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AST, ALT, Bilirubin and AST/ALT Ratio Role; COVID-19 Patients

Nor Amirah Mohammad Nazri [1*], Wan Norlina Wan Azman[1], Norsyuhadah Musa[1], Tuan Salwani Tuan Ismail[1], Azian Harun[2], Najib Majdi Yaacob[3] ,Sarina Sulong[4] , Sirajudeen K.N.S[5], Mahaya Che Mat[6], Hani Ajrina Zulkeflee[7]

[1] Department of Chemical Pathology, School of Medical Sciences, Universiti Sains Malaysia (Health Campus) Kelantan, Malaysia
[2] Department of Medical Microbiology and Parasitology, Universiti Sains Malaysia (Health Campus) Kelantan, Malaysia
[3] Unit of Biostatistic and Research Methodology, Universiti Sains Malaysia (Health Campus) Kelantan, Malaysia
[4] Human Genome Centre, Universiti Sains Malaysia (Health Campus) Kelantan, Malaysia
[5] Department of Basic Medical, Kuliyyah of Medicine, International Islamic University Malaysia, Kuantan Campus, Malaysia
[6] Department of Pathology, Hospital Raja Perempuan Zainab II, Kelantan, Malaysia
[7] Department of Medical Sciences II, Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia

*Correspondence email: ciknoramirah@gmail.com

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Background

Impaired liver function upon admission has been linked to the severity of COVID-19 infection, yet the data is debated [1]. Therefore, this retrospective study aimed to evaluate the liver function among COVID-19 patients during hospitalization and its association with the disease severity.

Methodology

The patient aged 18 to 80 with positive COVID-19 at Hospital Raja Perempuan Zainab II (HRPZ II), Kota Bharu, Kelantan, with available AST, ALT, Bilirubin, and AST/ALT ratio data on admission, were retrospectively evaluated from March 2021 to March 2022. Disease severity was categorized based on Annex 2e guidelines by Malaysia's Ministry of Health, which further classified them into mild to moderate disease (Stage 1-3) and severe to critical illness (Stage 4-5). The AST, ALT, Bilirubin, and AST/ALT ratio levels on Day 1 admission were archived from the electronic medical record system and compared between the two groups. The statistical analysis was using SPSS version 27. This study was approved by (JEPeM-USM) protocol code USM/JEPeM/21100691 and Ministry of Health Malaysia NMRR-21-762-58458 (IIR).

Results and Discussion

The study included a total of 168 COVID-19 patients with a mean (SD) age of 46.67(16.10) for mild to moderate and 56.66(12.41) for severe to critical. There is a significant age group for both groups (p-value=0.002). During hospitalization, 16(14.41%) patients progressed to death from severe to critically ill patients. Upon admission, the median (IQR) of AST and ALT were significantly higher in the severe to critical group compared to in the mild to moderate group, [AST; 39.0(49.0) and 24.0(14.0), ALT 38.0(43.0) and 21.0(18.0)], $p<0.05$. However, no significant difference between both groups for bilirubin level and AST/ALT ratio. Non-survivors had a higher AST and ALT level compared to survivors, with a median (IQR) of [AST 98.0(88.0) and 32.0 (26.0), ALT of 67.5(90.0) and 28.0(31.0), ($p<0.05$). Similarly, no significant difference between non-survivors and survivors for bilirubin and AST/ALT ratio. Our study support that, abnormal liver function at admission has been shown to be associated with the disease severity and mortality of COVID-19 infection. However, there is also a need to observe the COVID-19 survivors' hepatobiliary sequelae and dynamic liver function changes following hospital discharge.

Conclusion

Abnormal AST and ALT level at admission has been shown to be associated with the disease severity and mortality of COVID-19 infection. Further study needed to evaluate liver damage in COVID-19 post-discharge.

Acknowledgements

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References

[1] Liao X, Li D, Ma Z, Zhang L, Zheng B, Li Z, Li G, Liu L, Zhang Z. 12-Month Post-Discharge Liver Function Test Abnormalities Among Patients With COVID-19: A Single-Center Prospective Cohort Study. Frontiers in Cellular and Infection Microbiology. 2022:431.

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AST, ALT, BILIRUBIN AND AST/ALT RATIO ROLE; COVID-19 PATIENTS

Nor Amirah Mohammad Nazri 1*, Wan Norlina Wan Azman1, Norsyuhadah Musa1, Tuan Salwani Tuan Ismail1, Azian Harun2, Najib Majdi Yaacob3 ,Sarina Sulong4 , Sirajudeen K.N.S5, Mahaya Che Mat6, Hani Ajrina Zulkeflee7

1 Department of Chemical Pathology, School of Medical Sciences, Universiti Sains Malaysia (Health Campus) Kelantan, Malaysia
2 Department of Medical Microbiology and Parasitology, Universiti Sains Malaysia (Health Campus) Kelantan, Malaysia
3 Unit of Biostatistic and Research Methodology, Universiti Sains Malaysia (Health Campus) Kelantan, Malaysia
4 Human Genome Centre, Universiti Sains Malaysia (Health Campus) Kelantan, Malaysia
5 Department of Basic Medical, Kuliyyah of Medicine, International Islamic University Malaysia, Kuantan Campus, Malaysia
6 Department of Pathology, Hospital Raja Perempuan Zainab II, Kelantan, Malaysia
7 Department of Medical Sciences II, Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia
*Correspondence email: ciknoramirah@gmail.com

INTRODUCTION

Impaired liver function upon admission has been linked to the severity of COVID-19 infection, yet the data is debated [1]. In this aspect, AST and ALT can be valuable biomarkers that allow clinicians to immediately identify patients at increased risk of serious disease.

