PREVALENCE OF COVID-19 AND ASSOCIATED CO-MORBIDITIES AT A TERTIARY HOSPITAL IN EASTERN NEPAL

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ABSTRACT

Introduction

COVID-19 (coronavirus disease) manifests as asymptomatic, mild, or severe pneumonia-like symptoms. COVID-19 patients with diabetes, chronic obstructive pulmonary disease (COPD), cardiovascular disease (CVD), hypertension, malignancies, HIV, and other comorbidities could develop a life-threatening condition.

Objectives

To identify the various comorbid illnesses in COVID-19-positive patients along with its baseline characteristics in a tertiary hospital in eastern Nepal.

Methodology

A one-month observational study carried out in RT-PCR positive COVID-19 patients in Birat Medical College and Hospital (BMCTH) Molecular Laboratory from June to July 2021. All the data was entered in a pre-structured proforma. The data was then further entered and analyzed by using Microsoft Excel 2014.

Result

There were 354 (22.77%) RT-PCR positive COVID-19 cases and 1200 (77.22%) RT-PCR negative COVID-19 cases. More than half of the COVID-19 positive patients were males 211(59.60%). The most common symptoms were fever (92.3%), cough (83.5%) and tiredness (81.23%). Psycho-social stress such as anxiety, depression and insomnia 123 (34.74%) were common comorbidities followed by diabetes 91(25.70%) and hypertension 72(20.33%).

Conclusion

COVID-19 patients were mostly between the 20-30 years of age group. Fever, cough, and throat pain were the commonest presenting symptoms.

KEYWORDS

COVID-19; Comorbidities, RT-PCR

INTRODUCTION

In December 2019, several cases of pneumonia by an unknown causative agent, were seen in Wuhan city of Hubei province in China, and was reported to the World Health Organization (WHO) by the Health Authority of China on 31 December 2019 and the outbreak was called as New Coronavirus Pneumonia (NCP).[1] Originally novel coronavirus was referred to as 2019-nCoV by Chinese researchers.[2] The International Committee on Taxonomy of Viruses (ICTC) named this virus as Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-Cov-2) based on the phylogenetic association with coronavirus that caused SARS outbreak in 2003 and consequently the disease was named as COVID-19.[3]

World Health Organization (WHO) declared SARS-CoV-2 infection as a public health emergency of international concern on 30 January, 2020 and later declared it as global pandemic on 11 March, 2020. With the occurrence of first and second wave of this pandemic, there have been more than 192 million cases and more than 4 million deaths worldwide by mid-July, 2021.[4]

In Nepal, the first case was found on 23 January 2020, in a man returning from Wuhan.[5] According to the reports published by the Ministry of Health, Nepal, on 25 July, 2021, total cases of Covid-19 till then were 679017, out of which the total recovered cases were 641565, total deaths were 9695 & active cases were 27757.[6]

Coronaviruses (CoVs) are members of the Coronaviridae family, the order Nidovirales, and the genus Coronavirus. They are the largest group of viruses causing respiratory and gastrointestinal infections. Morphologically, CoVs are enveloped viruses containing a non-segmented positive-sense, single-stranded ribonucleic acid (RNA).[7] They are enveloped and have a non-segmented, single-stranded, positive-sense ribonucleic acid (ssRNA+) as their nuclear material. On electron microscopy, these viruses show a characteristic appearance that resembles a crown (corona in Latin means crown) due to the presence of club-shaped surface protein projections.[8] The CoVs are pleomorphic, measure between 80 and 160 nm in length, and have a small genome measuring 27-32 Kilobytes (KB) with a unique replication strategy.[9] The RNA group of viruses is classified into three orders that include the order Nidovirales, which is further classified into four families: Coronaviridae, Arteriviridae, Mesoniviridae, and Roniviridae.

The family Coronaviridae is further divided into two subfamilies: Coronavirinae and Torovirinae. The Coronavirinae subfamily includes four genera of viruses (Alphacoronaviruses, Betacorona viruses, Gammacoronaviruses, and Deltacorona viruses), which have been grouped primarily based on serology and phylogenetic clustering (divisions based on the habitat/genetic relatedness). SARS-CoV-2 is considered as a novel human-infecting Betacoronavirus.[10] This virus consists of crown-like spikes on the outer surface, therefore, it is named a coronavirus. The size of the virus is 65–125 nm in diameter with an envelope and contains a single-stranded positive-sense RNA that infects humans and many animal species like birds and mice.[11] The Severe

