta, H.F. and Cruz-Martins, N., 2021. Dairy-derived and egg white proteins in enhancing immune system against COVID-19. *Frontiers in nutrition*, p.394.

Bedock, D., Lassen, P.B., Mathian, A., Moreau, P., Couffignal, J., Ciangura, C., Poitou-Bernert, C., Jeannin, A.C., Mosbah, H., Fadlallah, J. and Amoura, Z., 2020. Prevalence and severity of malnutrition in hospitalized COVID-19 patients. *Clinical nutrition ESPEN*, *40*, pp.214-219.

Belaroussi, Y., Roblot, P., Peiffer-Smadja, N., Delaye, T., Mathoulin-Pelissier, S., Lemeux, J., Le Moal, G., Caumes, E., Roblot, F. and Bleibtreu, A., 2020. Why Methodology Is Important: Coffee as a Candidate Treatment for COVID-19?. *Journal of Clinical Medicine*, 9(11), p.3691.

Bertrand, L., Shaw, K.A., Ko, J., Deprez, D., Chilibeck, P.D. and Zello, G.A., 2021. The impact of the coronavirus disease 2019 (COVID-19) pandemic on university students' dietary intake, physical activity, and sedentary behaviour. *Applied Physiology, Nutrition, and Metabolism*, *46*(3), pp.265-272.

Bold, J., Harris, M., Fellows, L. and Chouchane, M., 2020. Nutrition, the digestive system and immunity in COVID-19 infection. *Gastroenterology and Hepatology from Bed to Bench*, *13*(4), p.331.

Bold, J., Harris, M., Fellows, L. and Chouchane, M., 2020. Nutrition, the digestive system and immunity in COVID-19 infection. *Gastroenterology and Hepatology from Bed to Bench, 13*(4), p.331.

Brugliera, L., Spina, A., Castellazzi, P., Cimino, P., Arcuri, P., Negro, A., Houdayer, E., Alemanno, F., Giordani, A., Mortini, P. and Iannaccone, S., 2020. Nutritional management of COVID-19 patients in a rehabilitation unit. *European journal of clinical nutrition*, *74*(6), pp.860-863.

Butler, M.J. and Barrientos, R.M., 2020. The impact of nutrition on COVID-19 susceptibility and long-term consequences. *Brain, behavior, and immunity*, *87*, pp.53-54.

Carr, A.C. and Maggini, S., 2017. Vitamin C and immune function. *Nutrients*, *9*(11), p.1211.

Cena, H. and Chieppa, M., 2020. Coronavirus disease (COVID-19–SARS-CoV-2) and nutrition: is infection in Italy suggesting a connection?. *Frontiers in immunology*, p.944.

Cereda, E., Bogliolo, L., Klersy, C., Lobascio, F., Masi, S., Crotti, S., De Stefano, L., Bruno, R., Corsico, A.G., Di Sabatino, A. and Perlini, S., 2021. Vitamin D 25OH deficiency in COVID-19 patients admitted to a tertiary referral hospital. *Clinical nutrition*, *40*(4), pp.2469-2472.

Cereda, E., Bogliolo, L., Lobascio, F., Barichella, M., Zecchinelli, A.L., Pezzoli, G. and Caccialanza, R., 2021. Vitamin D supplementation and outcomes in coronavirus disease 2019 (COVID-19) patients from the outbreak area of Lombardy, Italy. *Nutrition (Burbank, Los Angeles County, Calif.)*, *82*, p.111055.

Chandra, R.K., 1992. RETRACTED: Effect of vitamin and trace-element supplementation on immune responses and infection in elderly subjects. *Lancet*, 340, pp.1124–1127.

Chen, R., Liang, W., Jiang, M., Guan, W., Zhan, C., Wang, T., Tang, C., Sang, L., Liu, J., Ni, Z. and Hu, Y., 2020. Risk factors of fatal outcome in hospitalized subjects with coronavirus disease 2019 from a nationwide analysis in China. *Chest*, *158*(1), pp.97-105.

Chen, W., Yang, Y.X., Yang, X.G., 2020. Dietary guidelines for prevention and treatment of COVID-19. Acta Nutr Sinica;42:01–2.

Chowdhury, P. and Barooah, A.K., 2020. Tea bioactive modulate innate immunity: In perception to COVID-19 pandemic. *Frontiers in Immunology*, *11*, p.590716.

Cobre, A.F., Surek, M., Vilhena, R.O., Böger, B., Fachi, M.M., Momade, D.R., Tonin, F.S., Sarti, F.M. and Pontarolo, R., 2022. Influence of foods and nutrients on COVID-19 recovery: A multivariate analysis of data from 170 countries using a generalized linear model. *Clinical Nutrition*, *41*(12), pp.3077-3084.

Damayanthi, H.D.W.T. and Prabani, K.I.P., 2021. Nutritional determinants and COVID-19 outcomes of older patients with COVID-19: A systematic review. *Archives of Gerontology and Geriatrics*, *95*, p.104411.

Darand, M., Hassanizadeh, S., Marzban, A., Mirzaei, M. and Hosseinzadeh, M., 2022. The association between dairy products and the risk of COVID-19. *European journal of clinical nutrition*, pp.1-7.

de Araujo Morais, A.H., de Souza Aquino, J., da Silva-Maia, J.K., de Lima Vale, S.H., Maciel, B.L.L. and Passos, T.S., 2021. Nutritional status, diet and viral respiratory infections: perspectives for severe acute respiratory syndrome coronavirus 2. *British Journal of Nutrition*, *125*(8), pp.851-862.

