**DETERMINANTS OF COVID OUTBREAK AND NUTRITIONAL PROFILE OF GERIATRIC COVID -19 PATIENTS IN COASTAL AREAS OF ALAPPUZHA**

**Candidate Code: 65819139008**

**Exam Code: 65818402**

**Subject Code: HS245E**

***Dissertation submitted to the University of Kerala in partial fulfilment for the award of the Master’s Degree in Home Science (Nutrition & Dietetics)***

**MAY, 2021**

**CONTENTS**

|  |  |  |
| --- | --- | --- |
| **Chapter** | **Title** | **Page No.** |
|  | Abstract |  |
| **I** | Introduction |  |
| **II** | Review of Literature |  |
| **III** | Methodology |  |
| **IV** | Results and Discussion |  |
| **V** | Summary and Conclusions |  |
|  | Bibliography |  |
|  | Appendix |  |

**LIST OF TABLES**

|  |  |  |
| --- | --- | --- |
| **SI No.** | **Title** | **Page No.** |
| 1 | Classification of Body Mass Index |  |
| 2 | Depression Anxiety Stress Scale |  |
| 3 | Body Mass Index of Target Group |  |
| 4 | Physical Activity of Samples |  |
| 5 | Duration of Hospital Stay of Target Group |  |
| 6 | Medical History of Samples |  |
| 7 | Worsening of Existing Disease in Target Group |  |
| 8 | Nutritional Assessment During COVID-19 |  |
| 9 | Nutritional Assessment After COVID-19 |  |
| 10 | Appetite Among Target Group During Corona Virus Infection |  |
| 11 | Eating Disorders of Samples |  |
| 12 | Dietary intake of Samples During COVID-19 |  |
| 13 | Dietary intake of Samples After COVID-19 |  |
| 14 | Stress Among Geriatric Population During COVID19 Infection |  |
| 15 | Depression Among Geriatric Population During COVID19 Infection |  |
| 16 | Anxiety Among Geriatric Population During COVID19 Infection |  |

**LIST OF FIGURES**

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Title** | **Page No.** |
| 1 | Overview of Cherthala thaluk |  |
| 2 | Age wise Distribution of Samples |  |
| 3 | Family Size of the Target Samples |  |
| 4 | Marital Status of Samples |  |
| 5 | Frequency of occupational morbidities |  |
| 6 | Occupation of Elders |  |
| 7 | Annual Income of Samples |  |
| 8 | Mode of Transmission of Corona virus Infection Among Target Group |  |
| 9 | Symptoms Associated With COVID-19 Among Geriatric |  |
| 10 | Post Covid Health Issues Among Samples |  |
| 11 | Recovery Period of Target Group |  |
| 12 | Respiratory Strength of Selected Samples |  |
| 12 | Occurrence of Delirium or Cognitive Impairment in Target Group |  |

**LIST OF PLATES**

|  |  |  |
| --- | --- | --- |
| **Sl. No** | **Title** | **Page No** |
| 1 | Interviewing the Samples |  |
| 2 | Measuring Respondents Weight |  |

**LIST OF APPENDIX**

|  |  |  |
| --- | --- | --- |
| **Appendix No** | **Title** | **Page No** |
| I | Interview Schedule |  |
| II | Statistical Appraisal |  |

**ABSTRACT**

**DETERMINANTS OF COVID OUTBREAK AND NUTRITIONAL PROFILE OF GERIATRIC COVID -19 PATIENTS IN COASTAL AREAS OF ALAPPUZHA**

**Introduction**: The global COVID-19 pandemic has wreaked havoc on people all over the world. The social distancing protocols enacted to slow the spread of COVID-1 9 are more likely to have negative consequences for older people, who already have higher rates of social alienation and loneliness. Physiologic psychological changes reduced invulnerability capability, and multi-morbidity. The elderly may constitute a distinct group of patients who are at high risk of developing COVID-19 and experiencing rapid clinical deterioration. Immunosenescence and comorbid conditions are more likely in older people to promote viral-induced cytokine storms, which can lead to life-threatening respiratory failure and multisystemic involvement. **Methods**: 100 samples of old age people from Cherthala thaluk (Kadakkarapally grama panchayath) were taken, out of which 50 were females and 50 were males. Above 55 years old age were selected for the study through the purposive sampling method. Details of respondents from registers provided by health workers were used for the selection of samples. A structured questionnaire was used for assessing personal data, dietary information, health profile, anthropometric measurements, and quality of life. MNA Mini Nutritional Assessment) tool, FFQ( Food Frequency Questionnaire). The 24-hour recall method was used in nutritional surveys to collect the dietary intake of respondents. DASS (Depression Anxiety Stress Scale was used to analyze the psychological status of the respondents. **Results**: This study reveals that the majority of the people (80%) were from the low-income category, socio-economic factors may contribute to the incidence of coronavirus infection among elders. It was evident that the majority of the respondents have clinical symptoms such as fever, loss of smell and taste, tiredness, dry cough, headache, and gastrointestinal symptoms. Very few samples were found to have symptoms like difficulty breathing, chest pain, and loss of speech or movement associated with COVID 19. Post COVID-19 health issues among elders are palpitation, fatigue, joint pain. Shortness of breath, loss of taste or smell, memory loss were affected by numerous samples. Comorbidities increase the severity of COVID-19 among the geriatric population. The study found that females have more health issues after the COVID-19 infection. **Conclusions**: The change in lifestyle and nutritional profile during COVID-19 influence the quality of life of the geriatric population. Their socio-economic status negatively affected and limited their health care facilities. Nutritional status and health profile of elders were worsened during the pandemic, and some physiological distress developed after COVID-19 infection.

**Keywords**: **COVID-19, Comorbidities, Immunosenescence, Geriatrics, Quality of Life**

**INTRODUCTION**

**CHAPTER – 1**

**INTRODUCTION**

Covid 19 is the ongoing epidemic in the world that alters the life of every human being. In 2020 March World Health Organization declared the uprising of corona disease as a global pandemic. COVID-19 is caused by a new beta coronavirus strain (SARS-CoV-2) that was discovered in Wuhan, China, in 2019 (Rothan & Byrareddy, 2020). According to virus genome sequencing studies, the bat is suspected of being the virus's natural host, and infection could be transmitted from bats to humans through unknown intermediate hosts such as reptiles and snakes. COVID-19 is spread from person to person by droplet infection during the incubation period or after clinical symptoms such as fever, cough, sneezing, sputum, dyspnea, and pneumonia, as well as through infected fomites (Prasad et al., 2020).

According to WHO, there were 266,073 confirmed cases and 11,184 confirmed deaths in 183 countries as of March 21, 2020. On April 22nd, the World Health Organization (WHO) released regional reports on COVID cases and deaths, reporting a total of 2,471,136 confirmed cases and 169,006 deaths worldwide. On January 30, 2020, India recorded the first case of the COVID pandemic. The Indian Council of Medical Research (ICMR) released data on March 23 showing that out of 18,383 samples screened from 17,493 people, 415 were positive and 7 people died from COVID-19. To prevent the virus from spreading in the world, India introduced a 14-hour voluntary public curfew on March 22, 2020, followed by a 21-day nationwide lockout on March 24, affecting India's entire 1.3 billion population.

The most vulnerable category to COVID-19 is older adults and those with underlying medical problems that are chronic (D’Adamo et al., 2020). During the COVID – 19 pandemic geriatrics are at greater risk of the SARS-CoV -2. Some studies show that the incidence of COVID-19 is higher in the geriatric population (Nag et al., 2021). Because of developing physiologic changes of maturing, diminished invulnerable capacity, multi-organ failure chronic diseases, etc, that increase the risk of coronavirus. Geriatrics are more vulnerable to experience the serious effects of coronavirus. The aging process adversely affects pulmonary physiology, pathology, and function during respiratory infections. Old age compromised immunity, hearing loss, dementia, refractive errors, chronic obstructive pulmonary disease, diabetes, depression, and chronic diseases are the main predisposing factors for these people. Immunosuppression decreased organ function, and inadequate healthcare management has increased the suffering of the elderly (Tan et al., 2019).

People over the age of 60 are considered as senior citizens. According to the World Health Organization, most developed world countries define old age as 60 years or more. However, assigning the age range of 55 to over 100 as "aging" means that there must be a lot of things in common during this period (Angela et al.,2009). According to WHO, the expected population of old age is 2 billion by 2050, the population of geriatrics is increased day by day. Today 1.25 million people are aged in which 80 percent of old age are living in low- and middle-income countries (WHO, 2019). The adverse effects of the corona are more dominant in low-income or developing countries. Because the population of old age is comparatively higher in developing countries and inadequate health care facilities also affect the people.

In India, the elderly population has gradually risen, nearly doubling in the last 20 years. Though India's total population is expected to increase by 40% between 2006 and 2050, the elderly population is expected to increase by 270 percent (Balasundaram et al., 2020). When we compare the growth rates of the elderly population in various Indian states, we can see that there are differences. The elderly population is growing at the fastest rate in southern states like Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu. Kerala has the fastest-growing elderly population among the southern states ( India - Aging Population by State 2011*).*In the next 20 years, India's demographic transformation from a young to an aging nation will be complete, with a 20 percent aging population. Our country's cultural and regional diversity is reflected in the diversity of our elderly population. The steady rise in the number of elderly people in the population is due to the decrease in fertility and mortality rates, as well as increased life expectancy. An aging population poses new economic problems, requiring the government to invest more in old-age pensions, health-care programs, and social-benefits programs to meet the needs of the elderly.

Kerala was the first state in India affected by COVID-19, and the first instance of coronavirus was reported on 30 January in Thrissur District In 2020. By the beginning of March, the state soon had the largest number of active cases, predominantly in India, owing to a large number of imported cases from other states and nations. During the epidemic, the quality of life of people in Kerala has improved significantly through government initiatives, which has a significant effect on the survival of the epidemic period. Even before the first case of covid 19, Kerala introduced preventive strategies to further control the epidemic (Menon et al.,2020). Governments all over the world used a variety of tactics to combat the pandemic, including national lockout. While the goal was to avoid the virus from spreading, the abrupt implementation of lockdown could have harmed the already vulnerable elderly population.

According to government statistics on 21 January 24, 2021, the total confirmed cases are 870529, recovered cases are 796986, total death cases are 3545 and still active cases are 69771 reported in Kerala. According to the 2011 census, Kerala accommodates 4 million older adults. The census report shows that in India 8.6 percent of old adults are above 60, in which the share of Kerala elderly in the total older population is 4 percent which indicates that Kerala has the first rank in the elderly population. The chances of getting coronavirus among the elderly are more in Kerala.

**SIGNIFICANCE OF STUDY**

Coronavirus infection were new to everyone, it’s actual characteristics and effects of post-infection of coronavirus infection are unknown. This study helps to understand the characteristics and post-effect of coronavirus infection. Controlling and treating COVID-19 is difficult due to advanced age and underlying diseases. In 2019, 703 million people around the world were over the age of 65. COVID-19 is thought to be responsible for 18% of mortality in people over the age of 76. The introduction of effective preventive measures and possible strategies to protect against this disease in the geriatric population is compromised by frequent infections in older people, elevated disease severity, and increased mortality. Generally, psychological and physiological alterations frequently occur in the geriatric population. In this pandemic situation, the psychological and physiological may contribute to the severity of the disease and also worsen existing morbidities. Elders are physically and psychologically weak, thus family support is needed to support their life, and training staff and family in home-based rehabilitation services for elders is a necessity. Increased involvement of the elderly in society, increased acceptance of the elderly through combating ageism, continued enjoyment of home life in this pandemic period.

**OBJECTIVES**

· To assess the nutrition and health profile of geriatrics at pre and post-pandemic period.

· To determine the reasons for COVID 19 among geriatrics.

· To examine the psychological well-being during COVID- 19 among geriatrics.

· To find the treatment modality adopted for geriatric during COVID- 19 and strategies for fostering healthy aging.

**HYPOTHESIS OF THE STUDY**

**Ho**: COVID19 outbreak adversely affect nutritional and health status of geriatric and drastic changes in the dietary pattern and quality of life among the aged.

**Ho**: COVID 19 aggravated the psychological complications among elderly

**REVIEW OF LITERATURE**

**CHAPTER -2**

**REVIEW OF LITERATURE**

The relevant literature on the topic **“Determinants of Covid Outbreak and Nutrition Profile of Geriatric Covid Patients in Coastal Areas of Alappuzha”** is critically reviewed and presented under the following headings.

**2.1 The Determinants of COVID 19 In Geriatric Population**

2.1.1 Epigenetic changes in old age

2.1.2 The Immunocompetency, Nutritional factors, and Incidence of Corona Virus Infection

2.1.3 Socio-economic factors

2.1.4 The Impact of comorbidities in Covid 19 among elder people

2.1.5 Negligence of COVID 19 protocol among geriatric population

**2.2 Physiological symptoms associated with COVID 19**

**2.3 Psychological symptoms associated with COVID 19 in Geriatric population**

**2.4 Pathogenesis of Corona Virus infection in Geriatric**

**2.5 Long Term effects of COVID -19 Among the geriatric population**

2.5.1 Post Covid Effect on Cardiac Health

2.5.2 Post Covid Effect on Digestive Tract

2.5 .3 Post Covid Effect on Renal System

2.5.4 Respiratory Illness After COVID -19

**2.6 Treatment Modalities Adopted for Geriatric COVID 19 Patients**

**2.1 The Determinants of COVID19 Occurrence in Geriatric**

 COVID 19 makes sudden drastic changes among older peoples in everyday routine. They are more being challenged to spend more time at home and lack contact with friends and colleagues. The transient termination of employment and other activities, and other psychological disturbances associated with aging, and fear of death lead to worsening of disease, and also worsen the existing disease (WHO, 2019). Most of the people are staying at home during the epidemic period, however, the occurrence of COVID 19 is more dominant in the geriatric population. Several factors contribute to the prevalence of covid 19 among geriatrics.

**2.1.1** **Epigenetic changes in old age**

As biomarkers, and potential underlying causes, of chronic disease states and of aging itself, dysregulation of the epigenome and resulting changes in gene expression during aging are strongly involved (Mueller et al., 2020). The aging theory of 'relocalization of chromatin modifiers' postulates that signs of aging and loss of resistance are the product of the accumulation of epigenetic changes over a lifespan (Burgess et al., 2012). These changes may be triggered in part by the redistribution of chromatin factors, which indicated that age-related changes to the host epigenome compromised immune responses and give a negative impact on viral diseases.

The susceptibility of the elderly to SARS-CoV-2 could also have with the viral entry effects of the epigenome triggered by the physical contact between the receptor of the viral spike glycoprotein and the surface protein of the ACE2 cell. While genetic variations in ACE2 are being pursued as a cause of the severity of COVID 19.

**2.1.2 The Immunocompetency, Nutritional Factors, and Incidence of Corona Virus**

Geriatric have compromised immunity than other age groups. The immune response of an individual is the organized function of cell and molecule acting together to protect from pathogens, that cause disease (Nicholson, 2016). The overreaction of the immune system leads to inflammatory diseases. At a younger age, there is a good balance between immune responses. The older age the balance between immune response become lost, which leads to the risk of diseases (Travers, 2016). Immune senescence occurs in geriatrics, the word immune senescence is referred to as the slow impairment of our immune system. This decline in immunity also referred to as immune senescence, has been largely attributed to either the increased incidence and severity of infections, reduced immune monitoring of lymphocytes, and decreased vaccine effectiveness in the elderly (Alexopoulos & Morimoto, 2011). Generally, immune senescence occurs after 55 years of age. It is a major physiological change in old age. Immunosenescence is a very complex phenomenon due to deregulated immunity. Normal aging is genetically determined, although many external factors might have a positive or negative effect on immune senescence. Indeed, the actual state of the immune system in the elderly is, according to modern views, the product of a continuous phase of remodelling. Oxidative stress, likely due to an increased rate of telomere shortening resulting from DNA damage, is believed to be a major factor in accelerated aging. At the end of chromosomes, telomeres are DNA+ Protein complexes and are supposed to be the aging molecular clock, including that of the immune system, especially lymphocytes (McElhaney & Effros, 2009).

In any infectious disease, immunity is the foundation of host-pathogen interaction. It comprises three factors, viz vulnerability, immune response, and protentional immune pathology (Frasca et al., 2009).

           For all cells to function optimally, adequate and appropriate nutrition is needed. An "activated" immune system further increases the demand for the immune system. Optimal nutrition is required to maintain the best immunological outcome, which supports the overall functioning of the immune system. The demands of the immune system for energy and nutrients can be met from exogenous sources, i.e., diet, or from endogenous sources such as body stores if dietary sources are insufficient. Some micronutrients and dietary components play a very specific role in life in developing and sustaining an efficient immune system or in reducing chronic inflammatory disease. For the generation of nitric oxide by macrophages, the amino acid arginine is essential, and vitamin A and zinc micronutrients control the division of cells and are therefore essential for a good proliferative response within the immune system(Childs et al., 2019).

           In the geriatric population, food choices are different than any other population. In older individuals living at home and in nursing homes, as well as hospital patients, low appetite is a common concern. It can lead to weight loss, dietary deficiencies, and adverse health effects associated with it, including increased mortality and morbidity (Pilgrim et al., 2015). These nutritional problems induce the occurrence of underweight, obesity, diabetes mellitus, and other diet-related behavioral problems (Bourdel-Marchasson, 2010). Inadequate intake of food may be caused by many factors such as age, sex, appetite, olfactory acuity, availability of food, mental awareness, self-esteem, pathological factors, dental problems, use of drugs, and disability factors in the geriatric population (Pilgrim et al., 2015). These factors adversely affect the utilization of nutrients. That may result in malnutrition, which can cause suppression of immunity in elder people.

