

Dynamics of inflammatory cytokines after an acute yogic stretching intervention: preliminary results of a pilot study

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Introduction

Clinical studies have reported that following an acute bout of exercise (e.g., running), individuals experience a physiological inflammatory process with evident changes in systemic cytokine levels (e.g., IL-6). This phenomenon may contribute to the physiological impact of mind-body movement therapies (MBMT) interventions, such as yoga. To our knowledge, this is the first study exploring the isolated effect of yogic stretching (i.e., without meditation and breathing exercises) on systemic inflammatory mediators.

Aims

Primary: To evaluate the feasibility of a 3-arm randomized clinical trial (RCT) evaluating the acute effects of yogic stretching (i.e., a single session) on inflammation.

Secondary: To characterize the dynamics of systemic inflammatory cytokines following an acute yogic stretching intervention.

Material and methods

- We used mixed-methods to comprehensively evaluate the feasibility and acceptability of a pilot yogic stretching trial. Descriptive statistics were performed on all variables.
- Serum samples were analyzed in duplicate using the LEGENDplex™ Human Inflammation Panel 1.

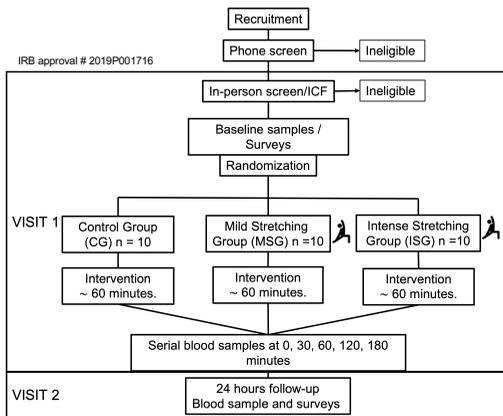


Figure 1. Study design

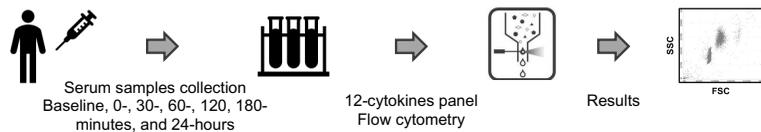
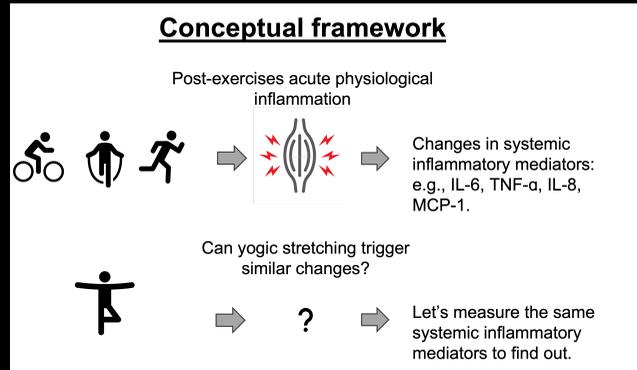


Figure 2. Samples analysis

What is New

To our knowledge, this is the first pilot study to evaluate the acute effects of yogic stretching on systemic inflammatory markers.



Main Results

Our results indicate that it was feasible to recruit participants and collect and analyze blood samples. Our preliminary results identified 7 cytokines that were the most informative.

Recruitment	
Number screened and enrolled per month	22 screened/~ 3p enrolled/per month
Time between screening and enrollment	2-4 weeks.
# months to complete recruitment	11 months
Proportion of eligible screens who enrolled	31/56 = 55% (CI: 57;54)
Proportion of enrolled who attend both study visits	29/31 = 94% (CI:95;92)
Adherence	
Proportion of participants that complete two study visits	29/30 = 97% (CI:98;96)
Specific adherence rate to yogic stretching protocol	88% (CI: 91;84)
Completing the outcome assessments for the three groups	389/400= 97.25% (CI:97% both)

Conclusion

It was feasible to measure the systemic effect of an acute intervention of yogic stretching on the short-term dynamics of inflammatory cytokines. Results provide valuable information for informing the future design of a fully powered study.

Results

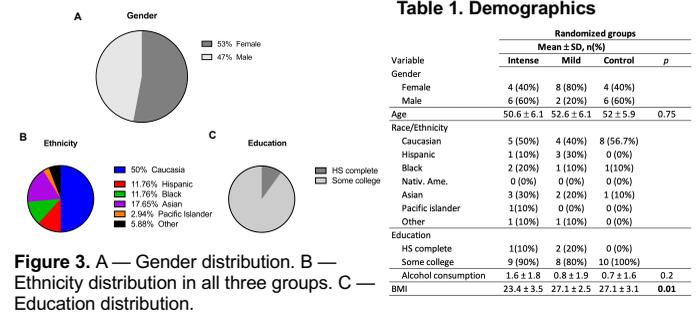


Figure 3. A — Gender distribution. B — Ethnicity distribution in all three groups. C — Education distribution.

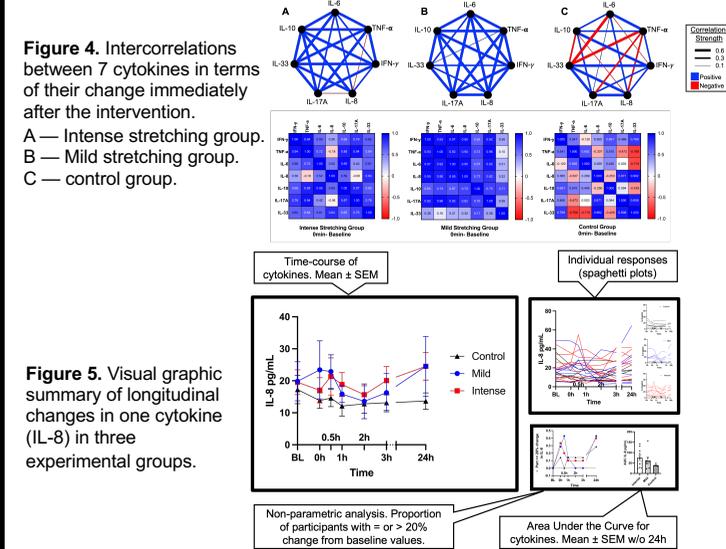
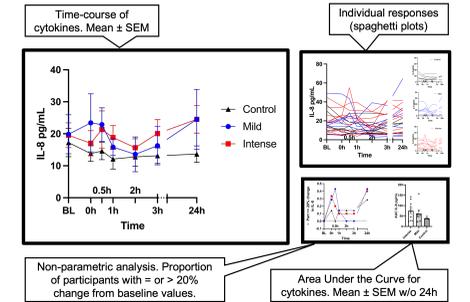


Figure 4. Intercorrelations between 7 cytokines in terms of their change immediately after the intervention. A — Intense stretching group. B — Mild stretching group. C — control group.

Figure 5. Visual graphic summary of longitudinal changes in one cytokine (IL-8) in three experimental groups.



Discussion

- We successfully recruited 30 participants in the middle of the COVID-19 pandemic with 88% adherence to the yogic stretching protocol.
- The study actively recruited different ethnic groups.
- It was feasible to collect and analyze blood samples taken at multiple timepoints after mild and intense yogic stretching.
- Results suggest strong correlation between multiple cytokines in their initial response to mild and intense stretching, but not in the control condition, and helped identify some cytokines that were positively modulated by the intervention (i.e., IFN-γ, TNF-α, IL-6, IL-8, IL-10, IL-17A and IL-33).
- Future powered studies should include quantitative methodologies to control for stretching parameters (e.g., intensity).

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