Du, Y., Lv, Y., Zha, W., Zhou, N. and Hong, X., 2021. Association of body mass index (BMI) with critical COVID-19 and in-hospital mortality: a dose-response meta-analysis. *Metabolism*, *117*, p.154373.

Fan, H., Hong, B., Luo, Y., Peng, Q., Wang, L., Jin, X., Chen, Y., Hu, Y., Shi, Y., Li, T. and Zhuang, H., 2020. The effect of whey protein on viral infection and replication of SARS-CoV-2 and pangolin coronavirus in vitro. *Signal Transduction and Targeted Therapy*, *5*(1), p.275.

FAQ, 2020. Covid-19, domande e risposte. http://www.salute.gov.it/portale/nuovocoronavirus/dettaglioFaqNuovoCoronavirus.jsp?lingua=italiano&id=228#11.

Formisano, E., Di Maio, P., Ivaldi, C., Sferrazzo, E., Arieta, L., Bongiovanni, S., Panizzi, L., Valentino, E., Pasta, A., Giudice, M. and Demontis, S., 2021. Nutritional therapy for patients with coronavirus disease 2019 (COVID-

19): practical protocol from a single center highly affected by an outbreak of the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. *Nutrition*, *82*, p.111048.

Gakidou, E., Afshin, A., Abajobir, A.A., Abate, K.H., Abbafati, C., Abbas, K.M., Abd-Allah, F., Abdulle, A.M., Abera, S.F., Aboyans, V. and Abu-Raddad, L.J., 2017. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *The Lancet*, *390*(10100), pp.1345-1422.

Ganguli, S., Howlader, S., Dey, K., Barua, S., Islam, M.N., Begum, A., Sobahan, M.A., Chakraborty, R.R., Hawlader, M.D.H. and Biswas, P.K., 2022. Association of food habit with the COVID-19 severity and hospitalization: A cross-sectional study among the recovered individuals in Bangladesh. *Nutrition and Health*, *28*(4), pp.771-782.

Gao, M., Piernas, C., Astbury, N.M., Hippisley-Cox, J., O'Rahilly, S., Aveyard, P. and Jebb, S.A., 2021. Associations between body-mass index and COVID-19 severity in 6· 9 million people in England: a prospective, community-based, cohort study. *The lancet Diabetes & endocrinology*, *9*(6), pp.350-359.

Garcia, O.P., Long, K.Z. and Rosado, J.L., 2009. Impact of micronutrient deficiencies on obesity. *Nutrition reviews*, *67*(10), pp.559-572.

Gasmi, A., Chirumbolo, S., Peana, M., Noor, S., Menzel, A., Dadar, M. and Bjørklund, G., 2022. The role of diet and supplementation of natural

products in COVID-19 prevention. *Biological Trace Element Research*, *200*(1), pp.27-30.

GBD 2016 Risk Factors Collaborators, 2017. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet (London, England)*, *390*(10100), p.1345.

Goncalves, T.J.M., Gonçalves, S.E.A.B., Guarnieri, A., Risegato, R.C., Guimarães, M.P., de Freitas, D.C., Razuk-Filho, A., Junior, P.B.B. and Parrillo, E.F., 2020. Prevalence of obesity and hypovitaminosis D in elderly with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). *Clinical nutrition ESPEN*, *40*, pp.110-114.

Grant, F., Scalvedi, M.L., Scognamiglio, U., Turrini, A. and Rossi, L., 2021. Eating habits during the COVID-19 lockdown in Italy: the nutritional and lifestyle side effects of the pandemic. *Nutrients*, *13*(7), p.2279.

Griffin, G., Hewison, M., Hopkin, J., Kenny, R.A., Quinton, R., Rhodes, J., Subramanian, S. and Thickett, D., 2021. Preventing vitamin D deficiency during the COVID-19 pandemic: UK definitions of vitamin D sufficiency and recommended supplement dose are set too low. *Clinical Medicine*, *21*(1), p.e48.

Haraj, N.E., El Aziz, S., Chadli, A., Dafir, A., Mjabber, A., Aissaoui, O., Barrou, L., El Hamidi, C.E.K., Nsiri, A., Harrar, R.A. and Ezzouine, H., 2021.

Nutritional status assessment in patients with Covid-19 after discharge from the intensive care unit. *Clinical nutrition ESPEN*, *41*, pp.423-428.

Harvard Medical School 2020: Fact Sheets covering prevention, understanding, and managing COVID-19; COVID-19 and pregnancy; and explanations of COVID-19 for age groups 3-6, 6-12, and 13-18.

Haskaraca, G., Bostanci, E. and Arslan, Y., 2021. Effects of the Covid-19 pandemic on eating and meat consumption habits of Turkish adults. *Turkish Journal of Agriculture-Food Science and Technology*, *9*(1), pp.63-69.

Hibino, S. and Hayashida, K., 2022. Modifiable Host Factors for the Prevention and Treatment of COVID-19: Diet and Lifestyle/Diet and Lifestyle Factors in the Prevention of COVID-19. *Nutrients*, *14*(9), p.1876.