           Malnutrition can generally weaken the immune response, thus impacting the vulnerability of the COVID-19 response. Adequate and healthy diets can help to improve the immune system for the prevention of infections, and a meaningful and balanced basis for an immune response is a consideration of the dietary and nutritional components, the factors during viral infection. For the development of antibodies, intake of an adequate amount of protein is important. Often, an increased risk of infection has been associated with a low level of Vitamin A or Zinc. The hairy morphology of the intestines can be preserved by branched-chain amino acids and the levels of intestinal immunoglobulin increase, thus strengthening the intestinal barrier. There is evidence that the immune response to infection and the intensity of COVID-19 reactions, as well as mortality, are related to vitamin D levels in geriatric COVID 19 patients. The most common deficiencies were vitamin D deficiency and selenium deficiency. Moreover, almost all COVID-19 patients with respiratory distress were found to be nutritionally deficient. It's unclear if individual nutrient deficiencies harmed immunity or whether the nutrient deficiency caused the patient's overall condition to deteriorate. Vitamin D helps the respiratory epithelium to produce antimicrobial peptides, which reduces the risk of viral infections and the severity of symptoms. Dysregulation of the renin-angiotensin system is the mechanism of lung injury in corvid-19 among geriatric. Vitamin D upregulates anti-inflammatory responses is vital for immune responses (Hyoung et al., 2020).

**2.1.3 Socio-Economic Factors**

The intensity of the coronavirus disease (COVID-19) pandemic in almost every country in the world has a tremendous effect on social life and economic activity. In addition to biological and epidemiological variables, the magnitude of the spread of coronavirus disease in the population is often regulated by a multitude of social and economic criteria. Most governments have adopted social distance restrictions such as the closure of schools, airports, to reduce the possible enormous effect of the spread of coronavirus disease. There were also lockdowns in the most extreme cases; all residents were forbidden from leaving their homes. Subsequently, this contributed to a drastic economic downturn: stock prices collapsed, foreign trade slowed, companies went bankrupt, and people were left unemployed (Stojkoski et al., 2020).

In low-income families restricted or no access to transport for doctor appointments, lack of health insurance, limited health care education, limited funding for health care, hours limited to working hours for providers, etc. the geriatric people require more health care attention than other age groups. The lack of health insurance is commonly seen in lower-income and minority communities. The geriatric people in low-income communities struggle to afford to maintain their health and nutritional status (Abrams & Szefler, 2020).

**2.1.4 The Impact of Comorbidities in Covid 19 Among Elder People**

                       Recent studies show that comorbidities increase the incidence of coronavirus among the geriatric population. COVID-19 is more likely to affect the elderly, particularly those in long-term care facilities, and people of any age with severe underlying medical conditions. The elderly are a vulnerable group with chronic illnesses such as diabetes and heart disease. COVID-19 infection is more likely in people who have untreated medical conditions such as diabetes, asthma, lung, liver, and kidney disease; cancer patients on chemotherapy, transplant recipients, and patients who take steroids on a long-term basis. Patients with mild to extreme asthma are at a disadvantage because the virus affects their respiratory tracts, causing asthma attacks, pneumonia, and acute respiratory distress. The magnitude of COVID-19 disease progression is linked to several comorbidities. Many of the COVID-19's worsened results have been linked to cardiovascular comorbidities.

**2.1.5 Negligence of COVID 19 Protocol in Geriatric**

The COVID 19 pandemic and its consequences like lockdown are a new phenomenon to everyone. In this world, things are happening that man never expected and not even heard. Humans are still struggling to cope with new situations especially vulnerable sections like elder people. Geriatric people do not accept the new situation and they may refuse to obey the epidemic protocols. The COVID 19 protocols such as social distancing, quarantine, isolation, wearing of mask and using sanitizers, etc are new to elder people, thus they can feel discomfort to obey protocols.

           The elder people do not like to be isolated. Most of them are more likely to go out and communicate with others. Lockdown was created to shut down all activities that are beneficial to old age. Physical activity is important for elders, to maintain their physical health and mental well-being. Temporary cessation of physical activities adversely affects the overall health of the geriatric (Goethals,2020).

           During this pandemic period, the use of facemask is increasing in the world to prevent transmission of the coronavirus. During this period, there was a corresponding increase in ocular irritation and dryness among geriatrics (Majid,2020). In healthy people, wearing a mask does not cause any harmful discomforts, and it has life-saving benefits (Jennifer 2020). Recent studies show that face mask does not affect the respiratory system. The use of average mask may cause respiratory disturbances (Nancy,2020), however, elder people believe that face mask cause respiratory discomfort, so that they refuse to use the mask, that leads to the transmission of coronavirus quickly.

           The elder people who are suffering from psychological disturbances such as delirium or dementia are not aware of coronavirus and its consequences. They are more vulnerable to these infections thus, disobedience of covid protocol leads to the incidence of disease.

**2.2 Physiological Symptoms Associated with COVID 19**

COVID-19 is a viral pandemic with a horrific global effect. This disorder is more infectious than influenza, so cluster outbreaks often occur. These outbreaks could be controlled if patients with symptoms rapidly underwent monitoring and touch tracing. Patients with COVID-19, sadly, have symptoms similar to other common diseases (Liu et al., 2020). Compared to other age groups, in the geriatric population severity of symptoms are higher due to their aging. Generally, the illness of COVID 19 can be categorized into five which include, asymptomatic, mild, moderate, severe, and critical (Guo et al., 2020).

Fever, cough, dyspnoea, fatigue, and myalgia are among the most common clinical manifestations of COVID-19 (Perlman, 2020). Extreme pneumonia has been documented in geriatric covid patients who may have acute respiratory distress syndrome (ARDS), extrapulmonary organ failure, or even death (Zhu et al., 2020).

A high level of cytokine surge, which can result in damage to multiple organs, including cardiac myocytes, has been reported as part of the systemic inflammatory response of extreme COVID-19 disease. In patients with serious COVID-19 disease, studies have shown elevated levels of proinflammatory cytokines. Coronavirus harms direct damage to myocardial cells. ACE2 receptors are used by the SARS-CoV2 virus as an entry point to the cell. ACE 2 receptors are expressed in pneumocytes of both type 1 and type 2 but are also expressed in other cell types, including endothelial cells. ACE2 is a Renin-Angiotensin System inverse regulator. This SARS-CoV2 interaction with ACE2 can lead to changes in ACE2 pathways that lead to acute injury. Because of increased cardiometabolic demand associated with coronavirus infection and ongoing hypoxia caused by severe pneumonia or acute respiratory distress syndrome, increased demand for oxygen leads to myocardial damage (Basu-Ray & Soos, 2020).

           Severe gastrointestinal manifestations are seen in geriatric people, which include diarrhoea, vomiting, lack of appetite, abdominal pain, etc. Patients with digestive symptoms had a slightly longer duration than patients without gastrointestinal symptoms from onset to hospital admission (Pan et al., 2020). A loss in appetite is faced by many older individuals. Reduced appetite, increasing the risk of weight loss and nutritional deficiencies, can lead to decreased food and nutrient intake. For elder people, dietary deficiencies and weight loss have significant effects (Villapol, 2020). It can be difficult for older people to regain lost weight. With the aging process, many changes may be responsible for a decline or loss in appetite, including changes in the physiology of the geriatric, changes in psychological and emotional factors, changes in social circumstances, acute illness, chronic diseases, and use of certain drugs (Zuo et al., 2020). The physiological changes were seen in the digestive system, hormonal changes, illness, pain, changes in the sense of smell, taste, and vision, and a decreased requirement for energy occur with aging that can impair appetite (Vodnar et al., 2020).

  A viral infection, resulting in enterocyte dysfunction, induces an alteration in intestinal permeability in geriatric covid patients (Villapol, 2020). Geriatric COVID-19 patients have typical symptoms in the respiratory system. However, complaints of intestinal symptoms, such as diarrhoea, vomiting are common (Sokolowska et al., 2020). Recent studies show that there is no proof of antidiarrheal drug effectiveness, however, as with all COVID-19 patients, sufficient rehydration and potassium monitoring were done. Inflammation or intestinal damage is followed by gastrointestinal symptoms (Pan et al., 2020). There is a loss of the integrity of the intestinal barrier and of gut microbes that can cause the release of proinflammatory cytokines into the circulatory system by innate and adaptive immune cells, leading to systemic inflammation. Inflammation or intestinal damage is followed by gastrointestinal symptoms. There is a loss of integrity of the intestinal barrier and of gut microbes that can cause the release of proinflammatory cytokines into the circulatory system by innate and adaptive immune cells, leading to systemic inflammation. Via dendritic cells, certain intestinal signalling pathways can control inflammation (Parasa et al., 2020).

**2.3 Psychological Symptoms Associated with Corona Virus In Geriatric Population**

Pandemics and other public health issues, such as extreme acute respiratory syndrome (SARS), and the recent pandemic of coronavirus (COVID-19), also contribute to high rates of mental health problems in elder people. Recent studies show that COVID 19 uprise depression, fear of death, hopeless in treatment which leads to suicidal behaviour in geriatric people who suffer from COVID 19 (Mukhtar, 2020). The most common mental health issues during pandemics are anxiety, depressive symptoms, and posttraumatic stress disorder in geriatric covid patients (Hossain et al., 2020).

 The tools needed to cope with the burden of COVID-19 are not available to many older adults. This may include material resources (e.g., lack of access to smart technology and lack of knowledge), social resources (e.g., few family members or friends), or cognitive or biological resources (e.g., failure to engage in physical exercise or participate in activities or routines) (García-Portilla et al., 2020).

**2.4 Pathogenesis of Coronavirus Infection in Geriatric Population**

The upper air passage is the entry of infections like SARS-CoV-2. In elders. The age-related reduction in inhaled particle clearance in the small airway region is responsible for the high prevalence of respiratory symptoms among the elderly. A peculiar dissociation between the intensity of hypoxemia and the relatively well-preserved ventilatory system of the pump has been documented in infected patients with SARS-CoV-2 (Perrotta et al., 2020). Over 60 autopsies of SARS cases have been documented with pathological findings in the lungs. The lungs were oedematous and increased in weight on gross inspection(Gu & Korteweg, 2007).

Many findings indicate that SARS-CoV is capable of causing central nervous system infection. SARS-CoV genomic sequences have been identified by RT-PCR in cerebral spinal fluid and brain tissue samples (Schouten et al., 2016).

**2.5 Long Term Effects of COVID -19 In Geriatric Population**

There is a various range of symptoms experienced by COVID -19 patients. Approximately 10-15% of cases lead to serious disease, and about 5% become seriously ill. After 2 to 6 weeks, people usually recover from COVID-19 except for geriatric people, who suffer from various diseases such as heart disease, cancer, etc. Some symptoms of coronavirus infection persist for longer which depends upon age, health status, etc.

Some lingering or long-term health hazards occur in post-corona virus infection, which includes fatigue, shortness of breath, loss of taste or smell, and body ache. Headache, chest pain, abdominal pain confusion, etc. In many cases reported that people especially geriatric people, do not achieve their previous health status after coronavirus infection. Prolonged health hazards are more common in elder COVID-19 patients. High blood pressure, psychological abnormalities, obesity, malnutrition occur in patients, that may lead to emerging of other disease associated with it.

           Coronavirus infection is new to everyone, the long-term effect of coronavirus infection is not discovered yet, still, research is going about it. However recent studies have shown that the coronavirus can affect the whole organ system such as the circulatory system (damage to heart muscles, heart failure) brain and nervous system (anosmia, cognitive impairment)muscular and skeletal system (pain in join and muscle) found as past COVID 19 impact (WHO, 2020).

**2.5.1 Post Covid Effect on Cardiac Health**

Coronaviruses cause a strong systemic inflammatory response, as well as localized vascular inflammation resulting in a higher risk of myocarditis and thromboembolic events in the acute phase of the disease. Patients with extreme acute COVID-19 have been reported to have a myocardial injury, as characterized by an elevated troponin level, as well as thromboembolic disease. After SARS-CoV-2 infection, myocardial inflammation and myocarditis, as well as cardiac arrhythmias, have been reported. The long-term consequences of these viruses on the cardiovascular system are currently unknown. Recent research shows that pneumonia (not SARS) hospitalization was associated with a higher risk of death that may be linked with a rise in the risk of cardiovascular disease.

The etiology of COVID-19 infection-related ACE2-dependent cardiovascular complications is problematic. By binding to the membrane-bound form of ACE2, SARS-CoV-2 reaches cardiovascular cells/tissue (ACE2 receptor). Patients with heart failure have elevated levels of ACE2 and its activity, which are biomarkers of cardiovascular disease.

           Arrhythmia, which may vary from tachycardia to bradycardia and asystole, is another face of COVID19's cardiac involvement, in addition to myocardial injury. Statistical figures show that there were deaths due to sudden cardiac arrest in patients who had no previous history of idiopathic pulmonary disease. These findings indicate that death is caused primarily by an imbalance in the pulmonary ventilation-perfusion ratio and a reduction in the pulmonary vasculature's capacity.

**2.5.2 Post Covid 19 Effect on Digestive Tract**

Currently, little is known about the impact of SARSCoV2 infection on GI functions. The digestive system consists of the gastrointestinal tract (GI), and also the liver, pancreas, and gall bladder, all of which should be monitored because COVID affects the GI tract in addition to other body parts (de Clerck, 2020). It interferes with its work and makes it incapable of removing electrolytes and fluids from the body. Patients may experience bleeding in the gastrointestinal tract. As the COVID-causing virus enters the body, it targets the upper respiratory tract before actively replicating in the airways, cell linings, and gastrointestinal tracts, binding to ACE2 receptors. At the molecular level, viral replication can cause cell damage and disrupt gut function, making fighting the virus even more difficult (Cheung et al., 2020).

**2.5.3 Post Covid 19 Effect on Renal System**

           In patients infected with SARSCoV2, the kidneys are one of the most commonly affected extrapulmonary organs, particularly in those who are severely ill or vulnerable people such as the geriatric population (Wang et al., 2020). Recent research has shown that tubular injury (as shown by irregular urine test results) and elevated serum creatinine and urea nitrogen concentrations are the most common signs of kidney damage in covid 19 survivors, who are susceptible to extrapulmonary organ dysfunction (Hu et al., 2020). Coronavirus may infect kidney tubules directly. Although the underlying virologic mechanisms are unidentified, the virus may bind to the ACE2 receptor, which is strongly expressed in kidney tubules, that resulting in glomerulopathy, acute tubular necrosis, and protein leakage in the Bowman's capsule of the kidney, however, it's likely that AKI is an epiphenomenon in both respiratory distress syndrome-induced hypoxia and septic shock caused by the infection of coronavirus. Other autopsy investigations have shown that the endothelium in the kidneys is compromised and that this is the cause of proteinuria in people after COVID – 19 infection (Bellan et al., 2021). The incidence of kidney tubular injury was also higher in COVID19 patients with serious disease than in those with less severe infection. Some statistical figures show that there were deaths due to sudden cardiac arrest in patients who had no previous history of idiopathic pulmonary disease.

**2.5.4 Respiratory Illness After Covid19**

The degree and severity of covid-19 infection's long-term respiratory complications are unknown, although new evidence suggests that many patients especially older adults have intermittent respiratory symptoms months after their initial illness (Bellan et al., 2021). Patients healing from covid-19 are assessed for possible respiratory issues such as chronic cough, fibrotic lung disease, bronchiectasis, and pulmonary vascular disease (Ngai et al., 2010). The evidence for these potential consequences comes primarily from acute covid-19 manifestations (Torres-Castro et al., 2020). Coronavirus can cause a variety of breathing problems, ranging from mild to serious. Adults over the age of 50, as well as those with other health issues such as coronary artery disease, cancer, or diabetes, may be at risk, there will be more genuine manifestations This is the effect of the new Covid on the lungs.

**2.6 Treatment Modalities Adopted For Geriatric Patients**

Treatment modalities adopted by COVID 19 geriatric patients include, including medication, nutrient supplements, infusion of fluid, etc are effective to the fast recovery of infectious disease.

There is no specific successful antiviral treatment for COVID-19 at this time. While the majority of COVID-19 patients have mild to moderate symptoms that, may have a serious, potentially fatal course. Of course, successful drugs are desperately needed, and supportive care or medications for other diseases, that reduce the severity of the disease. There are currently no authorized drugs to treat COVID-19 disease (Zhai et al., 2020). Supportive therapy, treatment of symptoms, and attempts to avoid respiratory failure in the clinical management of coronavirus infection. Antibiotic prophylaxis does not appear to prevent bacterial superinfection, and there is no indication that procalcitonin has a diagnostic role in COVID-19 patients. Specific antiviral drugs used to treat COVID-19 have been demonstrated *in vitro* and animal models, as well as anecdotal reports from human patients. These studies are almost entirely focused on SARS-CoV and MERS-CoV experience. Remdesivir was found to be effective in some COVID-19 patients. Remdesivir serves as a nucleotide equivalent by inserting into the nascent viral RNA chain and triggering its premature termination. Malaria and amoebiasis are treated with chloroquine and hydroxychloroquine. They both have a high tolerance profile. Chloroquine activity against SARS-CoV has been demonstrated in vitro and animal models so that these medications are used to cure coronavirus infection (Şimşek Yavuz & Ünal, 2020).

In some hospital settings, vitamin tablets are provided to geriatric patients to improve their immunity to fight against infectious disease, which helps in the fast recovery from disease. There is an electrolyte imbalance and inadequate dietary intake is seen in the severe geriatric patient as the result of diarrhoea. To ensure adequate nutrient intake and electrolyte balance, the patients may be subjected to administration of enough nutrients and electrolytes through IV.

**Related Studies**

**1. The Impact Of Delirium On Outcomes For Older Adults Hospitalised With COVID-19**

Delirium is a common illness in hospitalized older patients, and it is generally associated with a poor prognosis. It has been suggested that SARS-COV-2 has a direct impact on the central nervous system (CNS). In this study, 91 samples were selected for the study From March 8th to April 17th, 2020, 91 patients aged 70 and up were admitted to an emergency geriatric ward in Northern Italy. In the total sample, 39 patients died, 49 were discharged, and three were admitted to the intensive care unit. Delirium affected twenty-five patients (27.5%). During hospitalization, 72 percent of patients with delirium died, compared to 31.8 percent of patients without delirium. This study reveals that Delirium is normal in older COVID-19 patients and is closely linked to in-hospital mortality. Delirium should be viewed as a troubling prognostic indicator in older people, regardless of causation, whether due to a direct effect of SARS-COV-2 on the CNS or a multifactorial trigger (Marengoni et al., 2020).

