

## **Nutritional status on clinical outcomes among hospitalized patients with COVID-19**

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### **Abstract**

Corona virus disease 2019 (COVID-19), has attracted the attention of scientists where it has a high mortality rate among older adults and individuals suffering from chronic diseases. Although numerous studies have recommended several approaches for the management of COVID-19 with its impact on patients with co-morbidities remains the biggest challenge worldwide. Balanced diet and healthy patterns will strengthen the immune system, improve immune metabolism, and reduce the risk of chronic disease and infectious diseases. The study was undertaken and assessed blood tests which include haemoglobin, urea, creatinine, sodium, potassium, CRP, D - dimer, Hb A1C. Height and pre-admission weight were self-reported by the patient. Body mass index (BMI) was calculated as weight divided by height squared. Blood pressure was also recorded. All the parameters were analyzed on the day of admission and before the discharge from the hospital. Food was distributed to the patients by the hospital and the menu for 7 days was analyzed and the nutritive values were calculated to determine whether it is meeting the demands of the patients. The haemoglobin levels were less and urea, creatinine, sodium levels were high and potassium it is in the normal range but on the higher side. When they were leaving after recovery the haemoglobin levels slightly improved, urea, creatinine, sodium levels were slightly decreased and potassium levels were in the normal range. The blood pressure levels were high on the date of admission and became normal after recovery from covid and when they were leaving the hospital. The HbA1C levels on an average it was high ranging from 5.2% to 9.2% which has declined to 6.2% to 8.2% when they were leaving the hospital. In serum, increased

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concentrations of CRP and D-dimer were observed in COVID-19 patients on hospital admission and observed a decrease in the CRP and D-dimer when they were leaving the hospital. The distribution of the food by the hospital during their stay has improved the nutritional status and boosted the immunity. Diet played a significant role in boosting metabolism and in recovery.

**Key words :** Nutritional status, Covid-19, AKI CRP, D-dimer Haemoglobin, creatinine, SARS-Cov-2 infection.

On 11 March 2020, the World Health Organization (WHO) declared corona virus disease 2019 (COVID-19) a pandemic<sup>1</sup>. The Covid-19 pandemic, began in late 2019, in Wuhan, China, followed by a rapid spread worldwide. This has daunted the world with an enormous impact on healthcare, economic recession, psychological distress, and many associated adverse events. COVID-19 is a highly transmissible viral infection with high mortality due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the uncommon severe pneumonia. Adequate nutrition is an integral part of every person's care and should be integrated to the care of patients suffering from Covid-19.<sup>2</sup> Many factors that worsen the progression of this infection have been identified as age, the presence of comorbidities (cardiovascular disease, hypertension, diabetes, obesity and chronic obstructive pulmonary disease) and also nutritional status.

Moreover, the mortality rate of COVID-19 varies significantly not only by country or race, but for socio-economic status<sup>8</sup>. Actually, a poor socio-economic status and or a weak immunity appear to increase vulnerability in this disease<sup>3,5</sup>. In fact, a proper nutritional status is mandatory for the maintenance of an adequate immune response against infections<sup>5</sup>.

Malnutrition among hospitalized patients is very frequent. Studies have demonstrated that up to 60% of older patients in acute care settings are malnourished<sup>6</sup>, and these prevalence rates are even greater when the patients have associated comorbidities<sup>7,9</sup>. A poor nutritional status in this setting adversely affects clinical outcomes, such as complications, length of stay and mortality<sup>10</sup>.

Malnutrition could be a modifiable risk factor of poor prognosis among these patients with a SARS-CoV-2 infection<sup>11</sup>. In the context of the Covid-19 pandemic, most patients suffering mild signs and symptoms, are treated at home, require symptomatic therapies, and a good healthy diet is recommended as it should be common practice for any individual based on the percepts of healthy living habits. Nonetheless, if the Covid-19 patients are at risk of malnutrition or malnourished, commonly among the elderly, nutrition supplements may help improve the nutritional status, similarly to at risk-patients with other diseases. This study assesses the relationship between Nutritional status on clinical outcomes among hospitalized patients with COVID-19.