Hossain, M.I., Parvin, S., Islam, M.S., Alam, M.J., Podder, S., Datta, R., Majumdar, T.K., Hossain, M.J. and Ahmed, F., 2021. Demographic profile and outcome of patients admitted to a COVID dedicated hospital in Bangladesh during the second wave. *Medicine*, *100*(37).

Hu, D., Lou, X., Meng, N., Li, Z., Teng, Y., Zou, Y. and Wang, F., 2021. Influence of age and gender on the epidemic of COVID-19: Evidence from 177 countries and territories—an exploratory, ecological study. *Wiener KlinischeWochenschrift*, *133*, pp.321-330.

Huang, Q., Jackson, S., Derakhshan, S., Lee, L., Pham, E., Jackson, A. and Cutter, S.L., 2021. Urban-rural differences in COVID-19 exposures and

outcomes in the South: A preliminary analysis of South Carolina. *PloS one*, *16*(2), p.e0246548.

Huber, B.C., Steffen, J., Schlichtiger, J. and Brunner, S., 2021. Altered nutrition behavior during COVID-19 pandemic lockdown in young adults. *European journal of nutrition*, *60*, pp.2593-2602.

Hull, J.H., Loosemore, M. and Schwellnus, M., 2020. Respiratory health in athletes: facing the COVID-19 challenge. *The Lancet Respiratory Medicine*, *8*(6), pp.557-558.

Ilari, S., Vitiello, L., Russo, P., Proietti, S., Milić , M., Muscoli, C., Cardaci, V., Tomino, C., Bonassi, G. and Bonassi, S., 2021. Daily vegetables intake and response to copd rehabilitation. The role of oxidative stress, inflammation and dna damage. *Nutrients*, *13*(8), p.2787.

Islam, T., Talukder, A.K., Siddiqui, N. and Islam, T., 2020. Tackling the COVID-19 pandemic: The Bangladesh perspective. *Journal of public health research*, *9*(4), pp.jphr-2020.

Ismail, L.C., Osaili, T.M., Mohamad, M.N., Al Marzouqi, A., Jarrar, A.H., Zampelas, A., Habib-Mourad, C., Jamous, D.O.A., Ali, H.I., Al Sabbah, H. and Hasan, H., 2021. Assessment of eating habits and lifestyle during the coronavirus 2019 pandemic in the Middle East and North Africa region: a cross-sectional study. *British Journal of Nutrition*, *126*(5), pp.757-766.

Jayawardena, R. and Misra, A., 2020. Balanced diet is a major casualty in COVID-19. *Diabetes & metabolic syndrome*, *14*(5), p.1085.

Jordan, I., Keding, G.B., Stosius, L., Hawrysz, I., Janiszewska, K. and Heil, E.A., 2021. Changes in Vegetable Consumption in Times of COVID-19—First Findings From an International Civil Science Project. *Frontiers in Nutrition*, p.540.

Kennedy, O.J., Fallowfield, J.A., Poole, R., Hayes, P.C., Parkes, J. and Roderick, P.J., 2021. All coffee types decrease the risk of adverse clinical outcomes in chronic liver disease: A UK Biobank study. *BMC Public Health*, *21*(1), pp.1-14.

Khubber, S., Hashemifesharaki, R., Mohammadi, M. and Gharibzahedi, S.M.T., 2020. Garlic (Allium sativum L.): a potential unique therapeutic food rich in organosulfur and flavonoid compounds to fight with COVID-19. *Nutrition Journal*, *19*, pp.1-3.

Kim, G.U., Kim, M.J., Ra, S.H., Lee, J., Bae, S., Jung, J. and Kim, S.H., 2020. Clinical characteristics of asymptomatic and symptomatic patients with mild COVID-19. *Clinical microbiology and infection*, *26*(7), pp.948-e1.

Kim, H., Rebholz, C.M., Hegde, S., LaFiura, C., Raghavan, M., Lloyd, J.F., Cheng, S. and Seidelmann, S.B., 2021. Plant-based diets, pescatarian diets and COVID-19 severity: a population-based case–control study in six countries. *BMJ Nutrition, Prevention & Health*, *4*(1), p.257.

Kohlmeier, M., 2020. Avoidance of vitamin D deficiency to slow the COVID-19 pandemic. *BMJ Nutrition, Prevention & Health*, *3*(1), p.67.

Kushwaha, S., Khanna, P., Rajagopal, V. and Kiran, T., 2021. Biological attributes of age and gender variations in Indian COVID-19 cases: A

retrospective data analysis. *Clinical epidemiology and global health*, *11*, p.100788.

Lamarche, B., Brassard, D., Lapointe, A., Laramée, C., Kearney, M., Côté, M., Bélanger-Gravel, A., Desroches, S., Lemieux, S. and Plante, C., 2021. Changes in diet quality and food security among adults during the COVID-19–related early lockdown: Results from NutriQuébec. *The American journal of clinical nutrition*, *113*(4), pp.984-992.

Lanham-New, S.A., Webb, A.R., Cashman, K.D., Buttriss, J.L., Fallowfield, J.L., Masud, T., Hewison, M., Mathers, J.C., Kiely, M., Welch, A.A. and Ward, K.A., 2020. Vitamin D and SARS-CoV-2 virus/COVID-19 disease. *BMJ Nutrition, Prevention & Health*, *3*(1), p.106.

Ma, Y., Ratnasabapathy, R. and Gardiner, J., 2017. Carbohydrate Craving-not everything is sweet. *Current opinion in clinical nutrition and metabolic care*, *20*(4), p.261.