**2. Cardiac Injury Is Associated with Inflammation In Geriatric COVID-19 Patients**

The risk of heart injury in geriatric patients with coronavirus disease (COVID-19) is high. Identifying the factors that influence high-sensitivity cardiac troponin could help to identify the cause of cardiac injury in elderly patients, which could help to protect heart function in this population. In this study total of 188 inpatients were selected as samples who had been admitted for COVID-19 were screened. This research involved patients over the age of 60, and the clinical characteristics and laboratory results of the cohort were analyzed. The relationship between cardiac injury and clinical/laboratory variables was studied statistically, and logistic regression was used to see how these variables interacted. The findings indicate that age and inflammatory factors affect cardiac health. Injuries in the elderly Inhibiting inflammation in this patient population may theoretically protect the heart (Yan et al., 2021)

**3. COVID-19 and Geriatric Population: From Pathophysiology to Clinical Perspectives**

The COVID-19 pandemic has had the greatest health effects on the geriatric population, as well as a worldwide socioeconomic depression. Because of factors such as poor immunity and pre-existing co-morbidities such as hypertension, cardiovascular disease, and diabetes, the elderly population is prone to serious infections and has a high mortality rate. This is due to various factors, including atypical geriatric appearance, which may have resulted in diagnostic delay. According to WHO guidelines, only symptomatic people should be screened for RT-PCR, but only a small percentage of the population was tested, leaving a majority of the population undiagnosed. The elderly have a more serious type of pneumonia, a higher number of neutrophils and C-reactive protein, fewer lymphocytes, and a higher proportion of multiple lobe involvement. Due to the severe social suppression experienced during the COVID-19 pandemic, the risk of mental and physical side effects has increased, making older adults more vulnerable to depression and anxiety (Bansod et al., 2021).

**4. Risk factors for predicting mortality in elderly patients with COVID-19: A review of clinical data in China**

Though elderly patients are at a higher risk of death, COVID-19 research has focused on elucidating the clinical features. This research aims to find risk factors for mortality in COVID-19 patients who are elderly. Since single-center studies are less likely to be insightful since the elderly make up a small percentage of the Chinese population. Age remained a key mortality risk factor among geriatric patients of various ages, according to data from 154 people from 26 provinces. Dyspnoea and chest pain/discomfort were more common in deceased patients, indicating extreme pneumonia, while fever was more common in survivors (Leung, 2020).

**5. Nutritional risk and outcomes in intensive care unit patients with severe acute respiratory syndrome coronavirus**

As the Severe Acute Respiratory Syndrome Coronavirus disease (SARS-CoV-2/COVID-19) spread across the world, intensive care units (ICUs) were forced to confront a new fact, one in which the need for treatment increased dramatically. COVID-19 patients often face major dietary challenges, which can harm their nutritional status. This study aimed to see if there were any links between nutritional risk and duration of hospital stay and clinical outcome in COVID-19 ICU patients (Poulia et al., 2020).

**METHODOLOGY**

**CHAPTER -3**

**METHODOLOGY**

Research methodology is the science of studying how studies are carried out scientifically (Kothari, 2004). **Determinants of COVID Outbreak and Nutritional Profile of Geriatric COVID -19 Patients in Coastal Areas of Alappuzha**” are discussed under the following headings.

**3.1 Selection of Study Area**

**3.2 Selection of Samples**

**3.3 Selection of Methods and Tools**

           3.3.1 Personal Data of Older Adults

           3.3.2 Health Profile of Old Age

           3.3.3 Assessment of Nutritional Status of Old Age

           3.3.4 Anthropometric Measurements

           3.3.5 Assessment of Stress in Geriatrics

**3.1 Selection of Study Area**

           The area selected for study is a coastal area of Cherthala thaluk (Kadakkarapally Grama Panchayath of Alappuzha district in Kerala). Alappuzha is one of the longest coastlines in Kerala state. It has a continuous coastline and extends about 82 Kilometers (Thomas & Sheela.,2011). The population of the coastline is about 21,09,160, in which ninety-one villages are included in the coastline of Alappuzha. Cherthala is a municipal town and taluk in the Alappuzha district. Cherthala thaluk is a part of Alappuzha district panchayath and this area is subdivided into ten block panchayath, out of which four block panchayath are lie on the coastline of Alappuzha, in which most of the people are dependent on the marine economy and they are undergoing middle income or low-income categories (Salim et al., 2014). This area was chosen by considering elements such as availability of samples because 443 positive cases were reported in 2 wards of Kadakkarapally grama panchayath.



**Figure 1: Overview of Cherthala thaluk**

**3.2 Selection of samples**

The unit selected for sampling is known as samples. Samples are selected from particular groups, and they have identical features. Purposive sampling is adopted for this study. It is a sampling approach wherein the researcher is based on his or her judgment while selecting the individuals to take part in the study (Aldred et al., 2004).

100 samples of old age people from Cherthala taluk (Kadakkarapally grama panchayath) are taken, out of which 50 are females and 50 are males. Above 55 years elderly are selected for the study through purposive sampling method from registers provided by health workers. Personal interview and telephonic interview were conducted for data collection because older people are not aware of new technology. Data will be collected not only directly from older people but also through close relatives of those who have difficulty answering.

****

**Plate 1 Measuring respondent, s weight**



**Plate 2 Interviewing the sample**

**3.3 Selection of Tools and Techniques for Data** **Collection**

It consists of list of questions with the choice of answers to acquire the specific information from the selected respondents **(Appendix No 1)**. A structured questionnaire is used for assessing personal data, dietary information, health profile, anthropometric measurements and quality of life after taking prior consent from family members as shown in **Plate 2**. Pilot study is conducted among 10 sub samples to check the feasibility of the study and suitable corrections are made.

**3.3.1 Personal profile of old age**

The personal data include age, marital status, occupation, income and type of family. Personal information provide data regarding the respondents which is required to collect perfect data that is essential for good research.

**3.3.2 Health Profile of Old Age**

To assess the present and past health status of samples, the questions related to their present and past medical history, health issues during COVID-19 infection and post COVID-19 effects were included. To assess the lung capacity of the samples, breath holding test (BHT) were used. It is one of the reliable and safe method to check lung capacity (Battaglia.,2017).

**3.3.3 Assessment of nutritional status of old age**

Diet survey is an integral part of nutritional analysis. Diet survey provide information on nutrient intake, food habits, source of nutrients and source of nutrients. The diet survey are conducted through various methods such as MNA tool, 24 hour recall method and food frequency questionnaire (Agarwalla et al., 2015). Remembering consumption from the previous day can be difficult for certain people. Dietary assessment is particularly challenging for some groups of individuals, such as those with impaired cognition and memory (fading memory and reduced attention span) (Lafrenière et al., 2019).

The MNA was created in 1991 by researchers from France, Switzerland, and the United States as a "rapid and quick assessment of the elderly at risk of malnutrition in order to promote early nutrition intervention." It's now considered one of the most effective methods for determining nutritional status in the elderly. The MNA (Mini nutritional assessment) is a screening and evaluation tool with a dependable scale and clearly defined thresholds used by health care professionals. MNA tool is widely used to assess nutritional status of geriatric. The MNA score ranging from 12 -14 indicate normal nutritional status, 8 -11 indicates at the risk of malnutrition, 0-7 score indicate malnourished state. The current and past nutritional status of geriatrics are evaluated in this study (Koren-Hakim et al., 2016).

The 24- hour recall method is used in nutritional surveys to collect dietary intake of samples. A 24 -hour nutritional recall is structured interview that provide information about all meals consumed by samples in past 24 hours. It also provide information about portion size of each food, beverages, and food supplements (Osadchiy et al., 2020).

Food frequency questionnaire are attractive dietary assessment tool for rapid estimation of dietary intake over a long period of time. In this study, food frequency questionnaire is used to collect information on how specific category of food eaten. The basic food groups on food practices were listed in the questionnaire, in which samples were asked to mark their frequency of consumption of food (Lovell et al., 2017).

The Council on Nutrition Appetite Questionnaire (CNAQ) is a questionnaire of 8 items that was found to be valid in predicting clinically important weight loss for older adults in older living in the group and long-term in treatment. Each object is scored with a potential total score ranging from 8 (worst) to 40 on a 5-point scale (best). A score of 28 suggests a high risk of at least 5% weight loss within 6 months and was rated as at risk of malnutrition by these participants. The Simplified Nutritional Appetite Questionnaire (SNAQ)is a 4-item CNAQ derivative found to be equally valid. With a comparable scoring rubric, but fewer items are feasible, the cumulative score for the SNAQ ranges from 4 to 20 (worst) (best). Scores 14 display a high chance of weight loss of at least 5%.

**3.3.4 Anthropometric Measurements**

Anthropometric measurements are the chain of quantitative measurements of muscle, bone, and adipose tissue used to evaluate the composition of the body. The elements of anthropometric measurements are height, weight, body mass index, body circumference. These measurements are important to diagnose obesity, and other health care problems (Closs et al., 2017).

**3.3.4.1 Height**

According to UNICEF (1997) height is an indicator used to assess nutritional status of individual. The equipment used for measure height is stadiometer. The standing height can measure without wearing of shoes.

**3.3.4.2 Body Weight**

Body weight is the easiest method to assess the nutritional status of the individual. Body weight indicates body mass. Body weight comprises of all body constitutes like water, bone, muscle mass, mineral fat protein .etc. weighing machine is the equipment used measure body weight (Utkualp & Ercan, 2015) as shown in **Plate 1**.

**3.3.4.3 Body Mass Index**

BMI is an approach to quantify the quantity of tissue mass in an individual. The BMI is universally represented in Kg/m2. It is a tool for indicating weight status of an individual. Body mass index (BMI) is an estimate of body composition that correlates an individual’s weight and height to lean body mass. There are no well defined criteria or cut off values that relate to specific risks or aspects of health among individuals. Weight/height relationship changes dramatically with age during adolescence. Consequently at a given height, the weight corresponding to a particular percentile is not the same for all ages, so that the meaning of weight for height percentile differs with age. Because of these limitations Body Mass Index (BMI) for age and gender-specific centile was used in this study (Cole., 2000).

The body mass index (BMI) is defined as weight in kilograms (Kg) divided by the height in meter square (m²), is the best method of assessing nutritional status (Sreelakshmi,2012).

BMI = Weight (kg)

Height (m²)

**Table 1**

**Classification of Body Mass Index**

|  |  |
| --- | --- |
| **BMI** | **Category** |
| <18.5 Kg/m2 | Underweight |
| 18.5 – 22.9 kg/m2 | Normal |
| 23 – 24.9 kg/m2 | Overweight |
| >25 kg/m2 | Obese |

**Asian pacific BMI classification (2007)**

**3.3.5 Assessment of Psychological Status**

The rapid transmission of COVID-19 pandemic up rise higher mortality rate, self-isolation, social distancing and quarantine increase the risk of mental health problems. Mental health issues (new or existing) could escalate and further affect cognitive and emotional function. The effect of mental health on older adults varies across the world and the influence of geriatric mental health factors could vary from low middle income to developed countries.

Depression, Anxiety and Stress Scale (DASS), created by Lovibond (1995) accepted by Australian psychological society is used for the study. DASS scale comprises of 42 items that examine the level of depression, anxiety and stress of the individual (Greenberg, 2012). The DASS is an instrument for self-reporting, and no special skills are required to administer it. DASS interpretation can, however, be carried out by people with proper psychological science experience, including emotion, psychopathology and evaluation. When the DASS is administered to people who have requested clinical assistance or who show high levels of distress (Zaremba & Smoleński, 2000).

**Table2**

**DASS Tool Score**

|  |  |  |  |
| --- | --- | --- | --- |
| **Meaning** | **Depression** | **Anxiety** | **Stress** |
| Normal | 0 -9 | 0 -7 | 0 -14 |
| Mild | 10-13 | 8-9 | 15-18 |
| Moderate | 14 -20 | 10 -14 | 19-25 |
| Severe | 21 -27 | 15 -19 | 26 -33 |
| Extreme | 28 + | 20 | 33+ |

**(Lovibond,1995)**

Old age people are more sensitive, during epidemic period as they suffer more from psychological disturbances associated with aging process as well as corona virus infection. Recent studies shows that the occurrence of psychological disturbance is more in this pandemic era. Delirium is a psychological disturbance characterized by consciousness, disorientation and other cognitive impairments, that adversely affect older people and it also leads to death and prolonged hospitalization that is generally found among old age (Kukreja et al., 2015).

4AT tool were used to determine cognitive impairment in elders. The 4AT is made up of four sections. Item 1 determines how alert users are.  The Abbreviated Mental Test 4 (AMT4) and months backwards are the next two things, all of which are brief cognitive screening tests. Item 4 evaluates a sudden transition or fluctuation in one's mental state. A score of 4 or higher indicates the possibility of delirium. Positive levels of alertness or change objects, as well as un testability on both cognitive items, will result in a score of 4 or higher (Katzman et al., 2013).

**3.4 Statistical Analysis and Interpretation**

SPSS is a commercially available data processing and statistical analysis software package. SPSS was instrumental in transforming research methods in the social sciences. As a user-friendly and comprehensive statistics programmer, it enabled researchers to perform complex statistical analyses on large datasets without having to rely on statisticians (Arkkelin, 2014). Descriptive and inferential analysis was computed. The descriptive statistics include number and percentage and inferential statistics of T-test (paired), chi-square test and Wilcoxon signed rank were used, as shown in **Appendix No 2**.

**T test test**

A t test compares the means of two classes. It's one of the most popular statistical hypothesis tests. Parametric and nonparametric approaches are two different forms of statistical inference. Parametric methods are a mathematical technique for determining the probability distribution of probability variables and drawing conclusions about the distribution's parameters. Nonparametric approaches are used in situations where the probability distribution cannot be described. T tests are a form of parametric method that can be used when the samples are regular, have equal variance, and are independent.

**Chi-square test**

he Chi-square test of independence (also known as the Pearson Chi-square test, or simply the Chi-square) is one of the most useful statistics for testing hypotheses when the variables are nominal, as often happens in clinical research. When the dependent variable is evaluated at a nominal level, the Chi-square statistic is a non-parametric (distribution free) method for analyzing group differences. The Chi-square statistic, like all non-parametric statistics, is resilient to data distribution.

**Wilcoxon signed-rank test**

The Wilcoxon signed-rank test is a nonparametric test that is similar to a dependent t-test. Since the Wilcoxon signed-rank test does not presume that the data is regular, it can be used when the dependent t-test isn't suitable. It's used to compare two groups of scores from the same participants.

**RESEARCH DESIGN**

DETERMINANTS OF COVID OUTBREAK AND NUTRITIONAL PROFILE OF GERIATRIC COVID -19 PATIENTS IN COASTAL AREAS OF ALAPPUZHA

**AREA**: KADAKKARAAPALLY GRAMA PANCHAYATH

**SAMPLES (N)** = 100 SAMPLES

(50 MALES & 50 FEMALES)

**SAMPLING**: PURPOSIVE SAMPLING METHOD

**TOOL:** **PERSONAL INTERVIEW SCHEDULE**

**METHODS**

PSYCHOLOGICAL ASSESSMENT

SOCIO-ECONOMIC DEMOGRAPHIC PROFILE

NUTRITIONAL PROFILE

HEALTH PROFILE

MINI NUTRITIONAL ASSESSMENT

ANTHROPOMETRIC ASSESSMENT

FOOD FREQUENCY QUESTIONNAIRE

STATISTICAL ANALYSIS AND DATA INTERPRETATION

Chi-square test, t test.

CHI

**RESULTS AND DISCUSSION**

**CHAPTER - 4**

**RESULTS AND DISCUSSION**

The results of the study entitled “**Determinants of COVID Outbreak and Nutritional Profile of Geriatric COVID Patients in Coastal Areas of Alappuzha”** were consolidated, analyzed systematically and results are presented under the following headings.

**4.1 Socioeconomic & Demographic Variables**

4.1.1 Age

4.1.2 Family Size

4.1.3 Marital Status

4.14 Occupation of elders

4.1.5 Annual Income

**4.2 Anthropometric measurement of target group**

**4.3 Physical activity of the target group**

**4.4 Epidemiological factors associated with COVID 19 among geriatric people**

4.4.1 Mode of transmission of COVID 19 among geriatric

4.4.2 Symptoms associated with COVID 19 among geriatric

4.4.3 Health issues after corona virus infection

4.4.4 Duration of hospital stay of target group

4.4.5 Recovery period of corona virus infection among geriatric people

**4.5 Health profile of target group**

4.5.1 Medical history of target group

4.5.2 Worsening of existing disease in target group

4.5.3 Respiratory strength

**4.6 Nutritional profile**

4.6.1 Nutritional assessment during COVID 19

4.6.2 Nutritional assessment after COVID 19 infection among target group

4.6.3 Appetite among target group during corona virus infection

4.6.4 Appetite among target group after corona virus infection

4.6.5 Eating disorders among target group during COVID-19 infection

4.6.6 Eating disorders among target group after COVID-19 infection

4.6.7 Food frequency (during COVID19)

4.6.8 Food frequency (after COVID19)

**4.7 Psychological factors**

4.7.1 Stress among target group during pandemic

4.7.2 Depression among target group during pandemic

4.7.3 Anxiety among target group during pandemic

4.7.4 Occurrence of delirium in target group

**4.8 Treatment modalities adopted for geriatric**

**4.1 Socioeconomic Demographic Variables**

The analysis of socio-economic background of respondents has crucial importance. It helps to understand the diverse factors such as age, family size, economic status of the family that reflect the socio-economic background of the samples. This helps to understand the social structure and social relations of the respondents under the study. When compared to other age groups, the wellbeing and quality of life of the elderly are affected by many factors such as physical, psychological, social aspects (Farzianpour et al., 2015).

**Figure 2**

**4.1.1 Age Wise Distribution of Samples**

**Figure 2** shows the age category of the samples. It shows that 40% of the subjects are in the 55 -64years age group, followed by the age group of 65 -74 years (39%). About 17% of the samples belong to the age group of 75 -85years. Elder adults above 85 years constitute 4% of the total population of the samples.

The study carried out by O’Brien et al., (2020) shows that, the occurrence of COVID 19 infection is more in 50 to 80 years old age group, in which 60 to 80 is more prone to coronavirus infection.