This cross-sectional study was performed in 10 patients admitted to the hospital due to an infection caused by SARS-CoV-2. This study was conducted in the men and

women aged 25-70 years confirmed with COVID-19 by a **RT-PCR test**. Patients admitted to hospital due to COVID-19. Clinical parameters included were extracted from the electronic medical record. They include demographic characteristics, co-morbidities, symptoms and dietary treatment related to SARS-CoV-2 infection. Blood tests drawn after admission were also extracted from the electronic system. Blood tests include haemoglobin, urea, creatinine, sodium, potassium, CRP, D - dimer, Hb A1C. Height and pre-admission weight were self-reported by the patient. Body mass index (BMI) was calculated as weight divided by height squared. Blood pressure was also recorded. All the parameters were analyzed on the day of admission and before the discharge from the hospital. Nutrition is an integral part of every person life care, and should also be mandatorily integrated to patient care under the Covid-19

pandemic .Food was distributed to the patients by the hospital and the menu for 7 days was analyzed and the nutritive values were calculated to determine whether it is meeting the demands of the patients.

A total of 10 patients selected of age group 25-70 years with Covid positive and co-morbidities. All general characteristics of the study sample are included in Table-I. These patients had drastic decrease of food intake, further impacted by olfactory and gustatory dysfunctions. The patient had a history of diabetes mellitus, hypertension , over weight. Studies have shown that elderly age and people of any age with certain medical conditions like diabetes mellitus, cardiovascular disease, cancer, obesity, chronic obstructive pulmonary disease, and chronic kidney disease are at increased risk of severe disease and mortality<sup>12</sup> from COVID-19.

Table-1. Anthropometric measurement and Co-morbidities of the sample

S. no.	Patients	Age/ Sex	Date of joining	Height (cms)	Weight (Kgs)	BMI	Co-morbidities
Male							
1	K Chandraiah	52/M	21-11-21	168	64	22.7	NON DM, PTCA
2	G Subbalaxman	70/M	21-11-21	153	58	24.8	DM, PTCA
3	MV Venkat Mohan rao	57/M	22-11-21	162	57	21.7	DM, HTN
4	D Siva kumar	45/M	25-11-21	158	64	25.7	DM, HTN
5	SK Mansoor	29/M	26-11-21	170	72	24.9	DM, HTN, CKD
Female							
6	N Devarajamma	52/F	26-11-21	167	85	30.5	DM, CKD, OVER WT
7	J Mamola	54/F	28-11-21	153	75	32.05	NON DM, HTN, OVER WT
8	P Laxmi kanthamma	50/F	29-11-21	160	68	26.6	NON DM, CABG
9	A Jyothamma	61/F	29-11-21	166	70	25.45	DM
10	B Varalaxmi	65/F	29-11-21	156	62	25.51	DM, HTN, CVA

Table-2. Biochemical parameters of Haemoglobin, urea, creatinine, sodium, potassium on hospital admission

S. no.	Patients	Age	Date of admitted	Haemoglobin g/dL()	Urea mg/dl ()	Creatinine mg/dl ()	Sodium mmol/L ()	Potassium mmol/L ()
Male								
1	K Chandraiah	52	21-11-21	15	30	1.9	138	3.6
2	G Subbalaxman	70	21-11-21	13	35	1.2	142	3.5
3	MV Venkat Mohan rao	57	22-11-21	14.6	24	0.8	138	4.5
4	D Siva kumar	45	25-11-21	17.4	29	1.8	135	3
5	SK Mansoor	29	26-11-21	11.9	42	2.1	120	5.2
Female								
6	N Devarajamma	52	26-11-21	14.2	28	3	115	4.9
7	J Mamola	54/F	28-11-21	14.1	66	0.8	138	4.6
8	P Laxmi kanthamma	50/F	29-11-21	13.2	35	1.5	135	4.5
9	A Jyothamma	61/F	29-11-21	12.5	40	1.3	140	5.5
10	B Varalaxmi	65/F	29-11-21	11.5	35	1.1	145	5.2

