The Angiotensin Converting Enzyme-2 Serum Level and the Occurrence and Severity of SARS-COV-2 (COVID-19) Among Smokers

Thesis

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Abstract

Background: Corona Virus Disease of 2019 (COVID-19) was declared a pandemic on March 11, 2020 by the World Health Organization (WHO). Smoking depresses pulmonary immune function and is a risk factor contracting other infectious diseases. Angiotensin converting enzyme-2(ACE2) receptor is the viral binding site for the Severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) in human**.** High mobility group box 1 protein (HMGB1) initiates inflammation in COVID-19 patients via triggering toll like receptor-4 (TLR4), which causes the release of pro-inflammatory cytokines and by expression of the ACE2 receptor in alveolar epithelial cells.

Objectives: This study aimed to evaluate whether a variation in serum level of ACE2 among COVID-19 patients (smokers compared to non-smokers) and to investigate the relationship between level of ACE2 and disease severity in COVID-19.

Methods: This case-control descriptive analytical study was done in Fayoum University Teaching Hospital included 50 COVID-19 patients: (25 patients were smokers and 25 patients were non-smokers) and 15 COVID-19 recovered subjects compared to 25 healthy control subjects during a period extending from January, 2021 till December, 2021. All samples were subjected to Enzyme-Linked Immunosorbent Assay (ELISA) method for quantitative detection of both ACE2 and HMGB1 serum levels.

Results: ACE2 serum level was statistically significantly higher in COVD-19 positive patient compared to the control group (p-value <0.001), also it was statistically significantly higher among COVID-19 recovered group compared to COVD-19 positive patient (p-value < 0.05), while serum level of HMGB1 was statistically significantly higher in both COVID-19 positive patient and recovered group compared to control group (p-value <0.01). HMGB1 serum level could be used as a predictor for the clinical outcome with cut off value (320.79) as it was statistically significantly higher in non-survivors patients than survivors. ACE2 serum level could be used for the diagnosis of COVID-19 disease with cut off value (2.91). Among COVID-19 positive subjects; gender, smoking history and disease severity were statistically insignificant in relation to ACE2 serum level and HMGB1 serum level. There was no statistically significant difference in the levels of ACE2 and HMGB1 between smokers and non-smokers in different disease severity groups and different disease outcomes groups among COVID-19 positive patients.

Conclusion: Our study revealed that ACE2 serum level was higher in COVID-19 positive than the control group and could be used for

diagnosis of COVID-19 positive cases. ACE2 serum level was persistently elevated in COVID-19 recovered group as it was higher in recovered group compared with both positive cases and control group. HMGB1 could be used for prediction of COVID-19 clinical outcomes as it was higher among non-survivor patients compared with survivor group.
Key words: Angiotensin converting enzyme-2, High mobility group box1 protein, COVID-19 disease.