



Risk factor of Post Covid-19 Syndrome and Cost Outcome analysis of Covid-19 Patient in Some Selected Community of Bangladesh

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Abstract

Corona virus disease 2019 (COVID-19) rapidly became a global pandemic which has resulted in global healthcare crises and strained health resources. A cross-sectional survey was conducted to explore the prevalence of Post-COVID-19 syndrome and Cost Outcome analysis of Covid-19 Patient in Some Selected Community of Bangladesh based on retrospective interviews on 384 individuals. Out of 384 respondents, 219 (56.9%) were in the age group of 20-40 years (35.47±15.13). About 226 (58.7%) respondents were male and 159 (48.3%) were female and 315(81.8%) were literate. In respect of employment status, 134(34.8%) were service holder. More than fifty percent (n=214) respondents were married and 288 (74.8%) respondents were Muslim. Income (taka) was 46043.4386 ± 45473.43. Most 273(70.9%), 270(70.1%), 243(63.1%), 225(58.4%) of the respondents were suffered from Poor sleep quality, fatigue, anxiety and persistent cough followed by 211(54.8%), 188(48.8%), 189(49.1%), 163(42.3%) were suffered from joint pain, Continuous headache, chest pain, depression respectively and 180(46.8%), 155(40.3%) had developed mild to moderate degree of Covid-19 disease and 37(9.6%) had developed severe degree of Covid-19 disease. Only 13 (3.4%) respondent's needs ICU support. According to the risk factors, 227(59.0%), 166(43.1%), 132(34.3%) Covid-19 patient with respiratory distress, mental stress and poor nutritional status had developed Post Covid- 19 syndrome respectively. About 195(50.7%) Covid-19 patient had no Co-Morbidities to developed Post Covid-19 syndrome. Majority 250(65.1%) respondents need cost for diagnosis purpose, 302(78.76%) used money for medicine purpose as a direct cost of Covid-19 respondents and 205(53.4%) respondents said that they used money for taking food in hospital or outside the hospital, 159(41.4%) used money for any informal payments as a indirect cost of Covid-19 respondents. With millions infected across the world, our findings emphasize the need for the timely planning of resources and patient-centered services for post-COVID-19 care.

Key Words: Post Covid-19 syndrome, Risk factors, Co-morbidity, Cost outcome

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Introduction:

A series of acute atypical respiratory infections ravaged the Wuhan city of Hubei province of China in December 2019. The pathogen responsible for these atypical infections was soon discovered to be a novel corona virus and was named as the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2).^{1,2} The respiratory illness caused by this virus was termed as COVID-19 by the WHO, and the outbreak was considered to have started via a zoonotic spread from the seafood markets in Wuhan, China.^{3,4,5,6} Since the first report of Severe acute respiratory syndrome coronavirus 2 (SARS- CoV-2), which causes coronavirus disease (COVID-19) on December 31⁷, the

virus has dominated the life of every person worldwide. The clinical presentation of COVID-19 ranges from asymptomatic, mild symptomatic to fulminant and fatal cases.^{8,9} COVID-19-associated death is possibly a result of pneumonia and hyper inflammation.¹⁰ The COVID-19 symptoms last for an average of 11.5 ± 5.7 days¹¹. However, a significant proportion of patients have been found to remain unwell at post-discharge follow-ups¹². A smartphone application-based study in United Kingdom revealed the persistence of COVID-19 symptoms in approximately 10% patients after 3 weeks of disease onset.¹³ In this study, we have defined post-COVID-19 syndrome as (1) persistence of illness signs and symptoms after viral clearance results for COVID-19 at 4 months after initial positivity or no fever for >3 days, improved respiratory symptoms, pulmonary imaging showing obvious absorption of inflammation, (2) fresh development of symptoms within a month after initial clinical and virological cure (3) exaggeration of previously experienced chronic disease within a month after initial recovery from COVID-19. In COVID-19, the most common symptoms after acute COVID-19 are fatigue and dyspnea.¹⁴ Diagnosis of post-viral fatigue¹⁵ requires certain specific symptoms. It is most commonly accompanied by a substantial reduction or impairment in the ability to engage in pre-illness levels of occupational, educational, social, or personal activities that persist for >6 months. Post-COVID-19 patients suffered not only from physical ramifications but also from mental health impairment¹⁶. There is also a need to gain a better understanding of the risk factors that contribute toward the development of long COVID¹⁷. For further exploration of post-COVID-19 syndrome, it is necessary to have knowledge regarding the prevalence, types and risk factors of this syndrome. The current study aims to assess the current condition of post-COVID-19 syndrome and determine the correlations, if any, with factors like gender, age, and disease severity.