Makino, S., Ikegami, S., Kume, A., Horiuchi, H., Sasaki, H. and Orii, N., 2010. Reducing the risk of infection in the elderly by dietary intake of yoghurt fermented with Lactobacillus delbrueckii ssp. bulgaricus OLL1073R-1. *British Journal of Nutrition*, *104*(7), pp.998-1006.

Merino, J., Joshi, A.D., Nguyen, L.H., Leeming, E.R., Mazidi, M., Drew, D.A., Gibson, R., Graham, M.S., Lo, C.H., Capdevila, J. and Murray, B., 2021. Diet quality and risk and severity of COVID-19: a prospective cohort study. *Gut*, *70*(11), pp.2096-2104.

Moscatelli, F., Sessa, F., Valenzano, A., Polito, R., Monda, V., Cibelli, G., Villano, I., Pisanelli, D., Perrella, M., Daniele, A. and Monda, M., 2021. COVID-19: role of nutrition and supplementation. *Nutrients*, *13*(3), p.976.

Moynihan, A.B., Tilburg, W.A.V., Igou, E.R., Wisman, A., Donnelly, A.E. and Mulcaire, J.B., 2015. Eaten up by boredom: consuming food to escape awareness of the bored self. *Frontiers in psychology*, *6*, p.369.

Muscogiuri, G., Altieri, B., Annweiler, C., Balercia, G., Pal, H.B., Boucher, B.J., Cannell, J.J., Foresta, C., Grübler, M.R., Kotsa, K. and Mascitelli, L., 2017. Vitamin D and chronic diseases: the current state of the art. *Archives of toxicology*, *91*, pp.97-107.

Muscogiuri, G., Pugliese, G., Barrea, L., Savastano, S. and Colao, A., 2020. Commentary: obesity: the "Achilles heel" for COVID-19?. *Metabolism-Clinical and Experimental*, *108*.

Mutambudzi, M., Niedzwiedz, C., Macdonald, E.B., Leyland, A., Mair, F., Anderson, J., Celis-Morales, C., Cleland, J., Forbes, J., Gill, J. and Hastie, C., 2021. Occupation and risk of severe COVID-19: prospective cohort study of 120 075 UK Biobank participants. *Occupational and environmental medicine*, *78*(5), pp.307-314.

National Guidelines on Clinical Management of Coronavirus Disease 2019 (Covid-19) Version 4.0, 30 March 2020, Disease Control Division, Directorate General of Health Services, Ministry of Health & Family Welfare, Government of the People's Republic of Bangladesh

Nkire, N., Nwachukwu, I., Shalaby, R., Hrabok, M., Vuong, W., Gusnowski, A., Surood, S., Greenshaw, A.J. and Agyapong, V.I., 2021. COVID-19 pandemic: influence of relationship status on stress, anxiety, and depression in Canada. *Irish Journal of Psychological Medicine*, pp.1-12.

Peuhkuri, K., Sihvola, N. and Korpela, R., 2012. Diet promotes sleep duration and quality. *Nutrition research*, *32*(5), pp.309-319.

Pfeifer, D., Rešetar, J., GajdošKljusurić , J., PanjkotaKrbavč ić , I., Vranešić Bender, D., Rodríguez-Pérez, C., Ruíz-López, M.D. and Šatalić , Z., 2021. Cooking at home and adherence to the Mediterranean diet during the COVID-19 confinement: the experience from the Croatian COVIDiet study. *Frontiers in nutrition*, *8*, p.102.

Quilliot, D., Gérard, M., Bonsack, O., Malgras, A., Vaillant, M.F., Di Patrizio, P., Jaussaud, R., Ziegler, O. and Nguyen-Thi, P.L., 2021. Impact of severe SARS-CoV-2 infection on nutritional status and subjective functional loss in a prospective cohort of COVID-19 survivors. *BMJ open*, *11*(7), p.e048948.

Rana, R., Ranjan, V. and Kumar, N., 2021. Association of ABO and Rh blood group in susceptibility, severity, and mortality of coronavirus disease 2019: a hospital-based study from Delhi, India. *Frontiers in cellular and infection microbiology*, p.1071.

Richardson, S., Hirsch, J.S., Narasimhan, M., Crawford, J.M., McGinn, T., Davidson, K.W., Barnaby, D.P., Becker, L.B., Chelico, J.D., Cohen, S.L. and Cookingham, J., 2020. Presenting characteristics, comorbidities, and

outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. *Jama*, *323*(20), pp.2052-2059.

Rodriguez-Leyva, D. and Pierce, G.N., 2021. The Impact of Nutrition on the COVID-19 Pandemic and the Impact of the COVID-19 Pandemic on Nutrition. *Nutrients*, *13*(6), p.1752.

Rodriguez-Martin, B.C. and Meule, A., 2015. Food craving: new contributions on its assessment, moderators, and consequences. *Frontiers in PSYCHOLOGY*, *6*, p.21.

Rodriguez-Morales, A.J., Cardona-Ospina, J.A., Gutiérrez-Ocampo, E., VILLAMIZAR-PEÑA, R., HOLGUIN-RIVERA, Y. and ESCALERA-ANTEZANA, J.P., 2020. Travel Med Infect Dis. pp.101623-101623.