Acute Respiratory Distress Syndrome and Middle East Respiratory Syndrome (MERS) cases were reported to have a very high case fatality rate of 9.5 and 34.4% respectively. In contrast, the CoVID-19 has a case fatality rate of 2.13%. Also, there are no clear medical countermeasures for these coronaviruses yet.[12]

Evidence suggests that COVID-19 and SARS have many similarities. There are approximately 79.5% similarities in the genome sequences of these two viruses that have been reported.[13] The virus is mostly transmitted from person to person via respiratory droplets.[14] Some research suggests that direct contact with infected or contaminated items can also spread this virus.[15] The gastrointestinal system is also involved, and some reports indicate that SARS-CoV-2 is identified in feces, implying that fecal-oral pathway transmission is possible.[16] Another study reveals that SARS-CoV-2 can infect conjunctiva cells, which could be another route of transmission.[17]

CoV-2 primarily affects the respiratory system and can involve both the upper (sinuses, nose, and throat) and lower respiratory tracts (windpipe and lungs). The common symptoms of COVID-19 are fever, dry cough, and tiredness. The other symptoms include aches and body pains, nasal congestion, headache, conjunctivitis, sore throat, diarrhea and loss of taste or smell, etc. In addition to respiratory symptoms, and neurological manifestations[18] hepatic and gastrointestinal involvement[19] have been reported. Analyzing clinical and epidemiological data of COVID-19-specific comorbidities raise the risk of infection, resulting in severe lung injury and death. So far, the common comorbidities reported are hypertension, cardiovascular disease, and diabetes.[20] Also, a high proportion of COVID-19 patients being admitted in ICU suggests comorbidities as a potential risk factor for COVID-19 patients.

Despite this pandemic's increasing number of cases and duration, our country still lacks adequate data on COVID-19 comorbidities, and various clinical findings. As a result, the purpose of this study was to assess the comorbidities associated with COVID- 19 with respect to age and gender in a tertiary care centre of eastern Nepal. The data from our study will help in bringing awareness about Covid -19 cases and assisting the government in implementing policies to take the appropriate steps to control the pandemic within the country.

METHODOLOGY

This cross-sectional study included a total number of 1554 clinically suspected patients for COVID-19 who visited different OPD and emergency wards of Birat Medical College and Hospital (BMCTH) from June to July 2021. The study was approved by the Institutional Review Committee (Ref.no PA-190/2078-79). The samples were collected from all patients under investigation for COVID-19 infection. Only PCR - positive patients were included in the study. The comorbidity was identified from the patient record file maintained in the COVID-Block of the institute. The samples (oropharyngeal and nasopharyngeal swabs) were collected in the Molecular Laboratory of Birat Medical College and Hospital (BMCTH). The oropharyngeal and nasopharyngeal

swabs were collected in Viral Transport Medium (Run Mei) and the cold chain was maintained immediately. In the case of those samples which were not processed on the same day they were stored at -80^{0}C.

The samples were processed using the Interim Guidelines for SARS-Cov-2 PCR laboratories laid by Nepal's National Public Health Laboratory Network. RNA was extracted using a fully automated extraction machine and a Zybio Nucleic Acid Extraction kit based on the magnetic bead technique (Zybio, EXM-3000).

The extracted template was then added to a master mix (Zybio Nucleic Acid Detection kit) and analyzed in a Real-Time PCR system, Azure Cielo biosystem. All the data was entered in a pre-structured proforma. The data was then entered and analyzed using Microsoft Excel 2014.

RESULTS

Out of total samples of 1554; there were 354 (22.77%) COVID-19 positive cases and 1200 (77.22%) COVID-negative cases. More than half of the COVID-positive patients were males 211(59.60%). (Table No. 1)

Table 1: Distribution of cases as per gender

Gender	Total Positive	Total Negative
Male	211(59.60%)	989(82.41%)
Female	143(40.39%)	211(17.58%)
Total	354(100%)	1200(100)

The age of the patients ranged between 1 to 93 years with a mean age of 42.69, SD± 18.74, and a median age of 40 years. Most of the patients were between 20-30 years 77(21.75%) with the oldest age group being over 80 years 11(3.10%). (Table No. 2)