Materials and Methods

This descriptive cross sectional study was conducted in Malibagh, Santinagar Shajahanpur, kamalapur Community in the capital of Bangladesh, Dhaka during the period from January, 2021 to December, 2022, age from above 30 years and voluntarily agreed and given informed consent to participate in the study were enrolled as study subject. Sample size: Formula $n = z^2 pq / d^2$. Here, $z = 1.96$ (at 95% confidence level) $p = 50\%$, as prevalence of post COVID syndrome is not known in Bangladesh $q = (100 - p) = 50$. Here d is absolute error, 5% was considered. So, sample size, $n = (1.96)^2 \times 50 \times 50 / 5^2 = 384$. A total of 384 respondents were enrolled for the study by purposive sampling technique. A house to house survey was conducted and all the participants were interviewed and information regarding the age, education, occupation, monthly family income, post covid-19 syndrome (The post-coronavirus disease 2019 (COVID-19) syndrome is defined as the persistence of symptoms after viral clearance and the emergence of new symptoms after a few months following recovery from COVID-19.-Long-Term Effects - Post-COVID Conditions = CDC <https://www.cdc.gov/coronavirus/2019-ncov/long-te>), risk factors, co-morbidities, cost outcome (Direct costs include diagnosis, registration fees, medications, diagnostics and indirect cost include continuing care, hospitalization, rehabilitation; costs of transport to the hospital and any informal payments- The informal payments and medicine cost information were collected from patients during the interview though those were not included in the formal questionnaire. When the patient spoke about informal payments (bribes) to hospital staff, the enumerators asked about the amount and wrote it beside the related section. A similar method was employed for the medicine costs. These payments were cross checked with staff and the patient values were utilized in the analysis. Assurance had been given that the confidentiality concerning their information would be maintained strictly. The primary data has been collected by face to face interview. Observation was done using an observational checklist to assess the sanitary condition. The data were checked, verified and then entered into the computer. Editing and coding of data was done and analyzed by using SPSS-22. All analyzed data were presented in the form of percentages. Chi-square test was applied wherever applicable.