**Figure 3**

**4.1.2 Family Size of Target Samples**

**Figure 3** shows the family size of the target samples, which implies that 53% of the people have 4 to 5 family members in their house, 23% samples have 6 to 8 members, and 48% have less than 3 family members. According to Nunn et al., (2015) the transmission of infectious agents like corona virus is widely expected in large sized family, but this study shows that middle sized family suffer from infections more, because the area used for the study include more middle sized family (4-5family members). Most of the geriatric population , were affected by corona virus infection through close contact with infected person in their family (Xiong et al., 2021).

**Figure 4**

**4.1.3 Marital Status of The Samples**

For older adults, marital status tends to be more closely linked to life satisfaction than for younger adults. Married older adults have higher levels of life satisfaction than those who are not married (Mannel.R, 2020).

**Figure 4** shows the marital status of the target group, in which majority of the people are married (68%) and 31% people are widowed. The remaining 1% are single.

**Figure 5**

**4.1.4 Occupation of Elders**

**Figure 5** represent occupation of 100 geriatric people, in which 50 are males and 50 are females. When women are compared to men, majority of men are working. Majority of the men about 65.71 per cent are working in the field of fishing. About 5.7 per cent are involved as merchants and about 28.50 per cent have no occupation. They depend on other family members for their needs. Among women, only 31.36 per cent are working. According to Russo et al., (2006) several studies have found predictors of loss of mobility and physical fitness in vulnerable elderly people. Functional dependency has been shown to be more common in older people who have many chronic diseases, but there is a controversy in the case of selected male samples, in which majority of the people are working especially males and most of them are productive, independent and able to engage in occupational activities.

**Figure 6**

**4.1.5 Annual Income of Samples**

**Figure** **6** shows that majority of the people (80%) belongs to low income, 12% in high income category and 7 % in middle income category. Majority of people depends on marine economy for their daily needs. The annual income of selected samples are measured according to their ration card (Government issued welfare card) and income certificate issued by concerned authorities. According to (Salim et al., 2014) the nature and value of commercial fisheries can be affected by frequent adverse climate changes. Many artisanal fishermen are vulnerable and economically and politically oppressed. Many are marginalised and have limited access to healthcare and education because of their low-income status.

Low income groups are more susceptible to coronavirus infection because they had limited resources of COVID – 19 precaution measures such as health services, food supplements (immune boost food supplements), mask, sanitizers etc. and due to low income status, they are forced to go out in pandemic situation for their daily needs, which in turn may lead to corona virus infection (Angla et al., 2020).

**4.2 Anthropometric Measurement**

Frailty is common in the elderly population, and it is caused by a number of pathophysiological processes. It was also discovered that there is a strong link between frailty and weight loss, sarcopenia, obesity, body composition, and nutritional factors. Anthropometric measurements is a practical and simple method for assessing nutritional status, functional deterioration, and chronic health problems, all of which are significant risk factors for frailty (Closs et al., 2017).

Anthropometric scales are an integral part of dietary evaluation in the elderly. Because of the changes in body structure that occur as in old age, anthropometric standards derived from adult populations may not be suitable for the elderly. For the elderly, specific anthropometric reference data is needed (Perissinotto et al., 2021).

**Table 4**

**4.2.1 Body Mass Index of the Target Group**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **BMI** | **Females** | **Males** | **Number of respondents** | **Percentage** |
| Under weight | 12 | 7 | 19 | 19 |
| Normal | 12 | 24 | 36 | 36 |
| Over weight | 14 | 12 | 26 | 26 |
| Obesity | 12 | 7 | 19 | 19 |
| **Total** | **50** | **50** | **100** | **100** |

**Table 4** shows that, 36% of the population is in normal state, of which 24 are males and 12 are females. 19% of the elder people are underweight, of which 7 are males and 12 are females. 26% of the samples are overweight in which 12 are males and 14 are females. 19% of the population are obesity, in which 7 are males and 12 are females. According to the information in this table, while comparing BMI, males are physically stable than females. Physical wellbeing is depend upon their diet, life style, socio-economic status, morbidities associated with aging. According to Kvamme et al.,2018 gender difference in health status in terms of BMI have been recorded in a variety of areas women had higher morbidity than men due to acute and chronic physical and mental illness.

**4.3 Physical Activity**

**Table 5**

**Physical Activity of The Samples**

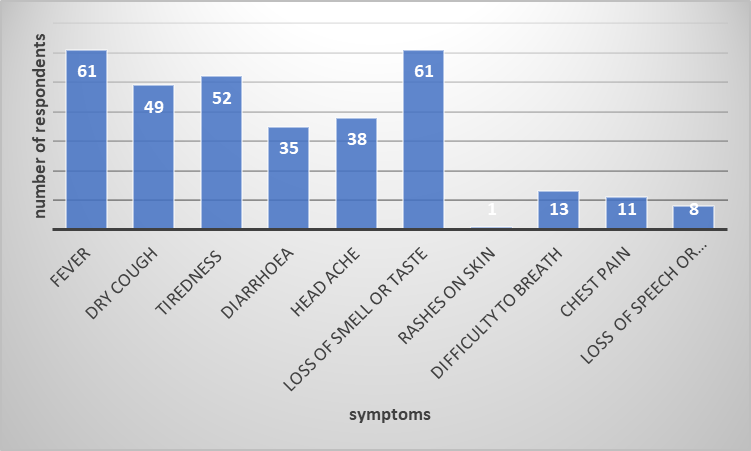
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Mode of activity** | **Females** | **Males** | **Frequency** | **Percentage** |
| Heavy | 12 | 36 | 48 | 48 |
| Moderate | 8 | 3 | 11 | 11 |
| Sedentary | 30 | 11 | 41 | 41 |
| **Total** | **50** | **50** | **100** | **100** |

**Table 5** shows that,48% people do heavy work,11% of the people moderate activity and 41% lead a sedentary life. Sedentary behaviour is defined as any waking behaviour that is characterised by low energy expenditure while sitting or reclining. Longer periods of sedentary behaviour have been linked to increased obesity, type 2 diabetes, decreased bone density, cardiovascular disease, and mortality (Pathan et al.,2016) . According to Kvamme et al., (2011) sedentary behaviour of elder people depends up on the quality of life of elder people. In selected population most of the people lead a sedentary life style because their quality of life was poor compared to other age group.

**Figure 7**

**Mode of Transmission of Corona Virus Infection Among Target Group**

**Figure** **7** shows the mode of transmission of corona virus among target group, based on this figure, close contact is the most common mode of transmission of COVID 19, with about 63%, 27% spread from work places and remaining 11% spread by traveling from place to place. Recent studies shows that uprise of corona virus among geriatric people is due to the immunocompetency and psychological factors of the people. Most of the people does not go outside, and spend most of the time at home. The close contact with infected person in family or colleagues in work place might have induced the chance of corona virus infection among geriatric people.



**Figure 8**

**4.4.2 Symptoms Associated with Covid 19 Among Geriatric**

**Figure** **8** shows that, about 61 of the samples have both fever and loss of smell and taste,52 of target group suffered from tiredness, 49 of elder people with dry cough, 38 of people with head ache and 35 people from diarrhoea. Very few samples suffered from symptoms like difficulty to breath, chest pain and loss of speech or movement associated with COVID 19 in selected samples.

In a study conducted by Lechien et al.,2020) gustatory disorders were identified among 88.8% of COVID 19 patients, and were described as impairment in the taste modalities of salt, sweet, bitter, and sour. The study concluded that there is relationship between gustatory dysfunction and comorbidities that may induce poor nutritional status among COVID 19 patients. Fever, cough, headache, diarrhoea were the major complaints among geriatric people. According to the study cough (56.6 percent), fatigue (56.6 percent), taste disease (35.7 percent), myalgia (34.3 percent), and fever (33.6 percent) were the most common symptoms in the COVID-19 patients (Lechien et al., 2020).

**Figure 9**

**4.4.2 Post Covid Health Issues Among Samples**

**Figure** **6** picturised the health issues after covid 19 among target group in which 35 females and 16 males had palpitation,28 females and 16 male had fatigue, 19 females and 13 males have pain in joints. Shortness of breath, loss of taste or smell, memory loss were effected by numerous people. When compared to males, females had more health issues than men. In this target group 4 men had no difficulties after COVID 19 infection. Majority of the target group confirmed that, work efficiency was reduced after covid 19 infection, because of the emerging heath issues after covid 19.

Recent reports shows that COVID-19 has the potential to damage the heart in a number of ways, causing symptoms such as chest pain, arrhythmias, palpitation (irregular pulse rhythms), or complications such as heart failure and cardiogenic shock in people of all ages and backgrounds. The most common cardiovascular impact of COVID-19 found in both symptomatic and asymptomatic patients is an exaggerated inflammatory response triggered by the virus, known as myocarditis. In one study, approximately 80% of COVID-19 survivors were found to have heart defects, most of which were inflammatory in nature and also found that post pandemic stress on geriatric people that mistaken as a cardiac symptoms (Huang et al., 2021).

Pandemic situation added stress to the older adult, that leads to physical and psychological distress. Many COVID-19 patients experience neurological symptoms such as loss of smell, delirium, and a higher risk of stroke. Myologic encephalomyelitis/chronic fatigue syndrome and Guillain-Barre syndrome are two brain conditions with long-term effects (Portacolone et al., 2021).

**Table 6**

**4.4.3 Duration of Hospital Stay of Target Group**

|  |  |  |
| --- | --- | --- |
| **Hospital Stay** | **Female** | **Male** |
| less than 5days | 0 | 3 |
| 5 to 10 days | 14 | 16 |
| 11 to 15 days | 23 | 21 |
| 16 to 20 days | 12 | 10 |
| more than 20 days | 1 | 0 |
| **Total** | **50** | **50** |

Duration of Hospital days of COVID 19 geriatric patients depends up on age, physical and psychological status of the patients. The information given by the respondents, says that after 5 days of detection of corona virus infection, the antigen test will be done and those who were positive would be stayed at hospital for further treatment and other will sent to home. During pandemic period, the COVID 19 rehabilitation centres were limited with accommodation of the patients, thereby health authorities tried to minimise the duration of hospital days of the patients.

**Table 6** demonstrate duration of hospital days of selected samples, in which very small number of people about 3 had less than 5 days of hospital stay,14 females and 16 male had 5 to 10 days of hospital stay, 23 females and 21 males had 11 to 15 days, 12 females and 10 males had 16 to 20 days of hospital days and one female had more than 20 days of hospital stay. In females compared to males, the hospital days are more.

**Figure 10**

**4.4.4 Recovery Period of Target Group**

**Figure** **10** reveals recovery period of COVID 19 among target group. Compared to males, females required more days to recover from corona virus infection. Up to one month was the recovery period of majority of the target group. According to (Voinsky et al., 2020) the recovery period of women compared to males are longer, because of their physical and psychological state.

* 1. **Health Profile of the samples**

Health profile of an individual is a qualitative and quantitative tool for assessing comprehensive health of individuals. It covers all the major information on disease morbidity and mortality. Health profile of an individual determine health risk factors such as morbidities, symptoms associated with corona virus infection (Nath & Ingle, 2008).

**Table 7**

**4.5.1 Medical History of The Samples**

|  |  |  |
| --- | --- | --- |
| **Co - Morbidities** | **Number of samples** | **Percentage** |
| Diabetes Mellitus | 20 | 20 |
| Hypertension | 56 | 56 |
| COPD | 1 | 1 |
| Heart disease | 2 | 2 |
| Cancer | 1 | 1.4 |
| Meningitis | 1 | 1.4 |
| Kidney disease | 1 | 1.4 |
| Hyperthyroidism | 1 | 1.4 |
| Seizure | 1 | 1.4 |
| No history | 16 | 30 |
| **Total** | **100** | **100** |

**Table 7** shows the past medical history of the selected samples. Majority of the people have hypertension (56), followed by diabetes mellitus in 20% of the people and heart disease in 2% of the total population. Cancer, meningitis, kidney disease, hyperthyroidism, seizure were found in 1% of the total population. Majority of the population suffer with more than one disease such as diabetes mellitus, hypertension etc.

According to Guan et al.,(2019) the clinical forms of COVID-19 are heterogeneous. At the time of admission, 20–51% of patients had at least one comorbidity, with diabetes (10–20%), hypertension (10–15%), and other cardiovascular and cerebrovascular disorders (7–40%) being the most prominent. Extreme cases were more likely than non-severe cases to have two or more comorbidities (40.0 percent versus 29.4%). Patients with two or more comorbidities were older (mean age 66.2 versus 58.2 years), and they were more likely to have multiple comorbidities.

**Table 8**

**4.5.2 Worsening of Existing Disease in Target Group**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Diseases** | **Female** | **Percentage** | **Male** | **Percentage** | **Total** | **Percentage** |
| Diabetes Mellitus | 16 | 16 | 6 | 6 | 22 | 22 |
| Hypertension | 20 | 20 | 12 | 12 | 32 | 46 |
| Heart disease | 1 | 1 | 3 | 3 | 4 | 4 |
| Kidney disease | 0 | 0 | 1 | 1 | 1 | 1 |
| No worsening | 0 | 0 | 27 | 27 | 27 | 27 |

Table 5 shows the worsening of existing morbidities in target group in which majority of the target group had hypertension (46%), followed by 22% people with diabetes, heart disease in 4% of the total population and kidney disease in about 1%. 27% of people had no health issues or worsening of existing disease. Table 5 also reveals that worsening of existing morbidities were found more in females.

By worsening clinical outcomes in terms of higher disease severity, co-morbidities increase vulnerability, risk of mortality, and decrease survival rate in COVID-19 patients. Individuals without co-morbidities have been shown to have a greater chance of survival and a lower mortality rate. During SARS-CoV-2 infection, heart disease, hypertension, and diabetes are all linked to a worsening of disease severity (Arumugam et al., 2020).

**Figure 11**

**4.5.3 Respiratory Strength of Selected Samples**

**Figure 11** demonstrate the respiratory strength of the target group, which shows that 50% of the people had abnormal respiratory strength, and remaining half of the samples had normal respiratory strength. According to a retrospective conducted by (Huang et al., 2020), significant lung impairment was found in the recovery phase of 57 adult COVID-19 patients. Majority of the samples had hypertension, and recent studies shows that there is a relationship between lung function and hypertension, where lung function is reduced in hypertensive patients (Lee et al., 2014). The abnormal respiratory strength of samples, depends on their age, gender, morbidities (hypertension, heart disease) (Meyer et al., 2001).

* 1. **Nutritional Profile of Target Group**

Nutrition is a major determinant of health in people over 55. Elderly malnutrition is often later diagnosed. For the successful diagnosis and development of comprehensive treatment plans for malnutrition in this population, a thorough nutritional assessment is required. health professionals do not readily determine weight loss in the elderly as a morbid symptom of malnutrition because some muscle wasting or weight reduction may be associated with age-related psychological and physiological problems. Weight loss is a frightening clinical sign in the elderly. Weight loss in the elderly, whether voluntary or involuntary, has been linked to increased mortality. In the elderly people, functional, psychological, social, and economic issues, as well as subsequent medical problems, may all contribute to poor nutrition and weight loss.

**Table 9**

**4.6.1 Nutritional Assessment During COVID 19**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Nutritional assessment Score** | **Females** | **Percentage** | **Males** | **Percentage** | **Total** | **Percentage** |
| Normal  (12- 14) | 5 | 5 | 12 | 12 | 17 | 17 |
| At the risk of malnutrition (8 –11) | 30 | 30 | 25 | 25 | 55 | 55 |
| Malnourished (0-7) | 15 | 15 | 13 | 13 | 28 | 28 |
| **Total** | **50** |  | **50** |  | **100** | **100** |

**(MNA Score\*)**

Malnutrition is a possible risk factor for older adults. Many factors affect nutritional status, including neuropsychological issues, and mobility, and it may be linked to other medical issues. It is highly difficult to test nutritional status of elders. The inadequacies of current screening tools exacerbate the issue. MNA tool is used to evaluate the nutritional status of geriatric population (Soini et al., 2004).

According to **Table 9**, nutritional state of target group reveals that 17% of the samples are normal, which includes 5 females and 12 males and 55% of the samples are at the risk of malnutrition. Majority of the selected samples are at the risk of malnutrition and 28% of the samples are malnourished.

Malnutrition is considered as a dietary disorder that disrupted normal human functioning which is more prevalent in elderly patients. Malnutrition was more common in COVID-19-positive elderly patients with the following reasons. In elderly patients with COVID-19, high rates of comorbid diabetes mellitus led to higher rates of malnutrition. Diabetic patients had problems with the metabolism of the three main nutrients as a result of their own internal glandular dysfunction, which was the internal cause of malnutrition. At the same time, external causes of malnutrition include diabetic patients' poor dietary control, an incorrect nutrient ratio, and other factors. SARS-CoV-2 induce gastrointestinal symptoms, which worsen malnutrition in elderly patients. In addition to respiratory symptoms, gastrointestinal symptoms were the most common in elderly COVID-19 patients. Diarrhoea, mild abdominal pain, nausea, vomiting, loss of appetite, and other symptoms were common, that contribute to poor nutritional status in elderly COVID 19 patients (Li et al., 2020).

**Table 10**

**4.6.2 Nutritional Assessment of Target Group After COVID -19 Infection**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Nutritional assessment** | **Females** | **Males** | **Total** | **Percentage** |
| Normal  \*(12-14) | 8 | 28 | 36 | 36 |
| At the risk of malnutrition  \*(8-11) | 15 | 8 | 23 | 23 |
| Malnourished  \*(0-7) | 27 | 14 | 41 | 41 |
| **Total** | **50** | **50** | **100** | **100** |

**t test (nutritional status of the respondents during and after COVID-19), p value=0.5108) MNA score** **\***

**Table 7** shows the nutritional assessment of target group after corona virus infection where 36% of the people are normal, in which 8 are females and 28 are males. 23% of the samples are at the risk of malnutrition (15 females and 8 males) and remaining 41% of the samples belong to malnourished state. When compared nutritional status after COVID 19 and during COVID 19, infection has remarkable transition to malnourished state of selected samples.