OBJECTIVE

To determine the AST,ALT, bilirubin, AST/ALT ratio among COVID-19 patients on Day 1 hospitalisation and its association with the disease severity.

METHODOLOGY

Patients aged 18 to 80 with positive COVID-19 at Hospital Raja Perempuan Zainab II (HRPZ II), Kota Bharu, Kelantan, having AST, ALT, Bilirubin, and AST/ALT ratio data on admission were retrospectively analysed from March 2021 to March 2022.

Based on Annex 2e guidelines, Malaysia's Ministry of Health placed diseases into two groups: mild to moderate (Stage 1-3) and severe to critical (Stage 4 and 5).

The first day of admission, the AST, ALT, Bilirubin, and AST/ALT ratio levels were archived from the electronic medical record system and compared between the two groups.

The statistical analysis was done with SPSS version 27.

RESULTS

Table 2: Comparison of AST, ALT, Bilirubin and Ast/Alt ratio on Day 1 admission between Mild to Moderate COVID-19 and Severe to Critically ill COVID-19

Variables	Median (IQR)		Z statistics	P value
	Mild to Moderate COVID-19 n = 57	Severe to Critically ill COVID-19 n = 111		
Ast	24(14)	39(49)	-4.472	P<0.05
Alt	21(18)	38(43)	-3.800	P<0.05
Bilirubin	10(5)	9(5)	-0.241	P = 0.810
Ast/Alt ratio	1.15(0.88)	1.32(0.81)	-0.067	P = 0.947

*Mann Whitney test

Table 3: Comparison of AST, ALT, Bilirubin and Ast/Alt ratio on Day 1 admission between survivor and non-survivor COVID-19 patients

Variables	Median (IQR)		Z statistics	P value
	Survivor n = 152	Non-survivor n = 16		
Ast	32(26)	99(88)	-4.284	P<0.05
Alt	28(31)	67.5(90)	-3.499	P<0.05
Bilirubin	9(5)	10.5(12)	-1.900	P=0.057
Ast/Alt ratio	1.27(0.81)	1.47(0.96)	-1.210	P=0.226

*Mann Whitney test

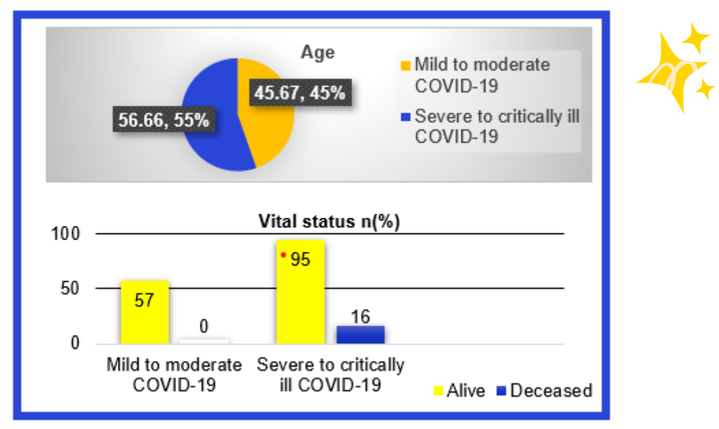

Figure 1: Characteristics of study participants

Table 1: Characteristics of study participants

Variables	Mild to Moderate COVID-19 n = 57	Severe to Critically ill COVID-19 n = 111	Test-stats (df)	P value
Age, year	45.67(16.10)	56.66(12.41)	166	0.002*
Vital status n (%)				
Alive	57(100)	95(85.59)		
Deceased	0(0)	16(14.41)		

*Independent sample t-test

DISCUSSION

- The median (IQR) of AST and ALT upon admission were substantially higher in the severe to critical group compared to the mild to moderate group Nevertheless, there was no significant difference in bilirubin levels or the AST/ALT ratio between the two groups.
- AST and ALT levels were greater in non-survivors than in survivors. Likewise, there was no significant difference between non-survivors and survivors for bilirubin and AST/ALT ratio.
- Our results correspond to the idea that poor liver function upon admission is related to the severity and mortality of COVID-19 infection.

CONCLUSION

Increased disease severity and death from COVID-19 infection have been linked to abnormally high levels of AST and ALT at admission. Additional research is required to examine the extent of liver injury in COVID-19 patients during the course of infection and after they were discharged.

REFERENCE

[1] Liao X, Li D, Ma Z, Zhang L, Zheng B, Li Z, Li G, Liu L, Zhang Z. 12-Month Post-Discharge Liver Function Test Abnormalities Among Patients With COVID-19: A Single-Center Prospective Cohort Study. Frontiers in Cellular and Infection Microbiology. 2022:431

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