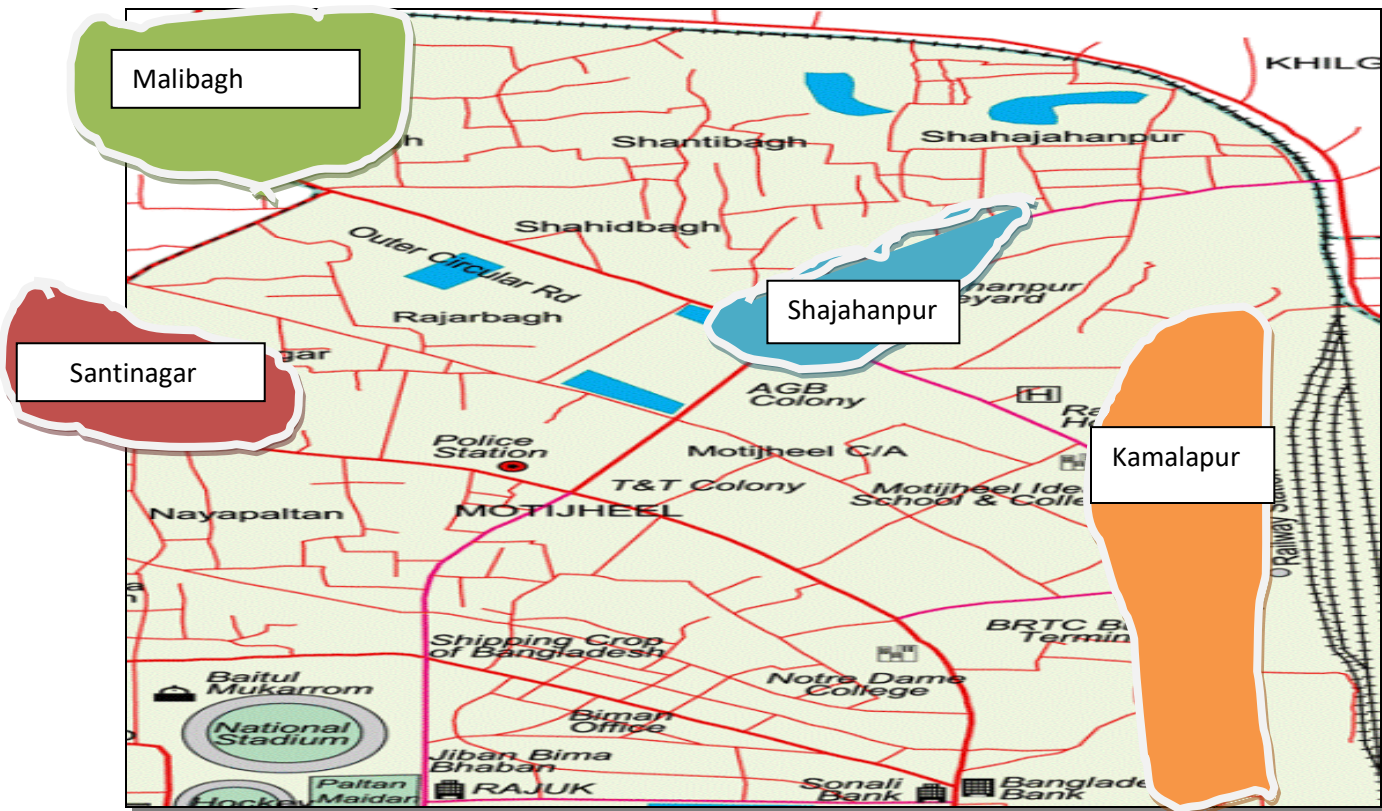


Figure: Study area of Dhaka City

Results:

The main objective of this cross sectional study to explore the prevalence of Post-COVID-19 syndrome and cost outcome analysis in Dhaka city based on retrospective interviews .To determine the prevalence of Post-COVID-19 syndrome and cost outcome as well as how socio-demographic variables relate to post covid-19 syndrome and cost outcome, the study had recruited a total of 384 respondents of Malibagh, shajahanpur, santinagar and kamalapur community. The overall findings of the study were described under following different heading:

1. Socio-demographic characteristics of the respondents
2. Prevalence of Post-Covid-19 syndrome
3. Risk factors and co-morbidities of Post Covid-19 syndrome
4. Cost outcome analysis of Covid-19 patients

Table-I. Distribution of the respondents by socio-demographic characteristics (n=384)