Table-3. Biochemical parameters of Haemoglobin, urea, creatinine, sodium, potassium on the day of leaving hospital

S. no.	Patients	Age	Date of Leaving	Haemoglobin g/dL ()	Urea mg/dl ()	Creatinine mg/dl ()	Sodium mmol/L ()	Potassium mmol/L ()
Male								
1	K Chandraiah	52	29-11-21	15	25	1.5	135	3.8
2	G Subbalaxman	70	27-11-21	14	28	1.3	140	3.9
3	MV Venkat Mohan rao	57	29-11-21	15.8	20	0.9	136	3.5
4	D Siva kumar	45	01-12-21	16.4	25	1.3	133	3
5	SK Mansoor	29	04-12-21	13.9	43	1.8	118	4.2
Female								
6	N Devarajamma	52	04-12-21	15.2	26	2.6	118	4.2
7	J Mamola	54/F	05-12-21	15.1	46	0.9	128	4.4
8	P Laxmi kanthamma	50/F	05-12-21	15.2	30	1.0	125	4.0
9	A Jyothamma	61/F	05-12-21	13.5	35	1.2	135	5.3
10	B Varalaxmi	65/F	06-12-21	12.5	29	1.0	136	5.0

Table-2 and Table-3 –Blood was collected from patients in the Emergency Room or during hospitalization on the day of admission and before leaving. After admission, on the day of joining when blood samples analyzed the haemoglobin levels were less and urea, creatinine, sodium levels were high and potassium it is in the normal range but on the

higher side. When they were leaving after recovery the haemoglobin levels slightly improved, urea, creatinine, sodium levels were slightly decreased and potassium levels were in the normal range. It indicates continuous support of nutritional diet is very important to improve the nutritional status & the immunity levels.

Table-4. HbA1C and Blood pressure parameters of the sample on the day of hospital admission and while leaving

S. no.	Patients	Age	Date of admitted	Hb A1C	Blood pressure	Date of Leaving	Hb A1C	Blood pressure
Male								
1	K Chandraiah	52	21-11-21	5.8%	130/70	29-11-21	6.2%	120/70
2	G Subbalaxman	70	21-11-21	6.8%	120/90	27-11-21	7.8%	120/80
3	MV Venkat Mohan rao	57	22-11-21	6.2%	140/90	29-11-21	7.1%	130/80
4	D Siva kumar	45	25-11-21	10.2%	150/80	01-12-21	8.2%	140/80
5	SK Mansoor	29	26-11-21	8.5%	160/90	04-12-21	7.5%	130/70
Female								
6	N Devarajamma	52	26-11-21	9.2%	150/70	04-12-21	8.0%	120/80
7	J Mamola	54/F	28-11-21	5.2%	180/70	05-12-21	6.2%	170/70
8	P Laxmi kanthamma	50/F	29-11-21	7.7%	120/70	05-12-21	6.7%	120/70
9	A Jyothamma	61/F	29-11-21	9.2%	130/70	05-12-21	8.2%	120/70
10	B Varalaxmi	65/F	29-11-21	6.4%	150/70	06-12-21	7.4%	140/70

The blood pressure levels were high on the date of admission and became normal after recovery from covid and when they were leaving the hospital. The HbA1C levels on an

average it was high ranging from 5.2% to 9.2% which has declined to 6.2% to 8.2% when they were leaving the hospital.