The study conducted by (Savage et al., 2020) , demonstrates the high prevalence of malnutrition in survivor of COVID 19 geriatric patients and also reveals that dietetic intervention in nutritionally vulnerable geriatric people optimize nutritional status.

Psychological and physiological changes are commonly associated with aging, such as loss of appetite, limited ability to chew or swallow, use of medicines, treatments and functional and cognitive impairment, can adversely affect diet and nutrition. Geriatric people are also at risk of malnourished state due to chronic diseases, disease, injury, and social isolation (Peng et al., 2020).To compare the nutritional status of patients during and after Covid 19, non- parametric t test(paired) were used. V = 370, p-value = 0.5108, its concluded that there is not so much change in the nutritional status of patients after Covid 19.

**Table 11**

**4.6.3** **Appetite Among Target Group During Corona Virus Infection**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Appetite** | **Females** | **Males** | **Total** | **Percentage** |
| Poor | 45 | 38 | 83 | 83 |
| Average | 5 | 12 | 12 | 17 |
| Good | 0 | 0 | 0 | 0 |
| Very good | 0 | 0 | 0 | 0 |
| **Total** | **50** | **50** | **100** | **100** |

**Table 11** shows appetite of target group during corona virus infection. It reveals that 83% of the samples have poor appetite in which 45 are females and 38 are males. 17% of the people had average appetite, in which 5 are females and 12 are males. Appetite of female groups compared to males, females had poor appetite, that may induce malnourished state during corona virus infection. Another survey of Italian adolescents and adults found that more than half of them had experienced changes in their appetite, with some evidence which differed by age, gender, and employment status. In a survey of adults in Poland, more than 40% said they were eating more and 42% said they had gained weight (loss or gain) (Landi et al., 2016).

**Table 12**

**4.6.4 Eating Disorders of Selected Samples**

|  |  |  |
| --- | --- | --- |
| **Eating disorders** | **Females** | **Males** |
| Anorexia | 25 | 15 |
| Bulimia nervosa | 4 | 0 |
| Both (anorexia nervosa and bulimia nervosa) | 2 | 3 |
| Nil | 19 | 34 |
| **Total** | **50** | **50** |

Eating disorders are complex and chronic medical conditions marked by irregular eating habits that may result in serious morbidity or even death. Eating disorders are often underestimated in the elderly, who are particularly vulnerable to the complications that may occur. Given the high morbidity and mortality rates associated with eating disorders in the elderly, as well as the wide variety of health complications that may occur as a result of eating disorders, such as vascular, metabolic, gastric, and bone diseases (Meyer et al., 2001).

SCOFF tool is used to detect the eating disorders in geriatric population. The SCOFF questionnaire appears to be a highly useful screening tool for identifying eating disorders; it is short, memorable, and quick to administer and score, and it is intended to raise suspicion rather than diagnose (Hetherington, 2000).

**Table 12** reveals that 25 females and 15 males had anorexia,4 females had bulimia nervosa and both anorexia and bulimia nervosa were found in 2 females and 3 females. 19 females and 34 males had no eating disorder. This table also exhibit that females had eating disorders more than men.

Eating disorders in the geriatric people, include anorexia nervosa and bulimia nervosa. Aging process, physical illness, with age-related psychological problems, and changes in familial relationships are associated with the development of eating disorders in the elderly (Lapid, 2015).

To compare the appetite information comparison of male patients during and after COVID 19, use non parametric t test (paired) (V = 0, p-value = 5.886e-07). There is significant difference between the appetite during and after Covid 19 in male patients. To compare the relationship between appetite (during Covid 19) and nutritional status we use chi square test for independent of attributes. χ 2= 7.7503, df = 2, p value = 0.02075 which indicates, nutritional status of the geriatric patients were independent of appetite.

**Table 13**

**4.6.7 Dietary Intake of Samples During COVID 19**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Food groups | Daily | 3-4 times/week | 1 – 2 times /week | 1 -3 times/month | Never |
| Cereals and millets | 100 | - | - | - | - |
| Pulses and legumes | 79 | 10 | 11 | - | - |
| Egg | 10 | 58 | 18 | 11 | 3 |
| Fish | 4 | 4 | 38 | 43 | 11 |
| Meat | 0 | 7 | 12 | 28 | 36 |
| Vegetables | 49 | 15 | 4 | 2 | 0 |
| Leafy vegetables | 48 | 18 | 3 | 1 | 0 |
| Fruits | 11 | 13 | 27 | 16 | 3 |
| Junk or fried foods | 1 | 1 | 6 | 14 | 78 |

One of the deciding factors in the development of chronic diseases is dietary consumption. It is a difficult value to quantify, unlike other behaviours, since people are rarely able to discriminate precisely what and how much they eat. Furthermore, an erroneous dietary evaluation may be a significant roadblock in determining the effect on the risk of developing diet-related diseases. Nowadays, food frequency questionnaires (FFQ) are used to assess dietary intakes. Since they are inexpensive, simple to produce, and provide valuable information on dietary intake over a long period of time. FFQs are the most widely used tools in nutritional epidemiology studies. This method can also be used to perform one-on-one interviews (Garciá Rodríguez et al., 2019).

**Table 13** represent dietary information of the samples during corona virus infection. 100% of the people consume cereals and millets daily. Majority (79%) consume pulses and legumes daily because during COVID-19 pandemic the samples were provided free rations and kits, while 10 per cent were consuming 3 to 4 times per week and 11 per cent 1 to 2 times per week. The intake of junk or fried foods were found to be very less on the target group during lockdown. Majority of the samples were found to consume vegetables, green leafy vegetables daily and consumption of fruits was 1 to 2 times per week. The intake of fish and meat was found to be low as they were restricted from stepping out of homes. The purchasing capacity was decreased during the pandemic.

Maintaining a healthy and diverse diet, as well as regular physical activity, may be discouraged by this new condition. Limited access to daily grocery shopping, for example, may lead to a shift away from fresh foods like fruit, vegetables, and fish in favour of highly processed foods like convenience foods, junk foods, snacks, and ready-to-eat cereals, all of which are high in fats, sodium, and sugar. Thus, psychological and emotional reactions to the COVID-19 outbreak may contribute to the risk of developing disordered eating habits. It is well understood that negative feelings or hopeless feeling and fear about pandemic can alter the dietary habit of the people (Di Renzo et al., 2020).

**Table 14**

**4.6.8 Dietary Intake of Samples After COVID 19 Pandemic**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Food groups | Daily | 3-4 times/week | 1 – 2 times /week | 1 -3 times/month | Never |
| Cereals and millets | 100 | - | - | - | - |
| Pulses and legumes | 65 | 21 | 14 | - | - |
| Egg | 23 | 20 | 38 | 2 | - |
| Fish | 96 | 3 | 1 | - | - |
| Meat |  | 28 | 32 | 17 | 24 |
| Milk and milk products | 73 | 11 | 13 | 3 | 1 |
| Vegetables | 70 | 23 | 7 | - | - |
| Leafy vegetables | 56 | 21 | 20 | 3 | - |
| Fruits | 23 | 22 | 35 | 15 | 3 |
| Junk or fried foods |  | 2 | 9 | 11 | 80 |

**Table 14** represent dietary intake after COVID -19 infection. 100 percent of the people consume cereals and millets daily. Majority of the people about 96 per cent of people consume fish daily, because selected area for study is fishing village, so the availability of the fish is more. 76% of the people consume milk and milk products daily. While compared to food consumption during COVID -19, daily consumption of vegetables (70%), leafy vegetables (56%) and fruits (23%) were increased, because they were aware about immune boosting foods and their capacity to prevent infectious disease. This pandemic period brought drastic changes in dietary habits of the people who live in coastal areas.

* 1. **Psychological Information**

The fear and uncertainty of a pandemic will have a greater impact on the mental health of the elderly, who are more aware of their vulnerability. The fear of death is overshadowed by the existential fear of losing loved ones and the guilt of potentially being the severity of the disease. They may be unaware of updates related to the COVID-19 situation due to generational constraints and sensory and cognitive deficits, making them easy targets for misinformation and insufficient precautionary measures. The effects of the quarantine and physical illness can be contribute feelings of isolation, physical separation from loved ones, sadness, anxiety, and chronic stress, all of which can have long-term psychological consequences(Banerjee, 2020). According to preliminary research, the elderly have a higher prevalence of depressive disorders, complex post-traumatic stress disorder (PTSD), and adjustment reactions are increased in geriatric population during COVID – 19 pandemic.

DASS tool was used to measure the psychological state of the samples. It comprises three factors viz; depression scale, anxiety scale and stress scale. The depression scale measures hopelessness, poor self-esteem, and low positive affection; the anxiety scale measures autonomic arousal, musculoskeletal symptoms, situational anxiety, and the subjective experience of anxious arousal; and the anxiety scale measures autonomic arousal, musculoskeletal symptoms, situational anxiety, and the subjective experience of anxious arousal; and the anxiety scale measures autonomic arousal, musculoskeletal symptoms and situational anxiety (Anibel et al., 2019).

**Table 12**

**4.7.1 Stress Among Geriatric Population During COVID -19 Infection**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Stress** | **Females** | **Males** | **Total** | **Percentage** |
| Extreme  \*(14 -33) | 34 | 18 | 52 | 52 |
| Normal  \*(9 -13) | 16 | 21 | 37 | 37 |
| Very low  \*(0-9) | 0 | 11 | 11 | 11 |
| Total | 50 | 50 | 100 | 100 |

**(W = 345, p-value = 0.0002375. stress Vs gender) DASS Score \***

**Table 12** demonstrates stress among target group during covid 19 pandemic. According to above table, 52% of the target group had extreme stress (34 females and 18 males), followed by 37 per cent of people with normal stress (16 females and 21 males) and 11 males in the target group had no stress during the pandemic. Moreover, females had extreme stress than males when compared.

Stress is a natural part of life for everyone, but it can be extremely serious in the elderly due to a variety of interrelated factors include demographic variable such as age, sex, socio economic status etc. According to studies, stress can cause severe immune suppression, which can lead to chronic infections and increased vulnerability to infections. They can display signs of emotional numbness, a loss of interest in daily activities, and a sense of separation from others. Delirium may be developed in association with stress. Geriatric COVID-19 patients are often exposed to intense physiological and psychological stress as a result of morbidities and symptoms associated with corona virus infection (Balan et al., 2020).

According to Wenham et al.,(2020) females have a greater risk of psychological outcomes. Females may experience higher psychological stress as a result of COVID-19 and the care pressure at home, according to some researchers. Stress discrepancies between men and women are often due to various influence on people's social environments.

To compare the stress between male and female patients Wilcoxon signed rank test was used, (W = 345, p-value = 0.0002375) indicates that stress level of men are less compared to female COVID-19 patients.

**Table 13**

**4.7.2 Depression Among Target Group**

|  |  |  |  |
| --- | --- | --- | --- |
| **Depression** | **Females** | **Males** | **Percentage** |
| Extreme  \*(28) | 23 | 19 | 42 |
| Normal  \*(0-9) | 7 | 27 | 34 |
| Very low  \*(4-21) | 0 | 24 | 24 |
| Total | 50 | 50 | 100 |

**(W = 392.5, p-value = 0.002915. depression Vs gender) DASS Score \***

**Table 13** shows depression among target group. 42 per cent of the samples (23 females and 19 males) had extreme depression during corona virus infection and 34 per cent people (7 females and 27 male) were normal. In comparison, females had extreme depression than males. Depression is a common mental condition that affects the health-related quality of life of older adults and its frequency increases as people get older(Medical Association, 2020).To compare the depression between male and female patients Wilcoxon signed rank test was used.(W = 392.5, p-value = 0.002915) indicates that depression level of men are less than female patients.

**Table 14**

**4.7.3 Anxiety Among Target Group**

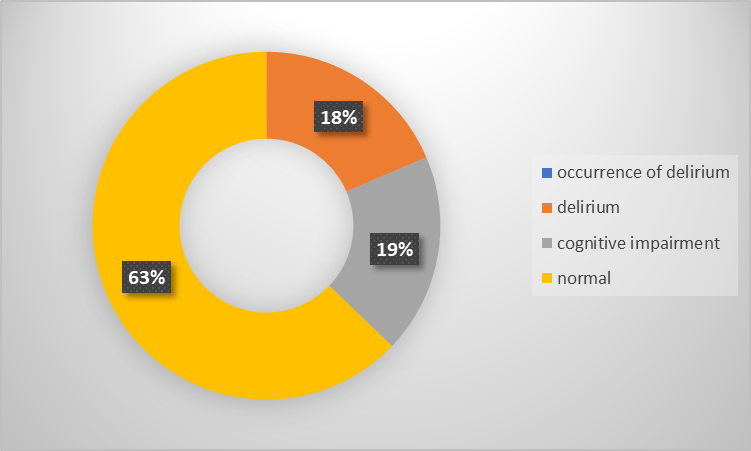
|  |  |  |  |
| --- | --- | --- | --- |
| Anxiety | Females | Males | Percentage |
| Extreme  \*(15-26) | 22 | 19 | 41 |
| Normal  \*(8-14) | 6 | 27 | 33 |
| Very low  \*(0-7) | 0 | 26 | 26 |
| **Total** | **50** | **50** | **100** |

**DASS score \* (W = 357.5, p-value, anxiety Vs gender)**

**Table 14** shows the anxiety among target group where 41 per cent of the target people (22 females and 19 males) had extreme anxiety and 33 per cent of the people were normal.

An anxiety disorder is characterized by excessive or disproportional feelings of fear, worry, apprehension, or dread in relation to the problems or circumstances feared. Anxiety disorders come in a variety of forms. Depression and anxiety are common in older adults, and both can be debilitating, lowering overall health and quality of life. Knowing the symptoms of anxiety and depression, as well as discussing any issues with a physician, is critical. Anxiety and memory are inextricably linked. Anxiety can affect memory, and severe anxiety can lead to amnesia or flashbacks of a traumatic event (Garciá Rodríguez et al., 2019).

To compare the anxiety between male and female patients Wilcoxon signed rank test was used. W = 357.5, p-value which indicates that anxiety level of men are less than female patients.



**Figure : 9**

**4.7.4 Occurrence of Delirium or Cognitive Impairment Among Target Group**

Delirium is a common symptom in older patients who are sick, particularly if they have an infection. Older people emerged atypically with delirium during the COVID-19 pandemic, and it seems to have influenced the subgroup of very old people with several comorbidities in our clinical scenario. Delirium tends to be more prevalent during COVID-19 infection in the short term. It can, however, expose underlying primary psychiatric conditions or leave a long-term unresolved effect (Emmerton.,2020).

**Figure 9** picturized the occurrence of delirium or cognitive impairment in selected samples, in which majority of the people about 63% of the people were normal, remaining 18% and 19% of target group had occurrence of delirium and cognitive impairment respectively. According to WHO altered consciousness/confusion may be a presenting symptom of COVID-19, even before fever and cough. A viral infection like COVID-19, fever, and hypoxemia, on the other hand, can cause delirium in geriatric people. Delirium or cognitive impairment were developed in geriatric people due to their aging process , the occurrence of delirium or cognitive impairment that may contribute severe risk during COVID 19 infection (Helms et al., 2020); (Cipriani et al., 2020).

**Figure :10**

**4.8 Treatment Modalities**

**Figure** **10** shows treatment modalities adopted for selected samples.48 per cent of the respondents were instructed to take rest. Drugs were provided to 20 per cent and I.V were given to 32 per cent of the respondents. Treatment modalities were more emphasized for the reduction of symptoms and improve the health status as well as immunity of the respondents. To improve immunity, vitamin tablets were given.

In short the COVID 19 pandemic was found to influence the nutritional profile of elderly negatively. The main determinants of COVID outbreak were found to be socio economic factors and close contact with those having COVID since majority of elderly were working and most of them were malnourished it was difficult for isolation and getting complete rest. Most of them were having anorexia, worsening of co morbidities and some were having problems of delirium too. It was found that the support of family and community along with socio economic improvement is cardinal in protecting elderly form COVID 19 pandemic. Females were found to have prolonged convalescence period and worsening of co morbidities compared to males in the community. Vaccination and awareness on improving immunity and providing financial help and volunteers or medical workers for follow up of health check up and helping in dayto day activities will only prove beneficial so that they can isolate and take rest during outbreak.

**SUMMARY AND CONCLUSIONS**

**CHAPTER - 5**

**SUMMARY AND CONCLUSIONS**

Covid 19 is the ongoing epidemic in the world that alter the life of every human being in the world. Novel corona virus was first reported in Wuhan, China (Rothan & Byrareddy, 2020). In 2020 March World Health Organization declare the uprising of corona disease as a global pandemic. Corona virus adversely affected the life of every human being. Kerala was the first state in India affected by COVID-19, and the first instance of coronavirus was reported on 30 January in Thrissur District in 2020. By the beginning of March, the state soon had the largest number of active cases, predominantly in India, owing to a large number of imported cases from other states and nations. During epidemic, quality of life of people in Kerala have improved significantly through government initiatives, that has significant effect on the survival of epidemic period. Even before the first case of covid 19, Kerala introduce preventive strategies to the further control of epidemic.

Older adults, as well as those with ongoing medical conditions, are the most vulnerable groups to COVID-19 (D' Adamo et al., 2020). Geriatrics was at higher risk of SARS –CoV -2 during the COVID – 19 pandemic. COVID-19 is more common in the elderly population, the incidence of COVID-19 is higher in the geriatric population due to maturing physiologic changes, reduced immune function, multi-organ failure, chronic diseases, and other factors that increase the risk of corona virus. Corona virus has a higher risk of causing serious illness in the elderly.