Table 2. Distribution of cases as per age group

Age Group (Years)	Number (%)
<20	24(6.77)
20-30	77(21.75)
31-40	60(16.94)
41-50	64(18.07)
51-60	50(14.12)
61-70	41(11.58)
70-80	27(7.62)
>80	11(3.1)
Total	**354(100)**
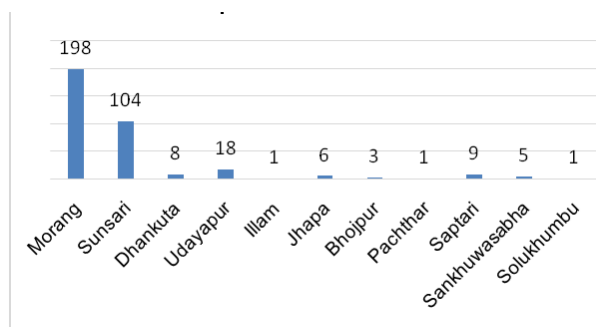
The district-wise distribution of positive cases is depicted in (Figure No.1). On admission, the most common symptoms were fever 327(92.3%), cough 295(83.5%), fatigue 287 (81.23%), body ache 277(78.23%), sore throat 256(72.54%) and nasal discharge 242(68.64%) (Figure No. 2)
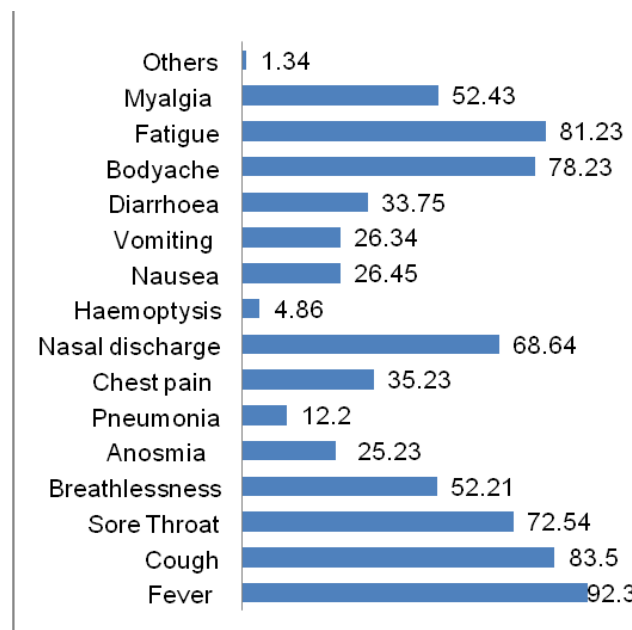

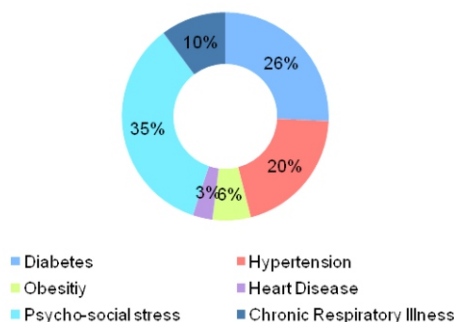**Figure 2:** Percentage of symptoms in COVID-19 positive patients

Figure 3: Comorbid conditions among patients

Overall, at least one of the comorbidities was present in 95(26.83%) of the patients. Psycho-social stress 123 (34.74%), in the form of anxiety, depression and insomnia was the most common comorbidity among patients followed by diabetes 91(25.70%) and hypertension 72(20.33%) and Figure 3

DISCUSSION

The clinical presentation of COVID-19 is wide, from asymptomatic infection to severe fatal diseases.[21] In this study, 354 RT-PCR-positive COVID-19 cases were studied. The mean age of patients was 42.69 SD ± 18.74 years. This finding is consistent with a study conducted in Bangladesh that found the mean age of the patients to be 42.59±14.43 years.[20] The age range of the patient varied from 1 to 93 years with the most affected age group being 20-30 years

(21.75 %). This could be attributed to the fact that people in this age group are more mobile, productive and active resulting in a higher risk of exposure. Overall, males were infected at a higher rate (59.60%) than females, which is consistent with the findings of other studies.[20,21] Males are generally more dynamic than females and participate in more outdoor and risk-taking activities and gatherings, which may have led to male predominance in our study. This could also be related to a gender disparity in female case detection and social stigma. A systemic review and meta-analysis mentioned that underreporting of female patients even after infection due to shyness or social stigma is a challenge to focus on, which could be a possible source of rapid disease transmission.[22] MERS-CoV and SARS-CoV showed a similar pattern of sex distribution according to other studies.[23,24]

In this study majority of the COVID-19 positive cases reported from Morang and Sunsari districts of Province 1 at a rate of (55.93%) and (29.37%) respectively. This finding is quite obvious as our hospital is one of the largest tertiary care hospitals located in Morang district and close to the neighboring district Sunsari.