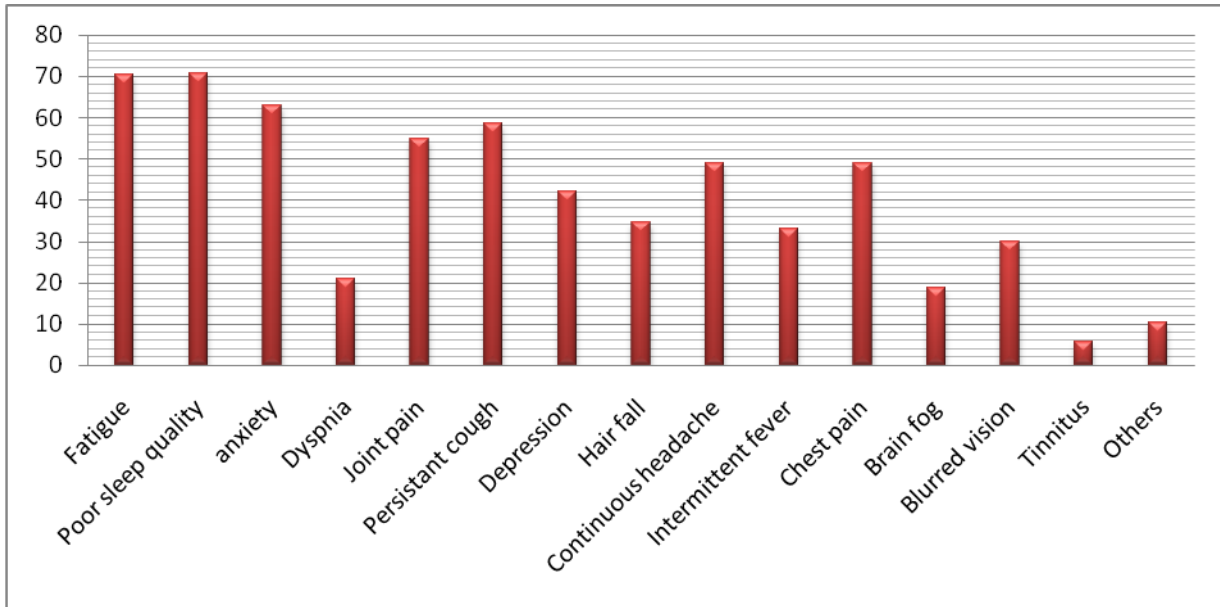
Socio-demographic characteristics	Frequency	Percent	Mean±SD
Age			Mean±SD 35.47±15.13
<20 years	48	12.5	
20-40 years	216	56.9	
40-60 years	89	23.1	
>60 years	29	7.5	
Sex			
Male	493	47.9	
Female	536	52.1	
Education			
Illiterate	70	18.2	
Primary	34	8.8	
Secondary	59	15.3	

Higher Secondary	93	24.2	
Graduate and above	129	33.5	
Occupation			
Housewife	73	19.0	
Day laborer	50	13.0	
Service holder	134	34.8	
Others	128	33.2	
Marital status			
Married	214	55.6	
Unmarried	149	38.7	
Other	22	5.7	
Religion			
Islam	288	74.8	
Hindu	74	19.2	
Type of family			
Nuclear family	227	58.9	
Joint family	153	39.7	
Others	5	1.2	Mean±SD 46043.4386±45473.43
Monthly Family income			
Taka <20000	233	22.6	
Taka 20,000-40,000	274	26.6	
Taka >40,000	284	27.6	

Socio-demographic characteristics of the study subject

Out of 384 respondents, 219 (57.0%) were in the age group of 20-40 years. Among others 88(22.9%), 48 (12.5%), 29 (7.6%) were in the age group 40-60 years, <20 years, >60 years respectively. Their mean \pm SD was 35.46 ± 15.15 . About 226 (58.9%) were male and 158 (41.1%) were female. Regarding education status of post Covid-19 respondents, 129(33.6%) were educated up to graduate level and above, 93 (24.2%) were higher secondary level, 59 (15.4 %) were secondary level, 34(8.9%) were primary level educated and 69 (18.0%) were illiterate. According to occupation, 134(34.9%) were service holder, 72(18.8%) were housewife, 50(13.0%) were day laborer and 128(33.3%) respondents involved in other activities like students, rickshaw puller, van puller, Car driver, auto rickshaw driver etc. Majority 213(55.5%) respondents were married, 149(38.8%) were unmarried. Among the respondents, Muslim's were predominant which is 288 (75.0%), 73 (19.0%) were Hindu and rest 22 (5.7%) were Christian, Buddhist and other religion respectively. More than fifty percent 58.8% (226) respondents belonged to nuclear family, 153(39.8%) respondents belonged to joint family and only 05 (1.3%) respondents belonged to others (Students, three generation family etc). Among 168 (43.8%) respondents had monthly family income > 40,000 taka and 113 (29.4%), 103 (26.8%) respondents earned 20,000-40,000 taka, <20,000 taka per month. The mean income of the respondents was taka Mean \pm SD = 46111.719 ± 45513.26 .