According to 2011 census Kerala accommodate 4 million older adults. The census report shows that, in India 8.6 per cent old adult are above 60, in which share of Kerala in elderly in total older population is 4 per cent that indicates Kerala has first rank in elderly population. The chances of getting corona virus among the elderly is more in Kerala, so this study is more relevant to this period. The study entitled **“Determinants of COVID Outbreak and Nutritional Profile of Geriatric COVID -19 Patients in Coastal Areas of Alappuzha** ” was coined with the following objectives:

* To assess the nutrition and health profile of geriatrics at pre and post pandemic period
* To determine the reasons of COVID 19 among geriatrics
* To examine the psychological well -being during COVID- 19 among geriatrics
* To find the treatment modality adopted for geriatric during COVID- 19 and strategies for fostering healthy ageing

The area selected for study was coastal areas of Cherthala taluk (Kadakkarapally Panchayath) of Alappuzha district in Kerala. 100 samples of old age people from Cherthala taluk were taken, out of which 50 are females and 50 are males. Above 55 years old age were selected for the study through purposive sampling method from registers provided by health workers. Personal interview and telephonic interview was conducted for data collection, because older people were not aware about new technology. Data were collected not only directly from older people but also through close relatives of those who have difficulty in answering.

A structured questionnaire was used to collect data from samples, it contains food frequency questionnaire (FFQ), Mini Nutritional Assessment tool (MNA), Depression Anxiety Stress Scale (DASS), 24- hour recall and SCOFF questionnaire. The combinations of these questionnaires were used for collecting the data. Pilot study was done among 10 samples and necessary changes were made. After collecting the data, it was analyzed and subjected to statistical analysis using SPSS (Statistical Package for Social Sciences, version 23). KS test, t test, Chi-square test, and Wilcoxon signed rank test were used for statistical analysis.

**The salient findings of the study are as follows:**

* Majority (40%) of the samples were in in the age group of 55-64 years, followed by 65 -74 (39%).
* This study shows that middle sized family suffer from infection more, because of the area used for the study contains middle sized family (4-5family members).
* When women were compared to men, it was found that majority of the men about 65 per cent were involved in fishing and in case of women, only 31.36 per cent were working.
* The study shows that majority of the people (80%) belong to low income, 12% in high income category and 7 % in middle income category. Low income groups were more susceptible to coronavirus infection because they had limited resources of COVID – 19 precaution measures such as health services, food supplements (immune boost food supplements), mask, sanitizers etc.
* It was found that, while comparing BMI, male were more stable than females
* it was found that,48% of the selected samples were physically active. Males were more physically active than females.
* This study shows that the common mode of transmission of corona virus among target group were close contact with infected person.
* From the data, it was evident that, about 61 of the samples have both fever and loss of smell and taste,52 of target group suffered from tiredness, 49 of elder people struggled with dry cough, 38 of people had head ache and 35 people struggled from diarrhoea. Very few samples were found to have symptoms like difficulty to breath, chest pain and loss of speech or movement are rare symptoms associated with COVID 19 in selected samples
* Health issues after covid 19 among target group pointed that 35 females and 16 males had palpitation,28 females and 16 male had fatigue, 19 females and 13 males have pain in joints. Shortness of breath, loss of taste or smell, memory loss were effected by numerous people.
* Females had more health issues after COVID-19 infection.
* Duration of Hospital days of COVID 19 geriatric patients depend up on age, physical and psychological status of the patients. It was found that very small number of people about 3 had less than 5 days of hospital stay,14 females and 16 male had5 to 10 days of hospital stay, 23 females and 21 males had 11 to 15 days, 12 females and 10 males had 16 to 20 days of hospital days and one female had more than 20 days of hospital stay. When compared to males , their hospital days were more among females.
* Recovery period of COVID 19 among females compared to men, pointed that females required more days to recover from corona virus infection. Up to one month was the recovery period among majority of the target group.
* Majority of the samples had past medical history of hypertension and diabetes mellitus
* It was found that, among more than half of the respondents (67%) have existing diseases were worsened.
* The study reveals that worsening of existing morbidities were found more in females than males.
* About 50% of the people had abnormal respiratory strength, and remaining 50% had normal respiratory strength. The abnormal respiratory strength of samples, depend up on their age, gender, morbidities (hypertension, heart disease).
* When compared nutritional status after COVID 19 to during COVID 19, infection has remarkable transition to malnourished state of selected samples.
* The data reveals that 83% of the samples have poor appetite and compared to males in appetite, females had poor appetite, that induce malnourished state during corona virus infection.
* About 35 % of respondents had anorexia,4% females had bulimia nervosa and both anorexia and bulimia nervosa were found in 2 males and 3 females respectively. This study exhibit that, females were more susceptible to eating disorders than men.
* To compare the nutritional status of patients during and after Covid 19, non-parametric t test(paired) were used. V = 370, p-value = 0.5108, and no significant difference in the nutritional status of patients were found after Covid 19.
* This study also reveals that 83% (45 females and 38 males) of the samples have poor appetite during COVID-19.
* There is significant difference between the appetite during and after Covid 19 in male patients.
* Nutritional status of the geriatric COVID-19 patients were independent of appetite.
* Dietary information of the samples during corona virus infection showed that 100% of the people consume cereals and millets daily and majority (79%) consume pulses and legumes daily.
* During corona virus infection, the consumption of animal foods such as milk, fish, meat etc were reduced, because of the unavailability of these foods during pandemic.
* Majority of the people, about 96 per cent of people consume fish daily, because selected area for study was fishing village, so the availability of the fish was more. 76% of the people consume milk and milk products daily.
* When compared to food consumption during COVID -19, daily consumption of vegetables (70%), leafy vegetables (56%) and fruits (23%) were increased, because they were aware about immune boosting foods and their capacity to prevent infectious disease.
* The psychological factors such as stress, depression, and anxiety between male and female patients were recognized by Wilcoxon signed rank test. It indicates that stress, depression and anxiety level of men were less than female COVID-19 patients.
* More than half of the samples about 63% of the people had normal cognitive functioning and remaining 18% and 19% of target group had occurrence of delirium and cognitive impairment respectively.
* The study shows that, treatment modalities adopted for selected samples were to take rest by 48% subjects. Drugs were provided to 20 per cent and I.V were given to 32 per cent of the respondents.

**Limitations of the study**

* Expensive
* Possibility of influencing respondents
* Long response time
* Time constraints for both the interviewer and the interviewee.
* It was very difficult to get clarification from geriatric population
* The interview provides less anonymity than a mail questionnaire report, particularly if the latter does not include follow-up. The interviewer usually knows the respondent's name and address, as well as the names and addresses of all family members.
* There were many restrictions to conduct survey during pandemic
* Most of the respondents does not cooperate with data collection, because of the fear of corona virus infection.

**Suggestions for future study**

* A comparison of males and females consciousness towards pandemic period, psychological factors and dietary changes can be carried out.
* The biochemical parameters of the selected samples can be measured to assess the accurate information.
* Respiratory strength of the samples can be assessed by equipment or advanced technologies that helps to assess how corona virus effect respiratory system.
* The periodic monitoring of psychological physiological status of samples must be carried out.
* To teach their family members how to support their elders, initiate new programme strategies and to help them to live healthy and happy.
* Intervention using immune boosters and its effect on prevention of COVID and fast recovery.
* Effect of vaccination on elderly population

**CONCLUSION**

The socio-economic status negatively affected elders during pandemic, and limited health care facilities, that are need to support elder’s life. Nutritional status and health profile of elders were worsened during pandemic, and physiological distress developed after COVID-19 infection however, they were not able to take much rest due to socio economic conditions because of their involvement in occupational activities. Family support was found to very important in fast recovery and maintenance of health and nutritional status of geriatric population. The change in life style and nutritional profile during and after COVID-19 influenced the quality of life of geriatric population.