COVID-19 patients are commonly present with fever and respiratory illness. Some patients, however, reported GI symptoms such as diarrhea, nausea/vomiting, and abdominal pain. Fecal–oral transmission of COVID-19 infection has been confirmed by the fact that the virus can replicate in both the respiratory and digestive tracts.[25] In our study, the most common symptoms of COVID-19-positive patients were fever, cough, tiredness and body aches. Fever is the most common symptom in COVID-19 patients, but it does not affect all patients according to a few studies.[26,27] The fever is an alarming sign of the disease, and vomiting and fever (above 39 degrees) are usually associated with a more severe illness and a longer hospital stay. COVID-19 fever is less common than SARS and MERS.[28, 29] As a result, more attention should be paid to COVID-19 patients who do not have fever as a source clue of infection, because if the surveillance system only relies on fever in patients, some patients will then be missed.[30] In this study fever was seen in (92.3%) of cases, cough in (83.5%) of cases, and fatigue in (81.23%) of cases. Our results are comparable to a Chinese study where the common symptoms of COVID-19-positive patients were fever (67.4%), dry cough (34.3%), and myalgia (28.5%).[31] Similarly, in an Iranian study fever (63.8%), cough (68.1%), and dyspnea (72.7%) were the most common symptoms of COVID-19-positive patients.[26] According to a Bangladeshi report (87.8%) of the patients were symptomatic, and the most commonly reported symptoms were fever (77%), cough (56.8%), breathlessness (24.3%), myalgia (24.3%), sore throat (21.6%) and fatigue (17.6%).[20] In our study loss of smell and taste sensation was present in (25.23%) of the patients. Breathlessness was present in (52.21%) of patients, much higher than WHO suggested

prevalence of (31-40%).[30] Among the non-respiratory symptoms diarrhea, myalgia, hemoptysis, and sore throats were the least common symptoms; however, these findings were similar to those obtained for other viruses such as SARS and MERS. [31] This may indicate that COVID-19 is a similar infection to SARS and MERS, which target the cells in the lower respiratory tract system. Although the nasopharynx is theoretically the first organ to become infected with COVID-19, a recent study found that infected people rarely have upper respiratory symptoms at the onset of the infection.[32] This suggests that the virus usually targets cells of the lower respiratory tract. [33]

The most common comorbidities found in our study were psychological comorbidity (34.74%) followed by cardiovascular disorders (20.33%) and diabetes (25.70%). The psychological comorbidities were mostly in the form of anxiety (66.66%) and depression (33.33%) as a result of the outbreak of COVID-19. Out of these (36.58%) of the patients had severe anxiety and (15.44%) had severe depression. Our finding is in line with a Bangladeshi study where (60%) and (52.9%) of patients had anxiety and depression; among them (21.4%) had severe anxiety and (8.1%) had severe depression.[20] Similarly, another study from China showed that (53.8%) of the patients had a psychological impact of moderate or severe degree; (16.5%) with moderate to severe depressive symptoms; (28.8%) with moderate to severe anxiety symptoms, and (8.1%) with moderate to severe stress levels.[34] Various studies have reported diverse prevalence rates for cardiovascular disorders ranging from (11%) to (45%) and for diabetes ranging from (13%) to (35%).[26,35] Cardiovascular disorders (20.33%) and diabetes (25.70%) were the most prevalent co-morbidities among Covid-19 patients in our study. A meta-analysis reported an overall pooled prevalence of (8.4%) for cardiovascular disorders and (9.7%) for diabetes respectively, while another meta-analysis reported a prevalence of (12%) for cardiovascular disorders and around (8%) for diabetes.[36]

Authorities believe that subjects with comorbidities had a worse disease outcome when infected with the novel coronavirus than patients without underlying disease.[37] According to the literature and previous research, underlying diseases increase the mortality rate in COVID-19 patients, with cardiac disease and diabetes being the most significant risk factors.[38]

CONCLUSION

COVID-19 patients were mostly between the 20-30 years of age group. Most of the patients were males. The most common symptoms were fever, cough, and throat pain. Psychological impacts were the most common comorbidity followed by diabetes and hypertension.

RECOMMENDATION

To provide a complete picture of the clinical severity spectrum, a hospital (including outpatient and inpatient) or community-based study with a high sample size will be required.

LIMITATIONS OF THE STUDY

Despite the fact that the current location is a tertiary centre, the current study cannot reflect the actual burden of cases from the Morang district because there are multiple other hospitals in this Province where RT-PCR tests are performed. Apart from this patient's hospitalization, neither the treatment course nor the outcome was addressed.

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