(n=384)



***Multiple answers

Figure 1: Distribution of the respondents regarding Post-Covid19 syndrome (n=384)

Most 273(70.9%), 270(70.1%), 243(63.1%), 225(58.4%) of the respondents were suffered from Poor sleep quality, fatigue, anxiety and persistent cough followed by 211(54.8%), 188(48.8%), 189(49.1%), 163(42.3%), 133(34.5%), 127(33.0%), 115(29.9%) were suffered from joint pain, Continuous headache, chest pain, depression, hair fall, Intermittent fever, Blurred vision respectively. Only few respondents were suffered from other diseases like dyspnea (20.8%), brain fog (18.7%), tinnitus (5.7%), others (10.4%) (Diarrhoea, thrombocytopenia, malnutrition)

Table-2: Distribution of the respondents according to risk factors of post Covid-19 respondents(n=384)

Risk factors of Post Covid-19 respondents	Frequency	Percent
Respiratory distress	227	59.0
Lethargy	77	20.0
Severity	146	37.9
Obesity	41	10.6
Mental stress	166	43.1
Nutritional status	132	34.3
Weight loss	73	19.0
Others	29	7.5

***Multiple answers

According to the risk factors of Post-covid-19 respondents, 227(59.0%), 166(43.1%), 132(34.3%) Covid-19 patient with respiratory distress, mental stress and poor nutritional status had developed Post Covid-19 respondents respectively. And 146(37.9%) severe Covid-19 respondents had developed Post Covid-19 syndrome. Among others 77(20.0%), 73(19.0%), 41(10.6%) and 29(7.5%) Covid-19 respondents with lethargy, weight loss, obesity, others risk factor like DM, HTN, hypothyroidism etc had develop Post Covid-19 syndrome respectively

(n=384)

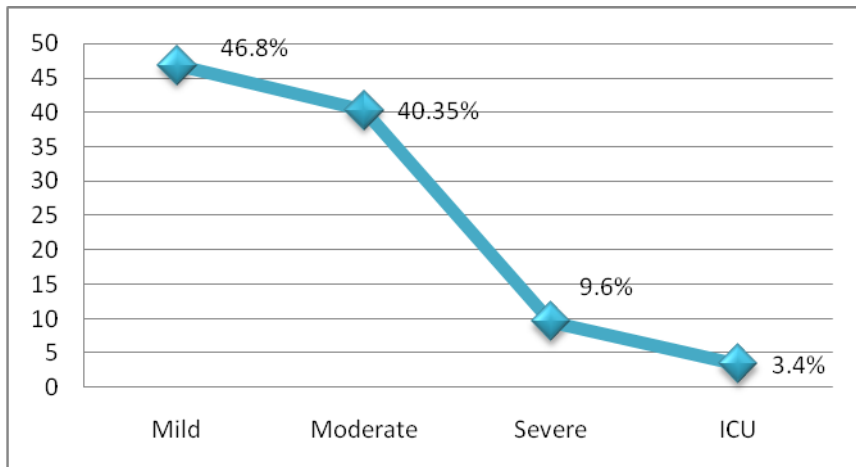


Figure-2: Distribution of the respondents according to severity of post Covid-19 respondents at the time of occurring

Regarding severity of Covid-19 respondents at the time of occurring, 180(46.8%), 155(40.3%) had developed mild to moderate degree of Covid-19 disease and 37(9.6%) had developed severe degree of Covid-19 disease. Only 13 (3.4%) respondent’s needs ICU support.(Figure-06). Regarding severity of Post Covid-19 respondents at the time of occurring, 180(46.8%), 155(40.3%) had developed mild to moderate degree of Covid-19 disease and 37(9.6%) had developed severe degree of Covid-19 disease. Only 13 (3.4%) respondent’s needs ICU support (Figure-02)

