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Potential relationships between circulating gene expression of *ACE2*, *TLR4*, and *IL-17* and disease severity and outcome of hospitalized patients with COVID-19

Key words: Acute respiratory distress syndrome (ARDS); Coronavirus disease 2019 (COVID-19); Intensive care unit (ICU); Angiotensin-converting enzyme 2 (ACE2); Toll-like receptor 4 (TLR4); Interleukin-17 (IL-17); Polymerase chain reaction (PCR)

Research Summary

This research article mainly focused to Investigate the possible relationship between many biochemical and genetic parameters with the severity of COVID-19 disease and the disease prognosis in hospitalized patients through:

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- **Assessment of circulating gene expression of ACE-2, TLR-4 and IL-17**



Innovation points

- **Introduction** of ACE-2, TLR-4 and IL-17 molecular functions and possible role in COVID-19 disease



- **Summary**our results clarified that SARS-CoV-2 SP significantly increases both TLR-4 and ACE2 protein expression, promoting a marked inflammatory response. These observations were also confirmed by a notable release of pro-inflammatory cytokines IL-17, CRP, ferritin, and d-dimer, which are each well-known downstream products of TLR-4 activation.

- **Conclusion** : Our findings allow us to conclude that increased circulating-gene expression of TLR4 and IL-17 is helpful in assessing the severity of COVID-19 disease. Consequently, targeting these biomarkers may offer additional therapeutic options for COVID-19 patients in the future.

Innovation points

A series of comprehensive tables and figures were generated to summarize our results about ACE-2, TLR-4 and IL-17 role in COVID-19 .

Table 2 | Demographic and clinical characteristics and Laboratory investigations of COVID-19 patients and controls

Table 3 | Laboratory investigations of COVID-19 patients as regards severity.

Figure 1 | Fold-change gene expression ($2^{-\Delta\Delta Ct}$) For a. ACE2; b. TLR4; c. IL-17 in COVID-19 patients and controls.

Table 3 | Laboratory investigations of COVID-19 patients as regards outcome

Table 4 | Correlation studies between ACE2, TLR-4, IL-17, and laboratory data in COVID-19 patients

Table 5 | Diagnostic performance of ACE2, TLR4 and IL-17 for distinguishing COVID-19 patients from healthy controls

Research Recommendations

- **TLR-4 and IL-17** may be used as prognostic markers of COVID-19 disease with ARDS.
- **Blockade of ACE-2, TLR-4 and IL-17** may offer a promising approach to prevent severe COVID-19 (ARDS) and improve patient outcomes and could be used in **treatment of severe cases of the disease (ARDS)**.