Original Research Article

Comparison of liver function status between home treated and hospital treated SARS-CoV-2 survivors

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ABSTRACT

Background: SARS-CoV-2 has emerged as one of the greatest challenges faced by the world. There is association of liver injury with SARS-CoV-2 infection indicated by abnormal ALT levels accompanied by altered bilirubin level in blood. The aim of the study was to evaluate the quantitative difference of serum ALT and bilirubin level in home and hospital treated patients.
Methods: A cross-sectional study was conducted in the Department of Biochemistry and Molecular Biology, Bangabandhu Sheikh Mujib Medical University, from July 2020 to June 2021. After infection most of the patients with mild symptoms were treated at home but patients with difficulty in breathing and various complications were treated at the hospital. Due to SARS-CoV-2 infection certain derangement of liver enzymes were noticed.
Results: This study was planned to evaluate the changes of liver enzymes (ALT) and serum bilirubin after the recovery of SARS-CoV-2 infected patients. The aim of the study was to compare the derangement of serum bilirubin and ALT in home and hospital treated patients.
Conclusions: There was no significant difference regarding liver function between these two groups.

Keywords: SARS-CoV-2, Liver function status, ALT, Bilirubin

INTRODUCTION

SARS-CoV-2 (severe acute respiratory syndrome coronavirus-2), is a highly infectious rapidly spreading communicable disease.[1] SARS-CoV-2 belongs to the Coronaviridae family. It is an enveloped RNA positive virus. Middle east respiratory syndrome-related coronavirus (MERS-CoV) and severe acute respiratory syndrome coronavirus (SARS-CoV) were also from this family. These viruses were previously responsible for pandemic in 2012 and 2002 respectively.[2] SARS primarily infect lung and develop 'severe acute respiratory syndrome' and 'SARS atypical pneumonia'.

Later it develops extra pulmonary spread of infection such as multiple organ dysfunctions, including gastrointestinal symptoms, abnormal liver functions, lymphadenopathy and splenic atrophy in many patients.[3] There is a relationship between abnormal liver function and severity of SARS-CoV-2 infection after hospital admission. But mild liver injury was not in relation with development of complications. Multiple-organ failure was associated with severe liver injury.[4] Abnormal liver enzyme status were observed in patients at the time of hospitalization. The derangement of ALT was sustained during the infection period. From the period of being RT-PCR positive to one month, hospitalized severe patients

had remarkably increased liver enzymes in comparison to non-severe patients.[5] During the infection period abnormal liver function might indicate worse recovery of SARS-CoV-2 patients. Severe SARS-CoV-2 patients had higher rates of liver injuries during hospitalization with increased level of alanine aminotransferase (ALT). One month after discharge, the ratio of AST/ALT and ALP were decreased.[6] Elevation of liver enzymes during admission was associated with a poor prognosis. Moderate elevation of LFT after one week of hospitalization was an independent risk factor for mortality in these patients.[7] Liver injury in SARS-CoV-2 patients was an independent predictor of a poor prognosis.[8] Bilirubin, ALT, AST, and CRP were significantly in relation with disease severity. ALT, AST can be used as for monitoring progression of disease to severity and increase the risk of mortality.[9] Bilirubin, alanine aminotransferase (ALT) and Alkaline Phosphatase (ALP) levels were significantly deranged in patients after SARS-CoV-2 infection. The increase of enzymes were not significantly associated with disease severity.[10] In severe SARA-CoV-2 infection bile duct cells injury by the virus cause derangement of liver enzymes. So, it is important to monitor the patients following recovery periods.[11] High prevalence of altered liver enzymes was noticed in SARS-CoV-2 patients which made worse outcomes when developing severe respiratory complications.[12] Liver function tests were very commonly altered in severe case of SARS-CoV-2 patients. A remarkable number of patients had still higher liver enzymes during recovery.[13]

METHODS

From July 2020 to June 2021, this cross-sectional study was conducted at Department of Biochemistry and Molecular Biology, BSMMU, Shahbag, Dhaka. The total study subject was 60.

All of them were confirmed as infected case of SARS-CoV-2 and recovered (30 home-treated patients were taken as group I and another 30 hospital-treated patients were taken as group II). The patients with mild symptoms and treated at home were enrolled as home-treated patients. RT-PCR positive for SARS-CoV-2 within last 3 to 6 months, age 18 to 70 years were inclusion criteria for both group I and II. All the study subjects were non vaccinated against SARS-CoV-2 virus. Pregnancy lactation and renal disease, history of heart failure, history of malignancy, any immunosuppressive disorders and radiation therapy were excluded from the study.