**BIBLIOGRAPHY**

* + - * + **BIBLIOGRAPHY**
* *• India - aging population by state 2011 | Statista*. (n.d.). Retrieved April 8, 2021, from https://www.statista.com/statistics/620090/aging-population-by-state-india/
* Abrams, E. M., & Szefler, S. J. (2020). COVID-19 and the impact of social determinants of health. *The Lancet Respiratory Medicine*, *8*(7), 659–661. https://doi.org/10.1016/S2213-2600(20)30234-4
* Agarwalla, R., Saikia, A., & Baruah, R. (2015). Assessment of the nutritional status of the elderly and its correlates. *Journal of Family and Community Medicine*, *22*(1), 39. https://doi.org/10.4103/2230-8229.149588
* Aldred, S., Grant, M. M., & Griffiths, H. R. (2004). The use of proteomics for the assessment of clinical samples in research. In *Clinical Biochemistry* (Vol. 37, Issue 11, pp. 943–952). Elsevier. https://doi.org/10.1016/j.clinbiochem.2004.09.002
* Alexopoulos, G. S., & Morimoto, S. S. (2011). The inflammation hypothesis in geriatric depression. In *International Journal of Geriatric Psychiatry* (Vol. 26, Issue 11, pp. 1109–1118). John Wiley & Sons, Ltd. https://doi.org/10.1002/gps.2672
* Angla, A. (n.d.). *The COVID-19 Pandemic: Effects on Low- and Middle-Income Countries*. Retrieved April 5, 2021, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7173081/
* Arkkelin, D. (2014). Using SPSS to Understand Research and Data Analysis. In *Psychology Curricular Materials 2014* (Vol. 1). http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.139.2050&rep=rep1&type=pdf
* Arumugam, V. A., Thangavelu, S., Fathah, Z., Ravindran, P., Sanjeev, A. M. A., Babu, S., Meyyazhagan, A., Yatoo, M. I., Sharun, K., Tiwari, R., Pandey, M. K., Sah, R., Chandra, R., & Dhama, K. (2020). COVID-19 and the world with co-morbidities of heart disease, hypertension and diabetes. In *Journal of Pure and Applied Microbiology* (Vol. 14, Issue 3, pp. 1623–1638). Journal of Pure and Applied Microbiology. https://doi.org/10.22207/JPAM.14.3.01
* Balan, R., Sasidharan, D., & Lalu, J. (2020). An insight into the elderly mind during COVID-19 pandemic: World Mental Health Day 2020. *Journal of Marine Medical Society*, *22*(2), 113. https://doi.org/10.4103/jmms.jmms\_151\_20
* Balasundaram, P., Libu, G., George, C., & Chandy, A. (2020). Study on the effect of COVID-19 lockdown on health care and psychosocial aspects of elderly in Kerala State. *Journal of the Indian Academy of Geriatrics*, *16*(3), 101. https://doi.org/10.4103/jiag.jiag\_3\_20
* Banerjee, D. (2020). ‘Age and ageism in COVID-19’: Elderly mental health-care vulnerabilities and needs. In *Asian Journal of Psychiatry* (Vol. 51, p. 102154). Elsevier B.V. https://doi.org/10.1016/j.ajp.2020.102154
* Bansod, S., Ahirwar, A. K., Sakarde, A., Asia, P., Gopal, N., Alam, S., Kaim, K., Ahirwar, P., & Sorte, S. R. (2021). COVID-19 and geriatric population: From pathophysiology to clinical perspectives. In *Hormone Molecular Biology and Clinical Investigation* (Vol. 42, Issue 1, pp. 87–98). https://doi.org/10.1515/hmbci-2020-0053
* Basu-Ray, I., & Soos, M. P. (2020). Cardiac Manifestations Of Coronavirus (COVID-19). In *StatPearls* (pp. 1–5). http://www.ncbi.nlm.nih.gov/pubmed/32310612
* Bellan, M., Soddu, D., Balbo, P. E., Baricich, A., Zeppegno, P., Avanzi, G. C., Baldon, G., Bartolomei, G., Battaglia, M., Battistini, S., Binda, V., Borg, M., Cantaluppi, V., Castello, L. M., Clivati, E., Cisari, C., Costanzo, M., Croce, A., Cuneo, D., … Pirisi, M. (2021). Respiratory and Psychophysical Sequelae Among Patients With COVID-19 Four Months After Hospital Discharge. *JAMA Network Open*, *4*(1), e2036142. https://doi.org/10.1001/jamanetworkopen.2020.36142
* Bourdel-Marchasson, I. (2010). How to Improve Nutritional Support in Geriatric Institutions. *Journal of the American Medical Directors Association*, *11*(1), 13–20. https://doi.org/10.1016/j.jamda.2009.04.003
* Burgess, R. C., Misteli, T., & Oberdoerffer, P. (2012). DNA damage, chromatin, and transcription: The trinity of aging. In *Current Opinion in Cell Biology* (Vol. 24, Issue 6, pp. 724–730). Curr Opin Cell Biol. https://doi.org/10.1016/j.ceb.2012.07.005
* Cheung, K. S., Hung, I. F. N., Chan, P. P. Y., Lung, K. C., Tso, E., Liu, R., Ng, Y. Y., Chu, M. Y., Chung, T. W. H., Tam, A. R., Yip, C. C. Y., Leung, K. H., Fung, A. Y. F., Zhang, R. R., Lin, Y., Cheng, H. M., Zhang, A. J. X., To, K. K. W., Chan, K. H., … Leung, W. K. (2020). Gastrointestinal Manifestations of SARS-CoV-2 Infection and Virus Load in Fecal Samples From a Hong Kong Cohort: Systematic Review and Meta-analysis. *Gastroenterology*, *159*(1). https://doi.org/10.1053/j.gastro.2020.03.065
* Childs, Calder, & Miles. (2019). Diet and Immune Function. *Nutrients*, *11*(8), 1933. https://doi.org/10.3390/nu11081933
* Cipriani, G., Danti, S., Nuti, A., Carlesi, C., Lucetti, C., & Di Fiorino, M. (2020). A complication of coronavirus disease 2019: delirium. *Acta Neurologica Belgica*, *120*(4), 927–932. https://doi.org/10.1007/s13760-020-01401-7
* Closs, V. E., Ziegelmann, P. K., Flores, J. H. F., Gomes, I., & Schwanke, C. H. A. (2017). Anthropometric Measures and Frailty Prediction in the Elderly: An Easy-to-Use Tool. *Current Gerontology and Geriatrics Research*, *2017*, 1–8. https://doi.org/10.1155/2017/8703503
* D’Adamo, H., Yoshikawa, T., & Ouslander, J. G. (2020). Coronavirus Disease 2019 in Geriatrics and Long-Term Care: The ABCDs of COVID-19. *Journal of the American Geriatrics Society*, *68*(5). https://doi.org/10.1111/jgs.16445
* De Clerck, F. (2020). Longstanding gastrointestinal symptoms after covid-19. In *Acta Gastro-Enterologica Belgica* (Vol. 83, Issue 4, pp. 1–6).
* Di Renzo, L., Gualtieri, P., Pivari, F., Soldati, L., Attinà, A., Cinelli, G., Cinelli, G., Leggeri, C., Caparello, G., Barrea, L., Scerbo, F., Esposito, E., & De Lorenzo, A. (2020). Eating habits and lifestyle changes during COVID-19 lockdown: An Italian survey. *Journal of Translational Medicine*, *18*(1), 229. https://doi.org/10.1186/s12967-020-02399-5
* Emmerton, D., & Abdelhafiz, A. (2020). Delirium in Older People with COVID-19: Clinical Scenario and Literature Review. *SN Comprehensive Clinical Medicine*, *2*(10), 1790–1797. https://doi.org/10.1007/s42399-020-00474-y
* Farzianpour, F., Foroushani, A. R., Badakhshan, A., & Gholipour, M. (2015). The Relationship between Quality of Life with Demographic Variables of Elderly in Golestan Province-Iran. *Health*, *07*(05), 507–513. https://doi.org/10.4236/health.2015.75060
* Frasca, D., & Blomberg, B. B. (2009). Effects of aging on B cell function. In *Current Opinion in Immunology* (Vol. 21, Issue 4, pp. 425–430). https://doi.org/10.1016/j.coi.2009.06.001
* García-Portilla, P., de la Fuente Tomás, L., Bobes-Bascarán, T., Jiménez Treviño, L., Zurrón Madera, P., Suárez Álvarez, M., Menéndez Miranda, I., García Álvarez, L., Sáiz Martínez, P. A., & Bobes, J. (2020). Are older adults also at higher psychological risk from COVID-19? In *Aging and Mental Health* (pp. 2–9). https://doi.org/10.1080/13607863.2020.1805723
* Garciá Rodríguez, M., Romero Saldanã, M., Alcaide Leyva, J. M., Moreno Rojas, R., & Molina Recio, G. (2019). Design and validation of a food frequency questionnaire (FFQ) for the nutritional evaluation of food intake in the Peruvian Amazon. *Journal of Health, Population and Nutrition*, *38*(1), 47. https://doi.org/10.1186/s41043-019-0199-8
* Gu, J., & Korteweg, C. (2007). Pathology and pathogenesis of severe acute respiratory syndrome. In *American Journal of Pathology* (Vol. 170, Issue 4, pp. 1136–1147). Elsevier Inc. https://doi.org/10.2353/ajpath.2007.061088
* Guo, T., Shen, Q., Guo, W., He, W., Li, J., Zhang, Y., Wang, Y., Zhou, Z., Deng, D., Ouyang, X., Xiang, Z., Jiang, M., Liang, M., Huang, P., Peng, Z., Xiang, X., Liu, W., Luo, H., Chen, P., & Peng, H. (2020). Clinical Characteristics of Elderly Patients with COVID-19 in Hunan Province, China: A Multicenter, Retrospective Study. *Gerontology*, *66*(5), 467–475. https://doi.org/10.1159/000508734
* Helms, J., Kremer, S., Merdji, H., Schenck, M., Severac, F., Clere-Jehl, R., Studer, A., Radosavljevic, M., Kummerlen, C., Monnier, A., Boulay, C., Fafi-Kremer, S., Castelain, V., Ohana, M., Anheim, M., Schneider, F., & Meziani, F. (2020). Delirium and encephalopathy in severe COVID-19: A cohort analysis of ICU patients. *Critical Care*, *24*(1), 491. https://doi.org/10.1186/s13054-020-03200-1
* Hetherington, M. M. (2000). Eating disorders: Diagnosis, etiology, and prevention. *Nutrition*, *16*(7–8), 547–551. https://doi.org/10.1016/S0899-9007(00)00320-8
* Hossain, M. M., Tasnim, S., Sultana, A., Faizah, F., Mazumder, H., Zou, L., McKyer, E. L. J., Ahmed, H. U., & Ma, P. (2020). Epidemiology of mental health problems in COVID-19: (Vol. 9). F1000 Research Ltd. https://doi.org/10.12688/f1000research.24457.1
* Hu, Z., Song, C., Xu, C., Jin, G., Chen, Y., Xu, X., Ma, H., Chen, W., Lin, Y., Zheng, Y., Wang, J., Hu, Z., Yi, Y., & Shen, H. (2020). Clinical characteristics of 24 asymptomatic infections with COVID-19 screened among close contacts in Nanjing, China. *Science China Life Sciences*, *63*(5), 706–711. https://doi.org/10.1007/s11427-020-1661-4
* Huang, Y., Tan, C., Wu, J., Chen, M., Wang, Z., Luo, L., Zhou, X., Liu, X., Huang, X., Yuan, S., Chen, C., Gao, F., Huang, J., Shan, H., & Liu, J. (2020). Impact of coronavirus disease 2019 on pulmonary function in early convalescence phase. In *Respiratory Research* (Vol. 21, Issue 1). BioMed Central. https://doi.org/10.1186/s12931-020-01429-6
* Katzman, R., Brown, T., Fuld, P., Peck, A., Schechter, R., & Schimmel, H. (1983). Validation of a short orientation-memory-concentration test of congestive impairment. In *American Journal of Psychiatry* (Vol. 140, Issue 6, pp. 734–739). https://doi.org/10.1176/ajp.140.6.734
* Koren-Hakim, T., Weiss, A., Hershkovitz, A., Otzrateni, I., Anbar, R., Gross Nevo, R. F., Schlesinger, A., Frishman, S., Salai, M., & Beloosesky, Y. (2016). Comparing the adequacy of the MNA-SF, NRS-2002 and MUST nutritional tools in assessing malnutrition in hip fracture operated elderly patients. *Clinical Nutrition*, *35*(5), 1053–1058. https://doi.org/10.1016/j.clnu.2015.07.014
* Kukreja, D., Günther, U., & Popp, J. (2015). Delirium in the elderly: Current problems with increasing geriatric age. In *Indian Journal of Medical Research* (Vol. 142, Issue 6, pp. 655–662). Indian Council of Medical Research. https://doi.org/10.4103/0971-5916.174546
* Lafrenière, J., Laramée, C., Robitaille, J., Lamarche, B., & Lemieux, S. (2019). Relative validity of a web-based, self-administered, 24-h dietary recall to evaluate adherence to Canadian dietary guidelines. *Nutrition*, *57*, 252–256. https://doi.org/10.1016/j.nut.2018.04.016
* Landi, F., Calvani, R., Tosato, M., Martone, A. M., Ortolani, E., Savera, G., Sisto, A., & Marzetti, E. (2016). Anorexia of aging: Risk factors, consequences, and potential treatments. In *Nutrients* (Vol. 8, Issue 2). MDPI AG. https://doi.org/10.3390/nu8020069
* Lechien, J. R., Chiesa-Estomba, C. M., De Siati, D. R., Horoi, M., Le Bon, S. D., Rodriguez, A., Dequanter, D., Blecic, S., El Afia, F., Distinguin, L., Chekkoury-Idrissi, Y., Hans, S., Delgado, I. L., Calvo-Henriquez, C., Lavigne, P., Falanga, C., Barillari, M. R., Cammaroto, G., Khalife, M., … Saussez, S. (2020). Olfactory and gustatory dysfunctions as a clinical presentation of mild-to-moderate forms of the coronavirus disease (COVID-19): a multicenter European study. *European Archives of Oto-Rhino-Laryngology*, *277*(8). https://doi.org/10.1007/s00405-020-05965-1
* Lee, H. M., Liu, M. A., Barrett-Connor, E., & Wong, N. D. (2014). Association of lung function with coronary heart disease and cardiovascular disease outcomes in elderly: The Rancho Bernardo study. *Respiratory Medicine*, *108*(12), 1779–1785. https://doi.org/10.1016/j.rmed.2014.09.016
* Leung, C. (2020). Risk factors for predicting mortality in elderly patients with COVID-19: A review of clinical data in China. In *Mechanisms of Ageing and Development* (Vol. 188). https://doi.org/10.1016/j.mad.2020.111255
* Li, T., Zhang, Y., Gong, C., Wang, J., Liu, B., Shi, L., & Duan, J. (2020). Prevalence of malnutrition and analysis of related factors in elderly patients with COVID-19 in Wuhan, China. *European Journal of Clinical Nutrition*, *74*, 871–875. https://doi.org/10.1038/s41430-020-0642-3
* Liu, K., Chen, Y., Lin, R., & Han, K. (2020). Clinical features of COVID-19 in elderly patients: A comparison with young and middle-aged patients. In *Journal of Infection* (Vol. 80, Issue 6, pp. e14–e18). W.B. Saunders Ltd. https://doi.org/10.1016/j.jinf.2020.03.005
* Lovell, A., Bulloch, R., Wall, C. R., & Grant, C. C. (2017). Quality of food-frequency questionnaire validation studies in the dietary assessment of children aged 12 to 36 months: A systematic literature review. In *Journal of Nutritional Science* (Vol. 6, pp. 1–12). Cambridge University Press. https://doi.org/10.1017/jns.2017.12
* Marengoni, A., Zucchelli, A., Grande, G., Fratiglioni, L., & Rizzuto, D. (2020). The impact of delirium on outcomes for older adults hospitalised with COVID-19. *Age and Ageing*, *49*(6). https://doi.org/10.1093/ageing/afaa189
* McElhaney, J. E., & Effros, R. B. (2009). Immunosenescence: what does it mean to health outcomes in older adults? In *Current Opinion in Immunology* (Vol. 21, Issue 4, pp. 418–424). Elsevier Current Trends. https://doi.org/10.1016/j.coi.2009.05.023
* Meyer, F. J., Borst, M. M., Zugck, C., Kirschke, A., Schellberg, D., Kübler, W., & Haass, M. (2001). Respiratory muscle dysfunction in congestive heart failure: Clinical correlation and prognostic significance. *Circulation*, *103*(17), 2153–2158. https://doi.org/10.1161/01.CIR.103.17.2153
* Mueller, A. L., Mcnamara, M. S., & Sinclair, D. A. (2020). Why does COVID-19 disproportionately affect older people? In *Aging* (Vol. 12, Issue 10, pp. 9959–9981). Impact Journals LLC. https://doi.org/10.18632/aging.103344
* Mukhtar, S. (2020). Psychological impact of COVID-19 on older adults. *Current Medicine Research and Practice*, *10*(4), 201–202. https://doi.org/10.1016/j.cmrp.2020.07.016
* Nath, A., & Ingle, G. (2008). Geriatric health in India: Concerns and solutions. *Indian Journal of Community Medicine*, *33*(4), 214. https://doi.org/10.4103/0970-0218.43225
* Ngai, J. C., Ko, F. W., Ng, S. S., To, K. W., Tong, M., & Hui, D. S. (2010). The long-term impact of severe acute respiratory syndrome on pulmonary function, exercise capacity and health status. *Respirology*, *15*(3), 543–550. https://doi.org/10.1111/j.1440-1843.2010.01720.x
* Nicholson, L. B. (2016). The immune system. *Essays in Biochemistry*, *60*(3), 275–301. https://doi.org/10.1042/EBC20160017
* O’Brien, J., Du, K. Y., & Peng, C. (2020). Incidence, clinical features, and outcomes of COVID-19 in Canada: impact of sex and age. *Journal of Ovarian Research*, *13*(1). https://doi.org/10.1186/s13048-020-00734-4
* Osadchiy, T., Poliakov, I., Olivier, P., Rowland, M., & Foster, E. (2020). Progressive 24-hour recall: Usability study of short retention intervals in web-based dietary assessment surveys. *Journal of Medical Internet Research*, *22*(2), e13266. https://doi.org/10.2196/13266
* Pan, L., Mu, M., Yang, P., Sun, Y., Wang, R., Yan, J., Li, P., Hu, B., Wang, J., Hu, C., Jin, Y., Niu, X., Ping, R., Du, Y., Li, T., Xu, G., Hu, Q., & Tu, L. (2020). Clinical Characteristics of COVID-19 Patients With Digestive Symptoms in Hubei, China: A Descriptive, Cross-Sectional, Multicenter Study. *The American Journal of GASTROENTEROLOGY*, *115*. https://doi.org/10.14309/ajg.0000000000000620
* Parasa, S., Desai, M., Thoguluva Chandrasekar, V., Patel, H. K., Kennedy, K. F., Roesch, T., Spadaccini, M., Colombo, M., Gabbiadini, R., Artifon, E. L. A., Repici, A., & Sharma, P. (2020). Prevalence of Gastrointestinal Symptoms and Fecal Viral Shedding in Patients With Coronavirus Disease 2019: A Systematic Review and Meta-analysis. *JAMA Network Open*, *3*(6), e2011335. https://doi.org/10.1001/jamanetworkopen.2020.11335
* Pascarella, G., Strumia, A., Piliego, C., Bruno, F., Del Buono, R., Costa, F., Scarlata, S., Felice, &, & Agr, E. (2020) *COVID-19 diagnosis and management: a comprehensive review*. https://doi.org/10.1111/joim.13091
* Pathan, S. B. and P. (2016). *Aging and the Socioeconomic Life of Older Adults in India: An Empirical Exposition*. *34*, 1–17. https://doi.org/10.1177/2158244015624130
* Peng, Y. D., Meng, K., Guan, H. Q., Leng, L., Zhu, R. R., Wang, B. Y., He, M. A., Cheng, L. X., Huang, K., & Zeng, Q. T. (2020). Clinical characteristics and outcomes of 112 cardiovascular disease patients infected by 2019-nCoV. *Zhonghua Xin Xue Guan Bing Za Zhi*, *48*(6), 450–455. https://doi.org/10.3760/cma.j.cn112148-20200220-00105
* Perlman, S. (2020). Another Decade, Another Coronavirus. *New England Journal of Medicine*, *382*(8), 760–762. https://doi.org/10.1056/nejme2001126
* Perrotta, F., Corbi, G., Mazzeo, G., Boccia, M., Aronne, · Luigi, D’agnano, V., Komici, K., Mazzarella, G., Parrella, R., & Bianco, A. (2020). *COVID-19 and the elderly: insights into pathogenesis and clinical decision-making*. *32*, 1599–1608. https://doi.org/10.1007/s40520-020-01631-y
* Pilgrim, A. L., Robinson, S. M., Sayer, A. A., & Roberts, H. C. (2015). An overview of appetite decline in older people. *Nursing Older People*, *27*(5), 29–35. https://doi.org/10.7748/nop.27.5.29.e697
* Portacolone, E., Chodos, A., Halpern, J., Covinsky, K. E., Keiser, S., Fung, J., Rivera, E., Tran, T., Bykhovsky, C., Johnson, J. K., & Bowers, B. J. (2021). The Effects of the COVID-19 Pandemic on the Lived Experience of Diverse Older Adults Living Alone With Cognitive Impairment. *The Gerontologist Cite as: Gerontologist*, *61*(2), 251–261. https://doi.org/10.1093/geront/gnaa201
* Prasad, N., Gopalakrishnan, N., Sahay, M., Gupta, A., & Agarwal, S. (2020). Epidemiology, genomicBalasundaram, P., Libu, G., George, C., & Chandy, A. (2020). Study on the effect of COVID-19 lockdown on health care and psychosocial aspects of elderly in Kerala State. Journal of the Indian Academy of Geriatrics, 16(3), 101. https:/. In *Indian Journal of Nephrology* (Vol. 30, Issue 3, pp. 143–154). Wolters Kluwer Medknow Publications. https://doi.org/10.4103/ijn.IJN\_191\_20
* Rothan, H. A., & Byrareddy, S. N. (2020). The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. In *Journal of Autoimmunity* (Vol. 109, pp 1-5). Elsevier. https://doi.org/10.1016/j.jaut.2020.102433
* Russo, A., Onder, G., Cesari, M., Zamboni, V., Barillaro, C., Capoluongo, E., Pahor, M., Bernabei, R., & Landi, F. (2006). Lifetime occupation and physical function: a prospective cohort study on persons aged 80 years and older living in a community. *Occup Environ Med*, *63*, 438–442. https://doi.org/10.1136/oem.2005.023549
* Salim, S. S., Kripa, V., Zachariah, P. U., Mohan, A., Ambrose, T. V, & Rani, M. (2014). *Vulnerability assessment of coastal fisher households in Kerala: A climate change perspective* (Vol. 61, Issue 4).
* Savage, M., Dooley, L., Waldron, T., Brady, S., & Mellett, H. (2020). Malnutrition risk post COVID-19 infection on a care of the elderly rehab ward. *Clinical Nutrition ESPEN*, *40*, 610–611. https://doi.org/10.1016/j.clnesp.2020.09.613
* Schouten, L. R. A., Helmerhorst, H. J. F., Wagenaar, G. T. M., Haltenhof, T., Lutter, R., Roelofs, J. J. T. H., Van Woensel, J. B. M., Van Kaam, A. H. L. C., Bos, A. P., Schultz, M. J., Walther, T., & Wösten-Van Asperen, R. M. (2016). Age-Dependent Changes in the Pulmonary Renin-Angiotensin System Are Associated with Severity of Lung Injury in a Model of Acute Lung Injury in Rats. *Critical Care Medicine*, *44*(12), e1226–e1235. https://doi.org/10.1097/CCM.0000000000002008
* Şimşek Yavuz, S., & Ünal, S. (2020). Antiviral treatment of covid-19. In *Turkish Journal of Medical Sciences* (Vol. 50, Issue SI-1). https://doi.org/10.3906/sag-2004-145
* Soini, H., Routasalo, P., & Lagström, H. (2004). Characteristics of the Mini-Nutritional Assessment in elderly home-care patients. *European Journal of Clinical Nutrition*, *58*, 64–70. https://doi.org/10.1038/sj.ejcn.1601748
* Sokolowska, M., Lukasik, Z. M., Agache, I., Akdis, C. A., Akdis, D., Akdis, M., Barcik, W., Brough, H. A., Eiwegger, T., Eljaszewicz, A., Eyerich, S., Feleszko, W., Gomez-Casado, C., Hoffmann-Sommergruber, K., Janda, J., Jiménez-Saiz, R., Jutel, M., Knol, E. F., Kortekaas Krohn, I., … Untersmayr, E. (2020). Immunology of COVID-19: Mechanisms, clinical outcome, diagnostics, and perspectives—A report of the European Academy of Allergy and Clinical Immunology (EAACI). *Allergy: European Journal of Allergy and Clinical Immunology*, *75*(10), 2445–2476. https://doi.org/10.1111/all.14462
* Torres-Castro, R., Vasconcello-Castillo, L., Alsina-Restoy, X., Solis-Navarro, L., Burgos, F., Puppo, H., & Vilaró, J. (2020). Respiratory function in patients post-infection by COVID-19: a systematic review and meta-analysis. In *Pulmonology*. https://doi.org/10.1016/j.pulmoe.2020.10.013
* Travers, P. J. (2016). The immune system. *Medicina*, *37*(1–2), 3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5091071/
* Utkualp, N., & Ercan, I. (2015). Anthropometric measurements usage in medical sciences. In *BioMed Research International* (Vol. 2015). Hindawi Publishing Corporation. https://doi.org/10.1155/2015/404261
* Villapol, S. (2020). Gastrointestinal symptoms associated with COVID-19: impact on the gut microbiome. In *Translational Research* (Vol. 226, pp. 57–69). Mosby Inc. https://doi.org/10.1016/j.trsl.2020.08.004
* Voinsky, I., Baristaite, G., & Gurwitz, D. (2020). Effects of age and sex on recovery from COVID-19: Analysis of 5769 Israeli patients. In *Journal of Infection* (Vol. 81, Issue 2, pp. e102–e103). W.B. Saunders Ltd. https://doi.org/10.1016/j.jinf.2020.05.026
* Wang, T., Du, Z., Zhu, F., Cao, Z., An, Y., Gao, Y., & Jiang, B. (2020). Comorbidities and multi-organ injuries in the treatment of COVID-19. In *The Lancet* (Vol. 395, Issue 10228, p. e52). Lancet Publishing Group. https://doi.org/10.1016/S0140-6736(20)30558-4
* WHO. (2019). *Coronavirus disease (COVID-19)*. WHO. https://www.who.int/emergencies/diseases/novel-coronavirus-2019?gclid=Cj0KCQiApsiBBhCKARIsAN8o\_4i9ieArmWtp6bnn1GDWVEx8KlwHEn4Tmo0StOXq8vueSjPybFhslykaAkZ9EALw\_wcB
* WHO. (2020). *THE LATEST ON THE COVID-19 GLOBAL SITUATION & LONG-TERM SEQUELAE Long-term effects of COVID-19*.
* Xiong, Q., Xu, M., Li, J., Liu, Y., Zhang, J., Xu, Y., & Dong, W. (2021). Clinical sequelae of COVID-19 survivors in Wuhan, China: a single-centre longitudinal study. *Clinical Microbiology and Infection*, *27*(1), 89–95. https://doi.org/10.1016/j.cmi.2020.09.023
* Yan, X., Wang, S., Ma, P., Yang, B., Si, D., Liu, G., Liu, L., Ding, M., Yang, W., Li, J., Sun, H., Yang, P., & Huan Sun, C. (2021). Cardiac injury is associated with inflammation in geriatric COVID-19 patients. *J Clin Lab Anal*, *35*. https://doi.org/10.1002/jcla.23654
* Zaremba, L. S., & Smoleński, W. H. (2000). Optimal portfolio choice under a liability constraint. *Annals of Operations Research*, *97*(1–4), 131–141. https://doi.org/10.1023/A
* Zhai, P., Ding, Y., Wu, X., Long, J., Zhong, Y., & Li, Y. (2020). The epidemiology, diagnosis and treatment of COVID-19. *International Journal of Antimicrobial Agents*, *55*(5). https://doi.org/10.1016/j.ijantimicag.2020.105955
* Zhu, N., Zhang, D., Wang, W., Li, X., Yang, B., Song, J., Zhao, X., Huang, B., Shi, W., Lu, R., Niu, P., Zhan, F., Ma, X., Wang, D., Xu, W., Wu, G., Gao, G. F., & Tan, W. (2020). A Novel Coronavirus from Patients with Pneumonia in China, 2019. *New England Journal of Medicine*, *382*(8), 727–733. https://doi.org/10.1056/nejmoa2001017
* Zuo, T., Zhang, F., Lui, G. C. Y., Yeoh, Y. K., Li, A. Y. L., Zhan, H., Wan, Y., Chung, A. C. K., Cheung, C. P., Chen, N., Lai, C. K. C., Chen, Z., Tso, E. Y. K., Fung, K. S. C., Chan, V., Ling, L., Joynt, G., Hui, D. S. C., Chan, F. K. L., … Ng, S. C. (2020). Alterations in Gut Microbiota of Patients With COVID-19 During Time of Hospitalization. *Gastroenterology*, *159*(3), 944-955.e8. https://doi.org/10.1053/j.gastro.2020.05.048

**APPENDICES**

**APPENDIX NO:1**

**INTERVIEW SCHEDULE**

**DETERMINANTS OF COVID 19 OUT BREAK AND NUTRITIONAL PROFILE OF GERIATRIC COVID PATIENTS IN COASTAL AREAS OF ALAPPUZHA**

**A. PERSONAL DATA**

* Name :
* Age :  55-64 ,  65-74,  75 -84 ,  85 above
* Sex : female ,  male , others
* Marital status :single,  married  widow/widower
* No of family members ;
* Are you in receipt of any type of social welfare pensions ;yes / no
* Annual Income :
* Occupation :

**B . NUTRITIONAL AND HEALTH ASSESSMENT**

* + - Weight :
    - Height :
    - BMI : underweight/normal /overweight / obesity
* Which is the mode of transmission of covid 19; p work place ,p close contact with infected person , ptravel , p others
* No of hospital days ;
* which center /hospital you were admitted: first line treatment center / medical college
* Signs and symptoms during hospital days ; p fever , p dry cough, p tiredness, pdiarrhoea p headache, ploss of taste or smell, p rashes on skin, p shortness of breath, p difficulty to breath, p chest pain, p loss of speech/movement
* Mention any difficulties after covid 19 : p fatigue, p shortness of breath, p heart attack p loss of smell pmemory loss p pain in join and muscle p sleep disturbancep palpitation p other
* Tidal volume : too low /normal /high
* Medical history : p DM, p HTN , p COPD, p Heart disease pCancer
* As an effect of covid 19, has any life style disease like hypertension, diabetes, etc. are worsened?

yes/ no

* after covid 19, did any situation arises where you had to consult a doctor? yes / no
* Have you refrained from visiting hospital due to fear of covid even when you where in need of medical aid? yes/ no
* How long you took regain smell and taste after recovery?