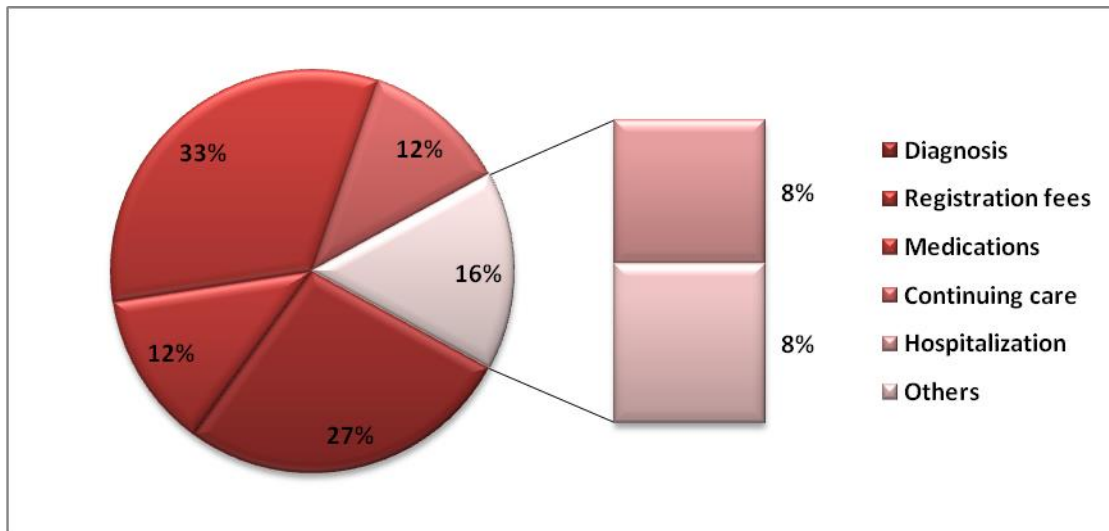
Table-03: Distribution of the respondents according to co-morbidities of post Covid-19 respondents

(n=384)

Co-morbidities of Post Covid-19 respondents	Frequency	Percent
Diabetes mellitus	85	22.1
Hypertension	96	25.0
Asthma	103	26.8
Hypothyroidism	13	3.4
Chronic kidney disease	40	10.4
Cardiovascular disease	31	8.1
None	130	33.9

***Multiple answers

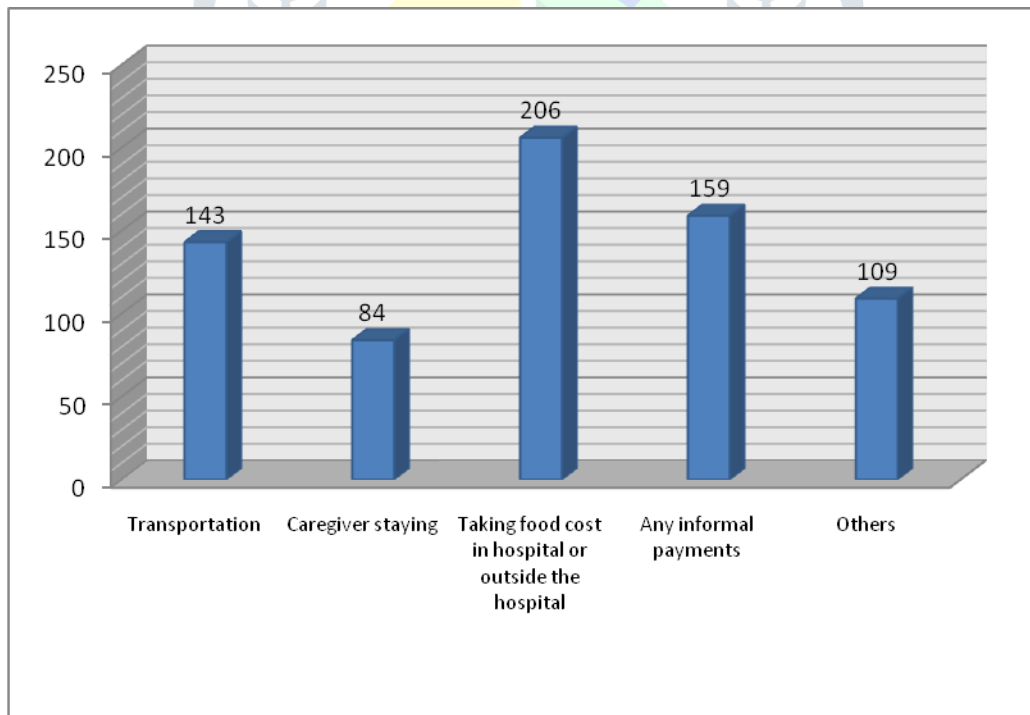
According to the Co-morbidities, 130(33.9%) Covid-19 patient had no Co-Morbidities. And 103(26.8%),96(25.0%),85(22.1%) 40(10.4%) respondents had Co-Morbidities of Asthma, hypertension, DM and Chronic kidney disease to developed Post Covid-19 syndrome respectively. Only 44(11.5%) respondents had co-morbidities of hypothyroidism and cardiovascular disease.(Table-3)