Table -5. CRP and D-dimer parameters of the sample on hospital admission and while leaving

S. no.	Patients	Age	Date of admitted	CRP mg/L	D dimer	Date of Leaving	CRP mg/L	D dimer
Male								
1	K Chandraiah	52	21-11-21	215.83	8.0	29-11-21	115.83	4.0
2	G Subbalaxman	70	21-11-21	129.2	6.0	27-11-21	109.2	5.0
3	MV Venkat Mohan rao	57	22-11-21	16.23	9.5	29-11-21	15.23	7.0
4	D Siva kumar	45	25-11-21	2.53	6.2	01-12-21	2.89	4.5
5	SK Mansoor	29	26-11-21	16.25	9.9	04-12-21	12.25	7.5
Female								
6	N Devarajamma	52	26-11-21	44.30	8.0	04-12-21	33.30	5.5
7	J Mamola	54/F	28-11-21	44.25	6.6	05-12-21	29.25	4.5
8	P Laxmi kanthamma	50/F	29-11-21	26.25	7.2	05-12-21	20.25	8.0
9	A Jyothamma	61/F	29-11-21	19.25	8.8	05-12-21	15.25	7.5
10	B Varalaxmi	65/F	29-11-21	16.36	9.5	06-12-21	14.36	7.5

In serum, increased concentrations of CRP and D-dimer were observed in COVID-19 patients on hospital admission and observed a decrease in the CRP and D-dimer when they were leaving the hospital.

Table-6. Shows the menu provided in the hospital for Covid-19 in- patients

S. No	Week/ Varamu	Breakfast	Lunch	Evening snacks	Dinner	
1	Sunday	1. Idli - 4 Nos. 2. Vada(Uddi) - 1 No. 3. Chutney 4. Sambar 5. Ragi Java	1. Veg- Pulav 2. Onion Raitha 3. White Rice- Soft boiled 4. Nune Vankaya 5. Akukura Pappu 6. Thalimpu - Veg oil fry 7. Cup Curd (Company) 8. Rasam 9. Baby Papad 10. Bread Halwa 11. Boiled Egg - 1	Boiled Peanuts 2. Allam Tea	1. Pulkha 2. Mixed Veg kurma 3. Curd Rice 4. Chutney 5. Boiled Egg -1	Energy 2000 kcal Protein 75 g Fat 30 g Vit A 800 IU Vit C 60 Zinc 10 mg
2	Monday	1.Dosa - 3 Nos. 2. Vada(Alasanda) -1 No 3. Chutney 4. Sambar 5. Cup of Ragi Java	1. Small Poori - 2 2. Chenna Curry 3. White Rice - Soft boiled 4. Akukura Pappu 5. Sambar 6. Thalimpu - Veg 7. Cup Curd (Company) 8. Rasam 9. Pesarapappu Payasam 10. Boiled Egg	1. Brown Chenna Sundalu 2. Sonti Coffee	1. Tomato/ Pudina Rice 2. Onion raitha 3. Curd Rice 4. Chutney 5. Boiled Egg	Energy 2000 kcal Protein 75 g Fat 30 g Vit A 800 IU Vit C 60 Zinc 10 mg
3	Tuesday	1. Samiya upma 2. Vada(Uddi) - 1 No. 3. Chutney 4. Sambar 5. Cup of Ragi Java	1. White Rice- Soft boiled 2 Akukura Pappu 3. Bendakaya karampulusu 4. Thalimpu - Veg 5. Cup Curd (Company) 6. Rasam 7. Baby Papad/Odiyalu 8. Fruit Kesari 9. Boiled Egg	1. Papaya 2. Allam Tea	1. Pindi idli - 3 Nos 2. Vada -1 No 3. Chutney 4. Sambar 5. Curd Rice 6. Boiled Egg	Energy 2000 kcal Protein 75 g Fat 30 g Vit A 800 IU Vit C 60 Zinc 10 mg

