Impact of pre-existing immune activation on SARS-CoV-2 incidence & disease during the first wave 331

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BACKGROUND

During the first wave of COVID-19 there was a relatively **low burden** of disease in many Sub-Saharan African (SSA) countries despite **considerable** SARS-CoV-2 transmission.

Previous studies have shown that prior **immune activation dampens** the **immune response** induced by subsequent vaccination and/or viral challenge[1].

In this study, we hypothesized that female sex workers (FSWs) would experience **frequent exposures** to SARS-CoV-2 through social and physical contact early in the pandemic, and that **pre-existing immune activation** would **protect** against infection and/or symptomatic disease.

FIGURE LEGEND

Figure 1. Immune activation score was similar between cases and controls (mean, 17.42 vs. 17.53; p = 0.86).

Figure 2. When looking at symptoms after SARS-CoV-2 infection, there was no significant difference in immune activation score (p>0.05) nor in the individual cytokines between symptomatic vs. asymptomatic cases (data not shown).

Figure 3. Levels of all 7 pro-inflammatory cytokines were robustly detected in cryo-preserved plasma however, there was no difference in levels between cases and controls for any of the cytokines (p>0.05).

REFERENCES

[1]Muyanja, Enoch, Aloysius Ssemaganda, Pearline Ngauv, Rafael Cubas, Helene Perrin, Divya Srinivasan, Glenda Canderan, et al. “Immune Activation Alters Cellular and Humoral Responses to Yellow Fever 17D Vaccine.” *The Journal of Clinical Investigation* 124, no. 7 (July 2014): 3147–58.

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1) Levels of pre-existing immune activation do not protect against SARS-CoV-2 infection

2) Also no association between pre-existing immune activation and symptomatic disease

RESULTS

Table 1. Participant sociodemographics

Sociodemographic Variable	Cases n = 99**	Controls n = 100	p-value
age (mean, range)*	30.55 (19 – 45)	30.84 (20 – 45)	0.77
# of symptoms (mean, range)	1.06 (0 – 7)	0.67 (0 – 4)	**0.037**
# of days since declaration of pandemic (mean, range)*	193.9 (98 – 313)	194.8 (98 – 310)	0.91
# of male clients (mean, range)	2.98 (0 – 20)	3.66 (0 – 60)	0.40
travel outside of Nairobi, past 6 months	29 (29.3%)	35 (35%)	0.39

*matched for 1:1 in cases and control
**n=99 due to insufficient samples in 1 participant

Welch’s t-test; chi-square test

Figure 3. pro-inflammatory cytokine levels in cases vs. controls

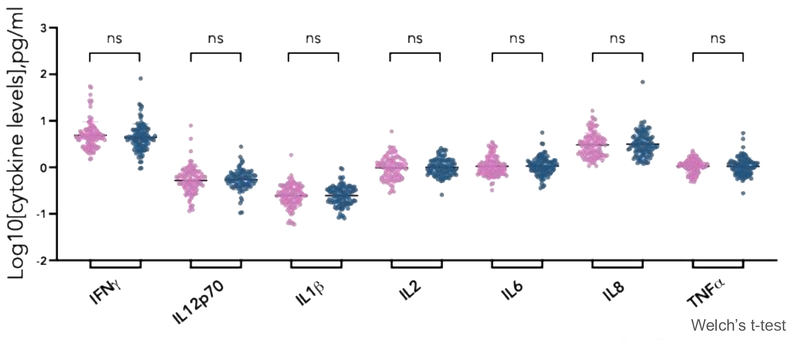


Figure 1. Immune activation scores in cases vs. controls

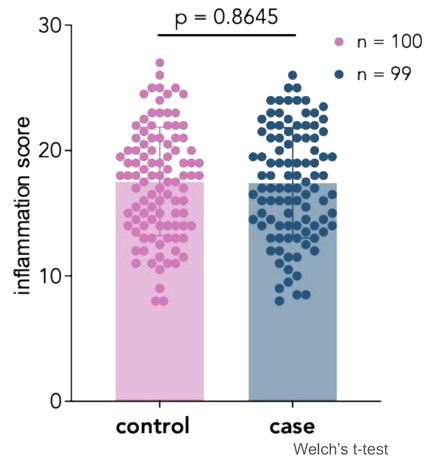
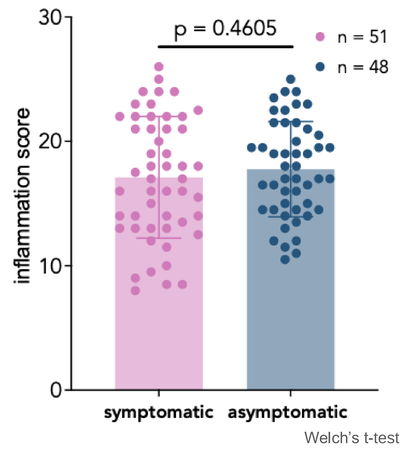
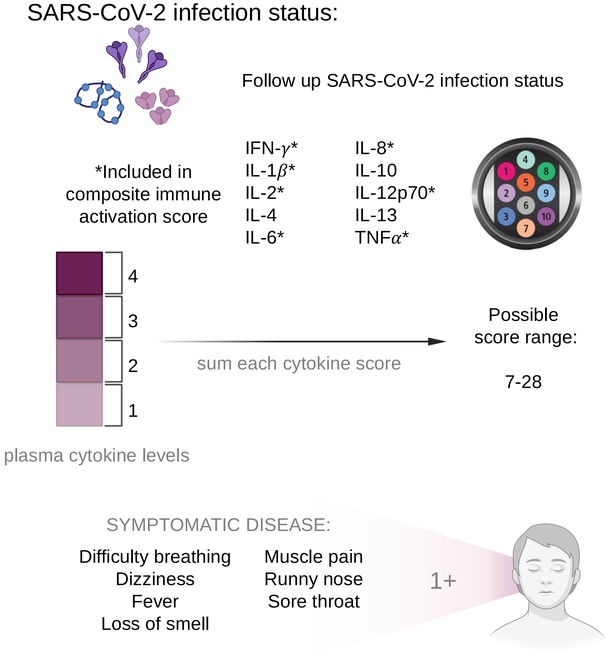


Figure 2. immune activation scores in cases



METHODS

FSWs from the Sex Worker Outreach Program (SWOP) clinics in Nairobi, Kenya had blood collected mid-2019 (**pre-pandemic**), with follow up samples approximately **1 year later**. From these samples, we quantified baseline immune activation and follow up SARS-CoV-2 infection status:



100 **cases** who acquired SARS-CoV-2 early in the pandemic and 100 **controls** were matched 1 to 1 for:

- age (±5 years)
- visit date (±2 weeks)

CONCLUSIONS

Levels of preceding systemic immune activation, defined based on plasma inflammatory cytokines, did not correlate with rates of SARS-CoV-2 infection, nor with symptomatic disease among those who did become infected. This suggests that increased levels of immune activation were not responsible for the relatively low burden of COVID infection and disease seen in many SSA countries. Future studies should investigate the role of immune activation at mucosal infection sites more proximal to viral entry.