Ruiz-Roso, M.B., Knott-Torcal, C., Matilla-Escalante, D.C., Garcimartín, A., Sampedro-Nuñez, M.A., Dávalos, A. and Marazuela, M., 2020. COVID-19 lockdown and changes of the dietary pattern and physical activity habits in a cohort of patients with type 2 diabetes mellitus. *Nutrients*, *12*(8), p.2327.

Salazar-Robles, E., Kalantar-Zadeh, K., Badillo, H., Calderón-Juárez, M., García-Bárcenas, C.A., Ledesma-Pérez, P.D., Lerma, A. and Lerma, C., 2021. Association between severity of COVID-19 symptoms and habitual food intake in adult outpatients. *BMJ nutrition, prevention & health*, *4*(2), p.469.

Sharif, M.K., Ejaz, R. and Pasha, I., 2018. Nutritional and therapeutic potential of spices. In *Therapeutic, probiotic, and unconventional foods* (pp. 181-199). Academic Press.

Sidor, A. and Rzymski, P., 2020. Dietary choices and habits during COVID-19 lockdown: experience from Poland. *Nutrients*, *12*(6), p.1657.

Singh, P., Tripathi, M.K., Yasir, M., Khare, R., Tripathi, M.K. and Shrivastava, R., 2020. Potential inhibitors for SARS-CoV-2 and functional food components as nutritional supplement for COVID-19: a review. *Plant Foods for Human Nutrition*, *75*, pp.458-466.

Sohrabi, C., Alsafi, Z., O'neill, N., Khan, M., Kerwan, A., Al-Jabir, A., Iosifidis, C. and Agha, R., 2020. World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *International journal of surgery*, *76*, pp.71-76.

Soldavini, J., Andrew, H. and Berner, M., 2021. Characteristics associated with changes in food security status among college students during the COVID-19 pandemic. *Translational behavioral medicine*, *11*(2), pp.295-304.

Sulejmani, E., Hyseni, A., Xhabiri, G. and Rodríguez-Pérez, C., 2021. Relationship in dietary habits variations during COVID-19 lockdown in Kosovo: The COVIDiet study. *Appetite*, *164*, p.105244.

Tavakol, Z., Ghannadi, S., Tabesh, M.R., Halabchi, F., Noormohammadpour, P., Akbarpour, S., Alizadeh, Z., Nezhad, M.H. and Reyhan, S.K., 2021. Relationship between physical activity, healthy lifestyle and COVID-19 disease severity; a cross-sectional study. *Journal of Public Health*, pp.1-9.

TeVelthuis, A.J., van den Worm, S.H., Sims, A.C., Baric, R.S., Snijder, E.J. and van Hemert, M.J., 2010. Zn2+ inhibits coronavirus and arterivirus RNA

polymerase activity in vitro and zinc ionophores block the replication of these viruses in cell culture. *PLoS pathogens*, *6*(11), p.e1001176.

Thibault, R., Quilliot, D., Seguin, P., Tamion, F., Schneider, S. and Déchelotte, P., 2020. Stratégie de prise en charge nutritionnelle à l'hôpital au cours de l'épidémie virale Covid-19: Avis d'experts de la societe francophone de nutrition clinique et metabolisme (SFNCM). *Nutrition Clinique et Métabolisme*, *34*(2), pp.97-104.

Thurnham, D.I., 1997. Micronutrients and immune function: some recent developments. *Journal of clinical pathology*, *50*(11), pp.887-891.

van Zanten, A.R.H., De Waele, E. and Wischmeyer, P.E., 2019. Nutrition therapy and critical illness: practical guidance for the ICU, post-ICU, and long-term convalescence phases. *Critical Care*, *23*(1), pp.1-10.

Vandevijvere, S., De Ridder, K., Drieskens, S., Charafeddine, R., Berete, F. and Demarest, S., 2021. Food insecurity and its association with changes in nutritional habits among adults during the COVID-19 confinement measures in Belgium. *Public health nutrition*, *24*(5), pp.950-956.

Velavan, T.P. and Meyer, C.G., 2020. The COVID‐19 epidemic. *Tropical medicine & international health*, *25*(3), pp.278-280.

Virgens, I.P., Santana, N.M., Lima, S.C. and Fayh, A.P., 2021. Can COVID-19 be a risk for cachexia for patients during intensive care? Narrative review and nutritional recommendations. *British Journal of Nutrition*, *126*(4), pp.552-560.

Visser, M., Schaap, L.A. and Wijnhoven, H.A., 2020. Self-reported impact of the COVID-19 pandemic on nutrition and physical activity behaviour in Dutch older adults living independently. *Nutrients*, *12*(12), p.3708.

Wang, C., Horby, P.W., Hayden, F.G. and Gao, G.F., 2020. A novel coronavirus outbreak of global health concern. *The lancet*, *395*(10223), pp.470-473.

Watanabe, S. and Inuma, K., 2020. Low COVID-19 infection and mortality in rice eating countries. *Sch. J. Food Nutr*, *3*, pp.326-328.

Watanabe, S., Hirakawa, A., Mizuno, S., Wakino, S. and Adachi, K., 2020. What should we eat for healthy longevity? Necessity of tailor-made nutrition. *Acta Scientific Nutritional Health*, *4*(3), pp.01-05.

Wu, C., Chen, X., Cai, Y., Zhou, X., Xu, S., Huang, H., Zhang, L., Zhou, X., Du, C., Zhang, Y. and Song, J., 2020. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA internal medicine*, *180*(7), pp.934-943.