4	Wednesday	1. Pongal 2. Vada-1 No. 3. Chutney 4. Sambar 5. Cup of Ragi Java	1. Small Poori – 2 Nos 2. Mixed veg. gravy 3. White Rice- Soft boiled 4. Akukura Pappu 5. Sambar 6. Talimpu - Veg 7. Cup Curd (Company) 8. Rasam 9. Baby Papad/Odiyalu 10. Semiya Payasam 11. Boiled Egg	1. Brown Alasanda Guggillu 2. Coffee	1. Gobi Rice/ Jeera Rice 2. Onion Raittha 3. Curd Rice 4. Pickle 5. Boiled Egg	Energy 2000 kcal Protein 75 g Fat 30 g Vit A 800 IU Vit C 60 Zinc 10 mg
5	Thursday	1 Idli - 4 Nos. 2. Vada(Uddi)- 1 No. 3. Chutney 4. Sambar 5. Cup of Ragi Java	1. White Rice- Soft boiled 2. Akukura Pappu 3. Chamagadda karampulusu 4. Thalimpu - Veg 5. Cup Curd (Company) 6. Rasam 7. Odiyalu 10. Carrot Halwa 11. Boiled Egg	1. White Chenna Sundal 2. Allam Tea	1. Set Dosa - 3 Nos 2. Chutney 3. Sambar 4. Curd Rice 5. Boiled Egg	Energy 2000 kcal Protein 75 g Fat 30 g Vit A 800 IU Vit C 60 Zinc 10 mg
6	Friday	1. Kitchidi 2. Vada(Alasanda) -1 No. 3. Chutney 4. Sambar 5. Cup of Ragi Java	1. White Rice- Soft boiled 2. Akukura Pappu 3. Sambar 4. Thalimpu - Veg 5. Cup Curd (Company) 6. Rasam 7. Baby Papad 8. Beetroot Halwa 9. Boiled Egg	1. Papaya 2. Sonti Coffee	1. Pindi idli - 3 Nos 2. Vada(Uddi)- 1 No 3. Chutney 4. Sambar 5. Curd 6. Boiled Egg	Energy 2000 kcal Protein 75 g Fat 30 g Vit A 800 IU Vit C 60 Zinc 10 mg
7	Saturday	1. Poha 2. Vada(Uddi) - 1 No. 3. Chutney 4. Sambar 5. Cup of Ragi Java	1. White Rice- Soft boiled 2. Akukura Pappu 3. Beerakaya/ sorakaya kura 4. Thalimpu - Veg 5. Cup Curd (Company) 6. Rasam 7. Baby Papad/Odiyalu 8. Bellam Pongal	1. White Alasanda Gugillu 2. Allam Tea	1. Set Dosa – 3 Nos 2. Chutney 3. Sambar 4. Veg-Salad 5. Curd Rice	Energy 2000 kcal Protein 75 g Fat 30 g Vit A 800 IU Vit C 60 Zinc 10 mg

Table-6 shows the menu provided during their stay in the hospital which is meeting the daily requirements of Energy, protein, fat, Vitamin-A, vitamin-C and Zinc. Due to drastic decrease in food intake, which has further impacted by olfactory and gustatory dysfunctions, there were differences in dietary patterns, unbalanced diets that affected the quality of life. This indicates the need for continuous support of suggested diet at home, after the covid-19 recovery. The patients were left with this counseling and they were advised to be in touch with the dietitian in SVIMS.

During the COVID-19 outbreak, the impact of lockdown increased feelings of stress or anxiety in the patients especially in the patients with comorbidities since they have been considered as a high-risk group according to health authorities. It is important to highlight patient education and self-care promotion which are key aspects in the proper management of their disease during covid -19 to prevent increased risk of developing complications. This study helps to manage food insecurity and unhealthy dietary patterns and increasing the immune system and decreasing the incidence of COVID-19 and its Prevention too.

**Abbreviations :**

**AKI:**

Acute kidney injury

**CKD:**

Chronic kidney disease

**COVID-19:**

Coronavirus disease

**CRP:**

C-reactive protein

**RT-PCR:**

Reverse transcriptase-polymerase chain reaction

**PTCA:**

Percutaneous transluminal coronary angioplasty

**Non DM:**

Non diabetes mellitus

**HTN:**

Hypertension

**Over Wt:**

Over weight

**CABG:**

Coronary artery bypass surgery

**DM:**

Diabetes mellitus

**CVA:**

Cerebral vascular accident

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