

Performance of serum apolipoprotein-A1 as a sentinel of Covid-19

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Background

Since 1920, a decrease in serum cholesterol has been identified as a marker of severe pneumonia. We have assessed the performance of serum apolipoprotein-A1, the main transporter of HDL-cholesterol, to identify the early spread of coronavirus disease 2019 (Covid-19) in the general population and its diagnostic performance for the Covid-19.

Methods

We compared the daily mean serum apolipoprotein-A1 during the first 39 weeks of 2020 in a population that is routinely followed for a risk of liver fibrosis risk in the USA (276,614 serum) and in France (27,490 serum) in relation to a local increase in confirmed cases, and in comparison to the same period in 2019 (337,092 and 36,442 serum, respectively). We prospectively assessed the sensitivity of this marker in an observational study of 136 consecutive hospitalized cases and retrospectively evaluated its specificity in 7,481 controls representing the general population.

Results

The mean serum apolipoprotein-A1 levels in the survey populations began decreasing in January 2020, compared to the same period in 2019. This decrease was highly correlated to and in parallel with the daily increase in confirmed Covid-19 cases in the following 39 weeks, in both France and USA, including the June and mid-July recovery periods in France.

Figure 1 shows the proportion of low A1 (<1.25 g/L) during the 39 weeks. Same differences were observed after stratifications on the following confounding factors: previous years 2017-2018, age, gender, hepatitis C or non-alcoholic fatty liver disease, BMI, fasting glucose and triglycerides. No similar changes were observed for ALT, AST, GGT, and haptoglobin.

Apolipoprotein-A1 at the 1.25 g/L cutoff had a sensitivity of 90.6% (95%CI84.2-95.1) and a specificity of 96.1% (95.7-96.6%) for the diagnosis of Covid-19. The area under the characteristics curve was 0.978 (0.957-0.988), and outperformed haptoglobin and liver function tests.

For a prevalence of 1.8% (136/7617;1.5-2.1) of Covid-19 cases, the positive predictive value (PPV) was 30.0% (25.6-34.7) and the negative predictive value (NPV) was 99.8% (99.7-99.9).

When adjusted on the range of Covid-19 prevalence predicted in the French population, the PPV was 40.5% and NPV was 99.7% for the 2.8% lower limit, and PPV was 56.0% and NPV was 99.3% for the 7.2% higher limit.

In the prospective recovery subset repeated measurements showed an increase of apolipoprotein-A1 from 0.92 to 1.05 g/L in a median range interval of 11 days (n=256; ANOVA P<0.01). The adjusted risk ratio of apolipoprotein-A1 for survival without transfer to intensive care unit was 5.61 (95%CI 1.02-31.0; P=0.04).

Conclusion

Apolipoprotein-A1 could be a sentinel of the pandemic in existing routine surveillance of the general population, as well as a candidate predictor of suspected Covid-19 in multivariate analysis in cases with a negative virological test.

Figure 1. Proportion of low apolipoproteinA1 in 2020 vs 2019