**Nutritional Assessment**

|  |  |  |
| --- | --- | --- |
| **Questions** | **During covid 19** | **After covid 19** |
| * + **Has food intake decline over the past 3 months due to less appetite, digestive problem, chewing or swallowing difficulties** | 0 🞐 – severe increase in food intake  1🞐 – moderate decrease in food intake  2🞐 – No decreasing in food intake | 0 🞐– severe increase in food intake  1 🞐 – moderate decrease in food intake  2🞐 – No decreasing in food intake |
| **Weight loss during at least 3 months** | 0🞐 – weight loss greater than 3kg  1 🞐– does not know  2🞐 – weight loss between 1 and 3kg 3 🞐– no weight loss | 0 🞐– weight loss greater than 3kg  1🞐 – does not know  2🞐 – weight loss between 1 and 3kg 3 🞐– no weight loss |
| **Mobility** | 0 🞐 – bed or chair bound  1🞐 – chair but does not go out  2 🞐– goes out | 0🞐 – bed or chair bound  1 🞐– chair but does not go out  2 🞐– goes out |
| **Has suffered psychological stress or acute disease in past 3 months** | 0 🞐- yes  2 🞐 – no | 0 🞐- yes  2 🞐 – no |
| **Neuropsychological problem** | 0 🞐 – severe depression  1 🞐– mild dementia  2 🞐 – no psychological problem | 0 🞐 – severe depression  1 🞐– mild dementia  2 🞐 – no psychological problem |
| **BMI** | 0 🞐– less than 19  1 🞐 – BMI 19 to less than 21  2 🞐 – BMI 21 to less than 23  3 🞐 – BMI 23 or greater than 23 | 0 🞐– less than 19  1 🞐 – BMI 19 to less than 21  2 🞐 – BMI 21 to less than 23  3 🞐 – BMI 23 or greater than 23 |
| **Screening score** | 🞐 12 – 14 (normal nutritional status)  🞐 8 – 11 (at the risk of malnutrition)  🞐 0 - 7(malnourished) | 🞐 12 – 14 (normal nutritional status)  🞐 8 – 11 (at the risk of malnutrition)  🞐 0 - 7(malnourished) |

**C . DIETARY INFORMATION**

**Food Frequency Questionnaire**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Food Groups** | **Before lockdown** | | | | | **During lockdown** | | | | |
| Daily | 3-4 times /week | 1-2 times/  week | Once in a month | Never | Daily | 3-4 times/  week | 1-2 times/  week | Once in a month | Never |
| Cereals & cereal products |  |  |  |  |  |  |  |  |  |  |
| Pulses |  |  |  |  |  |  |  |  |  |  |
| Vegetables |  |  |  |  |  |  |  |  |  |  |
| Green leafy vegetables |  |  |  |  |  |  |  |  |  |  |
| Fruits |  |  |  |  |  |  |  |  |  |  |
| Meat |  |  |  |  |  |  |  |  |  |  |
| Chicken |  |  |  |  |  |  |  |  |  |  |
| Egg |  |  |  |  |  |  |  |  |  |  |
| Fish |  |  |  |  |  |  |  |  |  |  |
| Milk & dairy products |  |  |  |  |  |  |  |  |  |  |

**CNAQ and SNAQ (Tool for assessing appetite)**

|  |  |
| --- | --- |
| During COVID-19 | After covid 19 |
| **My appetite is\*\***   1. Very poor 2. Poor 3. Average 4. Good 5. Very good | **My appetite is\*\***   1. Very poor 2. Poor 3. Average 4. Good 5. Very good |
| **When I eat\*\***   1. I feel full after eating only a few mouthfuls 2. I feel full after eating about third of the meal 3. I feel full after eating over half of the meal 4. I feel full after eating most of the meal 5. I hardly ever feel full | **When I eat\*\***  I feel full after eating only a few mouthfuls   1. I feel full after eating about third of the meal 2. I feel full after eating over half of the meal 3. I feel full after eating most of the meal 4. I hardly ever feel full |
| **I feel hungry**   1. Rarely 2. Occasionally 3. Some of the time 4. Most of the time 5. All of the time | **I feel hungry**  Rarely  Occasionally  Some of the time  Most of the time  All of the time |
| **Food tastes \*\***   1. Very bad 2. Bad 3. Average 4. Good 5. Very good | **Food tastes \*\***  Very bad  Bad  Average  Good  Very good |
| **Compared to when I was younger, food tastes**   1. Much worse 2. Worse 3. Just as good 4. Better 5. Much better | **Compared to when I was younger, food tastes**   1. Much worse 2. Worse 3. Just as good 4. Better 5. Much better |
| **Normally I eat \*\***   1. Less than one meal a day 2. One meal a day 3. Two meals a day 4. Three meals a day 5. More than three meals a day | **Normally I eat \*\***   1. Less than one meal a day 2. One meal a day 3. Two meals a day 4. Three meals a day 5. More than three meals a day |
| **I feel sick of nauseated when I eat**   1. Most times 2. Often 3. Sometimes 4. Rarely 5. Never | **I feel sick of nauseated when I eat**   1. Most times 2. Often 3. Sometimes 4. Rarely 5. Never |
| **Most of the time my mood is**   1. Very sad 2. Sad 3. Neither sad nor happy 4. Happy 5. Very happy | **Most of the time my mood is**   1. Very sad 2. Sad 3. Neither sad nor happy 4. Happy 5. Very happy |
| **Score :**  **Interpretation :** | **Score :**  **Interpretation :** |

**Screening tool for eating disorders ( SCOFF)**

1. Do you make yourself sick because you feel uncomfortably full ; 1 🞐 yes ,0 🞐 No
2. Do you worry that you have lost control over how much you eat ; 1🞐 yes , 0 🞐 No
3. Have you recently lose more than one stone in a 3 month period ; 1🞐 yes , 0🞐 No
4. Do you believe yourself to be fat when other saying you are too thin;1 🞐 yes , 0 🞐 No
5. Would you say that food dominates your life; 1 🞐 yes , 0 🞐 No

**D. PSYCHOLOGICAL ASSESSMENT**

**DASS tool**

|  |  |
| --- | --- |
| 1.I found myself getting upset by quite trivial things | 0 1 2 3 |
| 2. I was aware of dryness of my mouth | 0 1 2 3 |
| 3. I couldn’t seem to experience any positive feeling at all | 0 1 2 3 |
| 4.I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion) | 0 1 2 3 |
| 5. I just couldn’t seem to get going | 0 1 2 3 |
| 6. I tended to over-react to situations | 0 1 2 3 |
| 7. I had a feeling of shakiness (e.g. legs going to give way) | 0 1 2 3 |
| 8.I found it difficult to relax | 0 1 2 3 |
| 9.I found myself in situations that made me so anxious I was most relieved when they ended | 0 1 2 3 |
| 10.I felt that I had nothing to look forward to | 0 1 2 3 |
| 11.I found myself getting upset rather easily | 0 1 2 3 |
| 12.I felt that I was using a lot of nervous energy | 0 1 2 3 |
| 13.I felt sad and depressed | 0 1 2 3 |
| 14.I found myself getting impatient when I was delayed in any way (being kept waiting) | 0 1 2 3 |
| 15.I had a feeling of faintness | 0 1 2 3 |
| 16.I felt that I had lost interest in just about everything | 0 1 2 3 |
| 17.I felt wasn’t worth much as a person | 0 1 2 3 |
| 18.I felt that I was rather touchy | 0 1 2 3 |
| 19.I perspired noticeably (e.g. hands sweaty in the absence of high temperature or physical exertion) | 0 1 2 3 |
| 20.I felt scared without any good reason | 0 1 2 3 |
| 21.I felt that life wasn’t worthwhile | 0 1 2 3 |

|  |  |
| --- | --- |
| 22.I found it hard to wind down | 0 1 2 3 |
| 23.I had difficulty in swallowing | 0 1 2 3 |
| 24.I couldn’t seem to get any enjoyment out of the things I did | 0 1 2 3 |
| 25.I was aware of the action of my heart in the absence of physical exertion( e.g. sense of heart rate increase, heart missing a beat0 | 0 1 2 3 |
| 26.I felt down-hearted and blue | 0 1 2 3 |
| 27.I found that I was very irritable | 0 1 2 3 |
| 28.I felt I was close to panic | 0 1 2 3 |
| 29.I found it hard to calm down after something upset me | 0 1 2 3 |
| 30.I feared that I would be thrown by some trivial but unfamiliar task | 0 1 2 3 |
| 31.I was unable to become enthusiastic about anything | 0 1 2 3 |
| 32.I found it difficult to tolerate interruptions to what I was doing | 0 1 2 3 |
| 33.I was in a state of nervous tension | 0 1 2 3 |
| 34.I felt I was pretty worthless | 0 1 2 3 |
| 35.I was intolerant of anything that kept me from getting on with what I was doing | 0 1 2 3 |
| 36.I felt terrified | 0 1 2 3 |
| 37.I could see nothing in the future to be hopeful about | 0 1 2 3 |
| 38.I felt that life was meaningless | 0 1 2 3 |
| 39.I found myself getting agitated | 0 1 2 3 |
| 40.I was worried about situations in which I might panic and make a fool of myself | 0 1 2 3 |
| 41.I experienced trembling (in the hands) | 0 1 2 3 |
| 42.I found it difficult to work up the initiative to do things | 0 1 2 3 |

**Score interpretation**

|  |  |  |  |
| --- | --- | --- | --- |
| **Meaning** | **Depression** | **Anxiety** | **Stress** |
| Normal | 0-9 | 0 -7 | 0 -14 |
| Mild | 10\_13 | 8 -9 | 15- 18 |
| Moderate | 14 -20 | 10-14 | 19 -25 |
| Severe | 21 -27 | 15-19 | 26\_33 |
| Extreme | 28 + | 20 | 33 + |

**4 AT + Tool for Identifying Delirium**

**1. Alertness**

this includes patients who may be markedly drowsy (eg. difficult to rouse and/or obviously sleepy during assessment) or agitated hyper active. observe the patient if asleep, attempt to wake with speech or gentle touch on shoulder. ask the patient state their name and address to assist rating.

Normal (fully alert, but not agitated) 0

Mild sleepiness for < 10 second 0

Clearly abnormal 4

2. AMT4

Age, date of birth , place, current year

No mistake 0

One mistake 1

Two or more mistakes/ untestable 2

3. ATTENTION

Ask the patient; please of tell me the months of the year in backwards order, starting at December'. to assist initial understanding one prompt of "what is the month before December?" is permitted.

Months of the year backward

achieves seven months or more correctly 0

starts but score less than 7 month / refused to start 1

untestable (cannot start because unwell , drowsy, inattentive) 2

4. ACUTE CHANGE OR FLUCTUATING COURSE

Evidence of significance change or fluctuation in alertness, cognition, other mental function( eg paranoia, hallucinations0 arising over the last two weeks and still evident in last 24 hours

No 0

Yes 4

SCORE

4 Or above - possible delirium +/- cognitive impairment

1-3 possible cognitive impairment

0- delirium or severe cognitive impairment

**Treatment modalities**

* Which type of treatment modalities used? drug/ rest /infusion of intravenous fluid
* Is the treatment modalities effective? yes / no

**APPENDIX NO: 2**

**STATISTICAL APPRAISAL**

**Kolmogorov-Smirnov Test**

In statistics, the Kolmogorov–Smirnov test (*K*–*Stestor KS test*) is a non-parametric test of the equality of continuous (*or discontinuous*) one-dimensional probability distributions that can be used to compare a sample with a reference probability distribution (*one* – *sample K*–*S test*) or to compare two samples (*two* – *sample K*–*S test*). It is named after Andrey Kolmogorov and Nikolai Smirnov.

To compare the recovery period between male and female we have to test the equality of mean between males and females. To test whether the sample is from normal population we use Kolmogorov-Smirnov (*KS*) Test. KS Test is performed on data showing recovery of females and males respectively.

**KS Test on Female Data**

One-sample Kolmogorov-Smirnov test is performed on data of female patients using R software

D = 0*.*99865*, p*-*value <* 2*.*2*e* − 16 Since p -value is less 0*.*05 then we reject our null hypothesis the sample is not following normal distribution.

**KS Test on Male Data**

One-sample Kolmogorov-Smirnov test is performed on data of male patients using R software D = 0*.*99865*, p*-*value <* 2*.*2*e*−. Since p -value is less 0*.*05 then we reject our null hypothesis, the sample is not following normal distribution.

**Testing Equality of Recovery Period**

Since the samples are not from normal population, we use non parametric test for equality of recovery period mean of male and female patients. W = 761, p−value = 0*.*0738 alternative hypothesis: true location shift is not equal to 0. Since p value is greater than 0.05, we accept the hypothesis. So male and female patients show equal strength from recovering from COVID- 19.

**Nutritional Status Comparison**

To compare the nutritional status of Patients during and after Covid 19 we use non- parametric t test(paired). V = 370, p-value = 0.5108 alternative hypothesis: true location shift is not equal to 0. Here P value is not less than 0.05 we reject the null hypothesis (there is a change in nutritional status of patient after COVID-19infection).

**3.1.1 Conclusion**

We can Conclude that there is not so much change in the nutritional status of patients after COVID-19.

**Appetite information comparison**

Male

To compare the appetite information comparison of male patients we use non - parametric t test(paired). V = 0, p-value = 7.926e-07 alternative hypothesis: true location shift is not equal to 0. Here p value is less than 0.05 so we can conclude that there is enough evidence to reject the null hypothesis. There is significant difference between the appetite during and after Covid 19 in male patients.

Female

To compare the appetite information comparison of male patients we use non -parametric t test (paired) V = 0, p-value = 5.886e-07 alternative hypothesis: true location shift is not equal to 0. Here p value is less than 0.05 so we can conclude that there is enough evidence to reject the null hypothesis( There is significant difference between the appetite during and after Covid 19 in male patients).

**Relationship between appetite (during Covid 19) and nutritional status**

To compare the relationship between appetite (during Covid 19) and nutritional status we use chi square test for independent of attributes.

*χ*2= 7*.*7503 df = 2 p value = 0*.*02075

|  |  |  |
| --- | --- | --- |
| Malnourished | Normal At the risk of malnutrition | |
| Poor  36 | 19 9 | |
| Average  7 | 0 | 5 |
|  |  | |

Since the p value is less than 0*.*05. We reject the hypothesis ( Ho:nutritional status of the COVID-19 patients depend upon their appetite) that nutritional assessment of patients are independent of appetite .

**Relationship between eating disorders and nutritional status**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Eating Disorder | Under weight | Over weight | Normal | Obesity |
| Both | 1 | 2 | 0 | 1 |
| No | 1 | 13 | 18 | 5 |
| Anorexia Nervosa | 4 | 10 | 4 | 6 |
| Bulimia Nervosa | 0 | 1 | 1 | 0 |
|  |  | | | |

To compare the relationship of eating disorders and nutritional status we use chi square test for independent of attributes.

*χ*2= 12*.*361 df = 9 p value = 0*.*1937

Since the p value is greater than 0*.*05 .We accept the hypothesis that eating disorders and nutritional states are independent.

**Comparison of psychological information between male and female**

**Stress**

To compare the stress between male and female patients we use Wilcoxon signed rank test.

W = 345, p-value = 0.0002375 alternative hypothesis: true location shift is less than 0.

Since the p value is less than 0.05.

Conclusion:

We can conclude that stress level of men are less than female patients

**Anxiety**

W = 357.5, p-value = 0.0007043: true location shift is less than 0.

Since the p value is less than 0.05.

Conclusion:

We can conclude that anxiety level of men are less than female patients.

**Depression**

W = 392.5, p-value = 0.002915: true location shift is less than 0.

Since the p value is less than 0.05.

Conclusion:

We can conclude that depression level of men are less than female patients.