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# Alpha-1 antitrypsin in COVID-19 patients: a dual-center screening study in Malaysia

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[Musa, Norsyuhadah](#)<sup>a,b</sup>; [Wan Azman, Wan Norlina](#)<sup>a,b</sup> ; [Nazri, Nor Amirah Mohammad](#)<sup>a,b</sup>; [Tuan Ismail, Tuan Salwani](#)<sup>a,b</sup>; [Harun, Azian](#)<sup>b,c</sup>; [+5 authors](#)

<sup>a</sup> Department of Chemical Pathology, School of Medical Science, Universiti Sains Malaysia, Health Campus, Kelantan, Malaysia

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## Abstract

**BACKGROUND:** Alpha-1 antitrypsin (A1AT) deficiency has been recognized as an adverse prognostic determinant in severe instances of COVID-19. **OBJECTIVE:** To determine the A1AT phenotypes and levels in individuals at various clinical stages of COVID-19 compared to healthy controls. **DESIGN:** Case-control study **SETTINGS:** Hospital Raja Perempuan Zainab II (HRPZ II) and Hospital Ampang, Malaysia **PATIENTS AND METHODS:** The analysis included a total of 282 patients. We categorized 188 COVID-19 patients from two centres in Malaysia into two groups: mild to moderate (stages 1-3) and severe to critical (stages 4-5) and compared them with 94 healthy controls. **MAIN OUTCOME MEASURES:** A1AT phenotypes and levels in different COVID-19 stages compared to healthy controls **SAMPLE SIZE:** 282 subjects **RESULTS:** The frequency (n) and percentage (%) in the control group, 88 (93.6) exhibited PiMM phenotypes, whereas 6 (6.4) displayed PiXM/ PiYM phenotypes. Within the mild to moderate COVID-19 group, 88 (93.6) had PiMM phenotypes, 3 (3.2) featured PiXM/PiYM, and 1

presented PiBM phenotypes. Among severe to critical COVID-19 patients, the PiMM phenotype was identified in 61 (64.9) with 16 (17) having PiBM phenotypes, 4 (4.5) displaying PiCM, 2 (2.1) featuring PiXM/ PiYM, and 1 (1.1) presenting PiEM phenotypes. Variants such as MS, MZ, S, and Z were undetected. However, 12 COVID-19 patient samples yielded inconclusive results. Median (IQR: 25th to 75th percentile) A1AT concentrations for controls were 1.8 (1.3-2.3) g/L, for mild to moderate cases 1.9 (1.2-2.6) g/L, and for severe to critical COVID-19 cases 2.1 (1.4-2.8) g/L. **CONCLUSION:** This research identifies the PiMM phenotype as the predominant phenotype expression within the studied population. This prevalence underscores the potential role of genetic factors in determining the biological response to SARS-CoV-2 infection. The presence of another phenotype variant across the study population suggests a nuanced genetic landscape that warrants further exploration. **LIMITATION:** The absence of follow-up A1AT quantification and baseline measurements limits the assessment of disease progression. The isoelectric focusing phenotyping technique used might have missed specific A1ATD variants. Copyright © 2025, Annals of Saudi Medicine, Saudi Arabia.

## Indexed keywords

### MeSH

Adult; Aged; alpha 1-Antitrypsin; alpha 1-Antitrypsin Deficiency; Case-Control Studies; COVID-19; Female; Humans; Malaysia; Male; Middle Aged; Phenotype; SARS-CoV-2; Severity of Illness Index

### EMTREE drug terms

alpha 1 antitrypsin; alpha 1 antitrypsin

### EMTREE medical terms

acute respiratory distress syndrome; adult; aged; allele; Article; case control study; cerebellum disease; chronic kidney failure; chronic obstructive lung disease; comorbidity; controlled study; coronavirus disease 2019; demographics; descriptive research; diabetes mellitus; disease severity; DNA sequencing; female; follow up; frequency analysis; gene sequence; heart disease; heredity; human; hypertension; immunoturbidimetry; isoelectric focusing; liver disease; lung cancer; lung disease; major clinical study; Malaysia; male; malignant neoplasm; mortality; mortality rate; multicenter study; nasopharyngeal swab; phenotype; pneumonia; reverse transcription polymerase chain reaction; survivor; alpha 1 antitrypsin deficiency; blood; clinical trial; coronavirus disease 2019; epidemiology; genetics; middle aged; phenotype; Severe acute respiratory syndrome coronavirus 2; severity of illness index

## Chemicals and CAS Registry Numbers

Unique identifiers assigned by the Chemical Abstracts Service (CAS) to ensure accurate identification and tracking of chemicals across scientific literature.

alpha 1-Antitrypsin

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## Corresponding authors

|                      |  |
|----------------------|--|
| Corresponding author | W.N. Wan Azman   |
| Affiliation          | Department of Chemical Pathology, School of Medical Sciences, Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan, 16150, Malaysia |
| Email address        | dr_wannorlina@usm.my   |

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