Yı lmaz, C. and Gokmen, V., 2020. Neuroactive compounds in foods: Occurrence, mechanism and potential health effects. *Food Research International*, *128*, p.108744.

Youssef, N., Elbadry, M., Al Shafie, A., Abdalazeem, A., Hasan, S., Tahoon, M., Omran, D. and El Kassas, M., 2022. Nutritional status associated with clinical outcomes among patients hospitalized with COVID‐19: A multicenter prospective study in Egypt. *Nursing & Health Sciences*, *24*(1), pp.204-213.

Zhu, N., Zhang, D., Wang, W., Li, X., Yang, B., Song, J., Zhao, X., Huang, B., Shi, W., Lu, R. and Niu, P., 2020. A novel coronavirus from patients with pneumonia in China, 2019. *New England journal of medicine*.

APPENDICES

উত্তরদাতার/রোগীর ক্রমিক নম্বর :

CONSENT FORM (BENGALI)
অনুমতি পত্র

তারিখ :

.....

আমি ডাঃ মৌসুমী আফরিন ইভা , রেসিডেন্ট মেডিকেল অফিসার, মেডিসিন বিভাগ, হলি ফ্যামিলি রেড ক্রিসেন্ট মেডিকেল কলেজ হাসপাতাল, বর্তমানে কোভিড ডিউটিতে কর্মরত আছি। সেই সাথে ঢাকা বিশ্ববিদ্যালয় এর ''নিউট্রিশন এন্ড ফুড সাইন্স'' বিভাগে এম ফিল বিভাগের একজন নিয়মিত ছাত্রী। আমি কোভিড-১৯ নিয়ে একটি গবেষণা করছি। আমার 'গবেষণা ও একাডেমিক উদ্দেশ্যে' এর একটি অংশ হিসেবে আপনার থেকে কিছু মূল্যবান তথ্যের প্রয়োজন। তাই গবেষণা কাজে অংশগ্রহণের জন্য আপনাকে আমন্ত্রণ জানাচ্ছি। আপনার সহযোগিতা আমার কাজের জন্য অত্যন্ত গুরুত্বপূর্ণ ।

এ কাজে আপনার অংশগ্রহণ সম্পূর্ণ ঐচ্ছিক এবং যে কোন সময় আপনি অংশগ্রহণ করা থেকে বিরত থাকতে পারবেন। আপনার দেওয়া তথ্যটি শুধুমাত্র আমার গবেষণার কাজে ব্যবহার করা হবে এবং সমস্ত তথ্য গোপন রাখা হবে। সম্মতি জানালে আপনাকে কিছু প্রশ্ন করবো।

আপনার দেওয়া তথ্যটি আমার গবেষণাটি সফল করতে সাহায্য করবে এবং স্বাস্থ্যখাতে কল্যান বয়ে আনতে পারে।

আমি আপনার সহযোগিতা কামনা করছি। আপনি যদি গবেষণায় যোগ দিতে সম্মত হন, নীচের নির্দেশিত স্থানে সাইন অথবা টিপসই দিন ।

প্রশ্নকারীর স্বাক্ষর
তারিখঃ
মোবাইল নং :

অংশগ্রহণকারীর স্বাক্ষর /টিপসই
তারিখঃ
মোবাইল নং :

QUESTIONNAIRE

Dietary habit and Nutritional status on the severity of covid-19 treatment, admitted in selected hospital of Dhaka city Bangladesh.

রোগীর সাথে যোগাযোগের তারিখ :

রোগীর নাম :
কেবিন/ওয়ার্ড নং :
রোগীর ভর্তির তারিখ :
রোগীর ঠিকানা :
মোবাইল নম্বর :

BP :
Pulse :
SPO_2 :
Blood Sugar :
Temp :
Height :
Weight :

Section A: Socio -demographic Variables/ব্যক্তিগত বিবরণ

SI. No	Questions	Responses
01	আপনার বয়স কত ?	..... বছর
02	আপনার লিঙ্গ কি ?	১. পুরবষ ২. মহিলা
03	আপনার ধর্ম কি ?	১. মুসলিম ২. হিন্দু ৩. খ্রিষ্টান ৪. বৌদ্ধ ৫. অন্যান্য
04	আপনার শিক্ষাগত যোগ্যতা কি ?	১. নিরক্ষর ২. প্রাথমিক ৩. এস.এস.সি ৪.এইচ.এস.সি ৫. ডিগ্রী ৬. স্নাতকোত্তর
05	আপনার বাসস্থান কোথায় ?	১. নগরএলাকা ২. গ্রাম
06	বৈবাহিক অবস্থা ?	১. বিবাহিত ২. অবিবাহিত ৩. বিপত্নীক/বিধবা ৪. তালাকপ্রাপ্ত ৫. আলাদাবসবাসরত
07	আপনার পেশা কি ?	১. শ্রমিক/দিনমজুর/কৃষক ২. চাকুরীজীবি ক. সরকারী খ. বেসরকারী ৩. ব্যবসায়িক ৪. বেকার ৫. অবসরপ্রাপ্ত/কর্মৰমতাহীন ৬. গৃহিনী ৭. শিৰার্থী ৮. অন্যান্য
08	আপনার পরিবারের মাসিক আয় কত (সর্ব সাকুল্যে) ?	১. ৫০০০-১৫০০০/- টাকা ২. ১৬০০০-২৫০০০/- টাকা ৩. ২৬০০০-৩৫০০০/- টাকা ৪. ৩৫০০০/- এর উপরে
09	পেশা বা কাজের সময়কাল	১. ৮ ঘন্টার কম ২. ৮ ঘন্টা ৩. ১০ ঘন্টা ৪. ১২ ঘন্টা ৫. ১২ ঘন্টার বেশি ।
10	রোগটি দ্বারা কী ভাবে আক্রান্ত হলেন ?	১. দেশের বাহিরে যাওয়ার/আসার কারনে ২. পরিবারের মানুষ দ্বারা আক্রান্ত ৩. কাজের জন্য বাহিরে যাওয়ায়/বাজার করা ৪ . অজানা