***Multiple answers

Figure-3: Distribution of the respondents according to direct treatment cost of Covid-19 respondents at the time of occurring

According to the direct treatment cost of the respondents, 250(65.1%) respondents need cost for diagnosis purpose, 302(78.76%) used money for medicine purpose. Among others 116(30.2%), 108(28.1%), 77(20.1%) and 70(18.2%) respondents needed money as a registration fees, continuing care, hospitalization and other purposes like O₂ inhalation, doctors consultancy, OT charge, ICU charge etc(Figure-3)



***Multiple answers

Figure-4: Distribution of the respondents according to indirect treatment cost of Covid-19 respondents at the time of occurring

According to the indirect treatment cost of the respondents, 205(53.4%) respondents said that they used money for taking food in hospital or outside the hospital, 159(41.4%) used money for any informal payments and 143(37.2%) respondents used money for transportation. Among others 84(21.9%) ,109(28.3%) respondents needed money caregiver staying and others like room rent, phone recharge, buy utensils etc.(Figure -4)

Discussion:

Out of 384 respondents, 219 (57.0%) were in the age group of 20-40 years. Their mean age \pm SD was 35.46 ± 15.15 . These findings agreed with the findings of the study done in Southeast Brazil¹⁸. The age distributions of the respondents also agreed with the similar studies done at home and abroad^{19,20}. In the present study, the proportion of men with COVID-19 was higher 226 (58.9%) than that of women 158 (41.1%). Previous studies have reported such a pattern^{21,22}. Regarding education status, 129(33.6%) were educated up to graduate level and above, 93 (24.2%) were higher secondary level and 69 (18.2%) were illiterate. Use of self-reported educational status as marker of level of highest education achieved is similar to previous studies.^{23,24,25} About 134(34.9%) of the respondents were service holder, 72(18.8%) were housewife, 50(13.0%) were day laborer and 128(33.3%) respondents involved in other activities. This study finding was quite similar with the study findings conducted by Iqbal et.al²⁶

Most 273(70.9%), 270(70.1%), 243(63.1%), 225(58.4%) of the respondents were suffered from Poor sleep quality, fatigue, anxiety and persistent cough followed by 211(54.8%), 188(48.8%), 189(49.1%), 163(42.3%), 133(34.5%) 127(33.0%), 115(29.9%) were suffered from joint pain, Continuous headache, chest pain, depression, hair fall, Intermittent fever, Blurred vision respectively. Only few respondents were suffered from other diseases like dyspnea (20.8%), brain fog (18.7%), tinnitus (5.7%), others (10.4%) (Diarrhea, thrombocytopenia, malnutrition). These finding were almost similar with the study conducted by Daniel et al, 2021¹⁸. In the study, 50.2% presented with long COVID syndrome. Most frequent were fatigue (35.6%), persistent cough (34.0%), dyspnea (26.5%), loss of smell/taste (20.1%) and frequent headaches (17.3%). Mental disorders (20.7%) were also reported. Another study done by Mohammad Anwar Hosain et. al, 2021¹⁹ consisted almost the similar results that is the most common symptoms described were fever 76.6% (n=1683), fatigue 50.1% (n=1101), cough and upper respiratory tract symptoms 65.4% (n=1438), dyspnea 23.8% (n=523), pain 33.1% (n=727), ageusia 29.3% (n=644), headache 38% (n=836) and anosmia 43.9% (n=966).¹⁷ The study done in Dhaka medical college, Bangladesh revealed that post viral fatigue 117(33%) was the most prevalent features. Others features included persistent cough (8.5%), post exertional dyspnea (7%), Headache (3.4%), Vertigo (2.3%), and Sleep related disorders (5.9%)¹⁹. Many of the observed symptoms in our study were consistent with those from previous study.²⁷ According to the risk factors, 227(59.0%), 166(43.1%), 132(34.3%) Covid-19 patient with respiratory distress, mental stress and poor nutritional status had developed Post-Covid 19 respondents respectively. And 146(37.9%) severe Covid-19 respondents had developed Post Covid-19 syndrome. Among others 77(20.0%), 73(19.0%), 41(10.6%) and 29(7.5%) Covid-19 respondents with lethargy, weight loss, obesity, others risk factor like DM, HTN, hypothyroidism etc had develop Post Covid-19 syndrome respectively. The study conducted by Mohamad-Said Almasri et.al, 2021²⁸ revealed that six factors were found to be significantly increasing the risk factors of PCS. Among them respiratory disease (2.33, 1.21-4.501) was one of the important risk factor for developing post covid-19 syndrome which was quite similar with our study. Regarding severity of Covid-19 respondents at the time of occurring, 180(46.8%), 155(40.3%) had developed mild to moderate degree of Covid-19 disease and 37(9.6%) had developed severe degree of Covid-19 disease. Only 13 (3.4%) respondent's needs ICU support which was similar with the study findings conducted by Mahmud R et. al.¹⁹ A previous study conducted after 12 months from COVID-19 infection in Korea had recovered from an acute COVID-19 infection, similar to our study, showed that 194 (80.5%), 30 (12.4%), and 6 (2.5%) responders had mild, moderate, and severe illness at the time of occurring the disease respectively.²⁹