A structured questionnaire and data sheet were prepared for this research, which included all the variables of interest. With all aseptic precautions, blood sample was collected. The serum was separated from individual sample and stored at -56ºC. Estimation of serum ALT, Bilirubin were performed at the Department of Biochemistry and Molecular Biology, BSMMU.

Statistical analysis

Collected data were entered, checked and edited (to remove the outliers) with the help of the Statistical Package for Social Sciences (SPSS) software, version 26 and analyzed. The data were expressed as frequency and percentage, mean±SD for normally distributed data. P value ≤0.05 was considered statistically significant.

RESULTS

This cross-sectional study was conducted in the Department of Biochemistry and Molecular Biology, BSMMU from July 2020 to June 2021. A total of 60 SARS-CoV-2 study subjects aged 18-70 years were enrolled. Most of the SARS-CoV-2 patients were distributed in the age group 50-59. The mean±SD age of home-treated patients was 42.16±14.14 and hospital-treated patients was 50.0±10.8 years. It was observed that males were more infected in comparison to female patients in both groups. In this study, after 3 to 6 months recovery, ALT (mean±SD) of home treated patients was 27.6±25.7 (U/l) and hospital treated patient was 20.5±11.7 (U/l). The serum bilirubin (mean±SD) of home treated patients was 0.34±0.16 (mg/dl) and hospital treated patient was 0.29±0.19 (mg/dl).

Table 1: Mean duration of infection period in home and hospital treated patients.

Group	Mean duration of infection period (days)
Home treated SARS-CoV-2 patients	12
Hospital treated SARS-CoV-2 patients	5

Table 2: Distribution of the SARS-CoV-2 study subjects on the basis of gender.

Gender	N	%
Male	33	55
Female	27	45

Table 3: Mean of serum ALT in SARS-CoV-2 home and hospital treated patients.

	Home treated patient	Hospital treated patient
ALT (U/l) (Mean±SD)	27.6±25.7	20.5±11.7

Table 4: Mean of serum bilirubin in SARS-CoV-2 home and hospital treated patients.

	Home treated patient	Hospital treated patient
Bilirubin (mg/dl) (Mean±SD)	0.34±0.16	0.29±0.19

Table 5: Comparison of serum ALT value between home and hospital treated patients.

	Home treated patient	Hospital treated patient	P value
ALT (U/l) (Mean±SD)	27.6±25.7	20.5±11.7	0.17

Table 6: Comparison of serum bilirubin value between home and hospital treated patients.

	Home treated patient	Hospital treated patient	P value
Bilirubin (mg/dl) (Mean±SD)	0.34±0.16	0.29±0.19	0.18

DISCUSSION

In this cross sectional study SARS-CoV-2 infection rate was more in male patients. Here 55% participants were male. A cross-sectional study in Italy observed that infection of SARS-CoV-2 was predominant in male. The study reported infection rate of males compared to females were 17.0% vs 14.6%.[14] Another study in Chicago, mentioned that males had higher infection rate than that of female (19% vs 13%).[15] In this current study, the participants within age group 50-59 years were more infected. This result was consistent with Nikpouraghdam et al a recent study in Iran. The study reported that the majority COVID-19 infected patients were in the age group of 50 to 60 years old.[16] Patients with respiratory distress and other complications were treated in the hospital. In this study, in both home and hospital treated patients liver enzyme ALT and serum bilirubin was deranged. But there was no significant difference of ALT and serum bilirubin between two groups. This finding was consistent with a recent study in Pakistan. The study reported that the levels of total bilirubin and ALT was increased with during SARS-CoV-2 infection. But the derangement of ALT and bilirubin was not significantly associated with severity of disease status.[10] Another study in China observed that the parameters of liver function test were increased during SARS-CoV-2 infection period. But the ratio of ALT, AST and GGT decreased below 10% from a high level after 40 days of recovery.[6]

Limitation of the study

The present study had some limitations. Larger number of populations is needed for better evaluation.

CONCLUSION

There was no significant difference of serum ALT and serum total bilirubin between home treated and hospital treated SARS-CoV-2 survivors.

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