Section B
Nutritional StatusRelated Factor

SI. No I	Questions	Responses
11	আপনার ওজন কত ?	..... কেজি
12	আপনার উচ্চতা কত ?	..... ইঞ্চি/সেন্টিমিটার
13	**BMI**	

Biochemical Assessment

SI. No II	Questions	Range
14	Blood Group	.....
15	CRP	.....
16	S. Ferritin	.....
17	D-dimer	.....
18	S. Pro-Calcitonin	.....
19	S.D3-level	.....
20	S. Lipid Profile	1 . .....2. ..... 3 . .....4. .....

Co-Morbidity Related Variables

SI. No III	Questions	Responses
21	১. আপনি কি হাইপারটেনশনের রোগী ২. আপনার কি প্রেসার নিয়ন্ত্রণে থাকে ? ৩. উত্তর হ্যাঁ হলে কত বছর ?	১. হ্যাঁ ২. না ১. হ্যাঁ ২. না .....
22	১. আপনি কি ডায়বেটিক রোগী ? ২. আপনার কি ব্লাড সুগারনিয়ন্ত্রণে থাকে ? ৩. উত্তর হ্যাঁ হলে কত বছর ?	১. হ্যাঁ ২. না ১. হ্যাঁ ২. না .....
23	১. আপনি কি কিডনী রোগী ? ২. উত্তর হ্যাঁ হলে কত বছর ?	১. হ্যাঁ ২. না .....
24	১. আপনি কি হাপানী রোগী ? ২. উত্তর হ্যাঁ হলে কত বছর ?	১. হ্যাঁ ২. না .....
25	১. আপনার কি হরমোনের কোন রোগ আছে ? (হাইপোথাইরয়েড, হাইফার থাইরয়েড) ২. উত্তর হ্যাঁ হলে কত বছর ?	১. হ্যাঁ ২. না .....
26	১. আপনি কি ক্যান্সারের রোগী ? ২. উত্তর হ্যাঁ হলে কত বছর ?	১. হ্যাঁ ২. না .....
27	১. আপনি কি হার্টের রোগী ? ২. উত্তর হ্যাঁ হলে কত বছর ?	১. হ্যাঁ ২. না .....

Section C
Habitual Factors Related Variables/Behavioral Factors

SI. No	Questions	Responses
28	১. আপনি কি ধুমপায়ী ? ২. দিনে কয়টি সিগারেট খাওয়া পড়ে ? ৩. কত বছর যাবৎ ধুমপান করছেন ?	১. হ্যাঁ ২. না .... বছর
29	১. আপনি কি এ্যালকোহল পান করেন ? ২. কত বছর যাবৎ পান করছেন ?	১. হ্যাঁ ২. না ..... বছর
30	১. আপনি কি পানপাতা, জর্দ্দা সহ খান ? ২. কত বছর যাবৎ খাচ্ছেন ?	১. হ্যাঁ ২. না .....বছর
31	১. আপনি কি গুল ব্যবহার করেন ? ২. কত বছর যাবৎ ব্যবহার করছেন ?	১. হ্যাঁ ২. না .....বছর
32	১. আপনি কি প্রতিদিন এয়ারকন্ডিশন ব্যবহার করেন ?	১. হ্যাঁ ২. না
33	১. আপনার কি রোজ রোদে যাওয়া পড়ে ?	১. হ্যাঁ ২. না
34	১. আপনি কি নিয়মিত হাঁটেন/ব্যায়াম করেন	১. হ্যাঁ ২. না
35	১. আপনি কি হতাশাগ্রস্থ/দুশ্চিন্তা করেন ?	১. হ্যাঁ ২. না
36	১. আপনি কি দেরি করে ঘুমান/রাত জাগেন ?	১. হ্যাঁ ২. না
37	১. আপনি কি দিনের অধিকাংশ সময় শুয়ে/বসে কাটান ?	১. হ্যাঁ ২. না

Section D
Food Habit Factors

SI. No	Questions	Responses
38	দিনে আপনার কত বেলা খাওয়া পড়ে ?	১. দুই বেলা ২. তিন বেলা ৩. চার বেলা ৪. পাঁচ বেলা ৫. ছয় বেলা
39	খাবার কি ভাবে রান্না করা হয় ?	১. অতিরিক্ত আঁচে ভেজে রান্না ২. অল্প মশলাযুক্ত অল্প আঁচে রান্না ৩. অধিক মশলাযুক্ত অধিক আচেঁ রান্না
40	আপনার কি বাড়ির চাইতে বাহিরের খাবার বেশি খাওয়া পড়ে ?	১. হ্যাঁ ২. না
41	আপনার কি টিনের/প্রস্তুতকৃত/প্যাকেটজাত খাবার বেশি খাওয়া পড়ে ?	১. হ্যাঁ ২. না
42	আপনার কী প্রায় প্রতিদিনই কোমল পানীয় খাওয়া পড়ে ?	১. হ্যাঁ ২. না