According to the Co-morbidities, 130(33.9%) Covid-19 patient had no Co-Morbidities. And 103(26.8%), 96(25.0%), 85(22.1%) 40(10.4%) respondents had Co-Morbidities of Asthma, hypertension, DM and

Chronic kidney disease to developed Post Covid-19 syndrome respectively. Only 44(11.5%) respondents had co-morbidities of hypothyroidism and cardiovascular disease.(Table-8)This study findings is not support to the study findings conducted in Jordan³⁰. According to the direct treatment cost of the respondents, 250(65.1%) respondents need cost for diagnosis purpose, 302(78.76%) used money for medicine purpose. To date, few microcosting studies on patients with COVID-19 have been reported. In our analysis, 302(78.76%) used money for medicine purpose. A previous study reported these costs, including medical supplies, as the second highest cost, comprising 28% of the mean costs which is almost similar to our analysis.³¹ Only a limited number of published papers are available to measure the cost of treating COVID-19 patients, including case management, which is the focus of this article. Additionally, it is difficult to compare the literature due to differences in the study methodology, population, cost of medications. In a previous study of 70 patients in China, the cost of treating COVID-19 patients was found to be 6827 USD per treated episode. Interestingly, this study showed that the highest cost was spent on treatment medications, accounting for 45.1% of the total cost. This finding also aligned with our finding as the 2nd highest cost was observed with the treatment medications³².According to the indirect treatment cost of the respondents, 205(53.4%) respondents said that they used money for taking food in hospital or outside the hospital, 159(41.4%) used money for any informal payments and 143(37.2%) respondents used money for transportation.

It has been recently observed elsewhere in Cost of illness for outpatients attending public and private hospitals in Bangladesh that Transport costs were the second most expensive direct cost of treatment for illness in both public and private hospitals which was quite similar with the study.³³

Conclusion:

In this study, predominant risk factors of Post Covid-19 syndrome of Covid-19 patient was respiratory distress 227 (59.0%), mental stress 166(43.1%), and poor nutritional status132 (34.3%). Majority of the patient's need money for diagnosis purpose 250(65.1%) and 302(78.76%) used money for medicine purpose. Patients with COVID-19 require long-term follow-up even after recovery for observation and management of their post-COVID ailments. A comprehensive rehabilitation program is essential for such patients during hospitalization and discharge. During the ongoing COVID-19 pandemic, most health facilities are overloaded. Hence, arranging follow-up for patients can be a challenge. However, a significant population in the post-COVID state needs continuous monitoring. Female patients, patients presenting with respiratory distress, patients with lethargy, and patients with a disease for a prolonged duration require special attention in the post-COVID-19 state.

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