Section E
Average food intake in last 7 days
দয়া করে কোন লাইন বাদ রাখবেন না, প্রতিটি লাইনে টিক চিহ্ন দিন-

Sl. No 43	খাবারের নাম	প্রতিদিন	সপ্তাহে ৫-৬ বার	সপ্তাহে ৩-৪ বার	সপ্তাহে ১-২বার	গত ৭ দিনে খাওয়া হয়নি	কখনোনা
A	ভাত, রুটি, ময়দা						
B	মাছ, মাংস, দুধ, ডিম						
C	দুধ বা দুধের তৈরী খাবার						
D	বিভিন্ন ধরণের ডাল ও বাদাম						
E	রঙিন ও সবুজ শাকসবজি						
F	ডবভিন্ন রকমের ফল						
G	রান্নার তেল, ঘি, মাখন						
H	চিনি, মিষ্টি, মিষ্টি জাতীয় খাবার						
I	মশলা, মশলা জাতীয় খাবার						

Section F
Dietary Habit Related Factors /খাদ্যাভ্যাস

SI. No	Questions	Responses
44	আপনার প্রতিদিনের খাদ্য তালিকায় কি শর্করা জাতীয় খাবার থাকে ? (ভাত, রুটি, পরোটা, পাউররুটি)	১. হ্যাঁ ২. না
45	আপনার প্রতিদিনের খাদ্য তালিকায় কি বিভিন্ন ধরণের ডাল জাতীয় খাবার থাকে ?	১. হ্যাঁ ২. না
46	আপনার প্রতিদিনের খাদ্য তালিকায় কি বিভিন্ন ধরণের রঙিন শাক থাকে ?	১. হ্যাঁ ২. না
47	আপনার প্রতিদিনের খাদ্য তালিকায় কি বিভিন্ন ধরণের রঙিন সবজি থাকে ?	১. হ্যাঁ ২. না
48	আপনার প্রতিদিনের খাদ্য তালিকায় কি বিভিন্ন ধরণের মাটির নিচের সবজি থাকে ? (আলু ইত্যাদি)	১. হ্যাঁ ২. না
49	আপনার প্রতিদিনের খাদ্য তালিকায় কি বিভিন্ন ধরণের বাদাম বা বীজ জাতীয় খাবার থাকে ?	১. হ্যাঁ ২. না
50	আপনার প্রতিদিনের খাদ্য তালিকায় কি বিভিন্ন ধরণের মশলা থাকে ? (দারচিনি,রসুন,আদা, তেজপাতা,হলুদ ইত্যাদি)	১. হ্যাঁ ২. না
51	আপনার প্রতিদিনের খাদ্য তালিকায় কি বিভিন্ন ধরণের রঙিন ফলমূল থাকে ?	১. হ্যাঁ ২. না
52	আপনার প্রতিদিনের খাদ্য তালিকায় কি মাছ থাকে ?	১. হ্যাঁ ২. না
53	আপনার প্রতিদিনের খাদ্য তালিকায় কি মাংস থাকে ? (গররু, খাসি, মুরগী)	১. হ্যাঁ ২. না
54	আপনার প্রতিদিনের খাদ্য তালিকায় কি ডিম থাকে ?	১. হ্যাঁ ২. না
55	আপনার প্রতিদিনের খাদ্য তালিকায় কি দুধ ও দুধের তৈরী খাবার থাকে ?	১. হ্যাঁ ২. না
56	আপনার প্রতিদিনের খাদ্য তালিকায় কি তেল ও চর্বি জাতীয় খাবার থাকে ?	১. হ্যাঁ ২. না
57	আপনার প্রতিদিনের খাদ্য তালিকায় কি চিনি বা মিষ্টি জাতীয় খাবার থাকে ?	১. হ্যাঁ ২. না
58	আপনার প্রতিদিনের খাদ্য তালিকায় কি অতিরিক্ত লবণ থাকে ? (পাতে কাঁচা লবণ, চানাচুর, আচার, চিপস ইত্যাদি)	১. হ্যাঁ ২. না

Section G
Clinical Feature, Treatment Related Variables

SI. No	Questions	Responses
59	লৰণ /শারীরিক কষ্ট	১. গলাব্যাথা ২. শুষ্ক কাশি ৩. শ্বাসকষ্ট ৪. জ্বর-অবসাদ ৫. শরীর/মাথাব্যথা ৬. পেটখারাপ ৭. দুর্বলতা ৮. অস্থিরতা /হাত পা কাঁপা ৯. অন্যান্য ১০. কোন সমস্যা নাই
60	**Treatment**	**1. Mild Category 2. Moderate Category** **3. Severe Category 4. Critical Category**
61	**Hospital Stay time** হাসপাতালে থাকার সময়	..... **Days (**দিন)
62	**Outcome (**ফলাফল)	**1. Discharge with advise** **2. Discharge on Request** **3. Death**

Dietany Habit and Nutritional Status on the Severity of CoVID-19 treatment

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