The Effect of COVID-19 Infection on Fat, Lean Mass, and Bone Mineral Density

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BACKGROUND

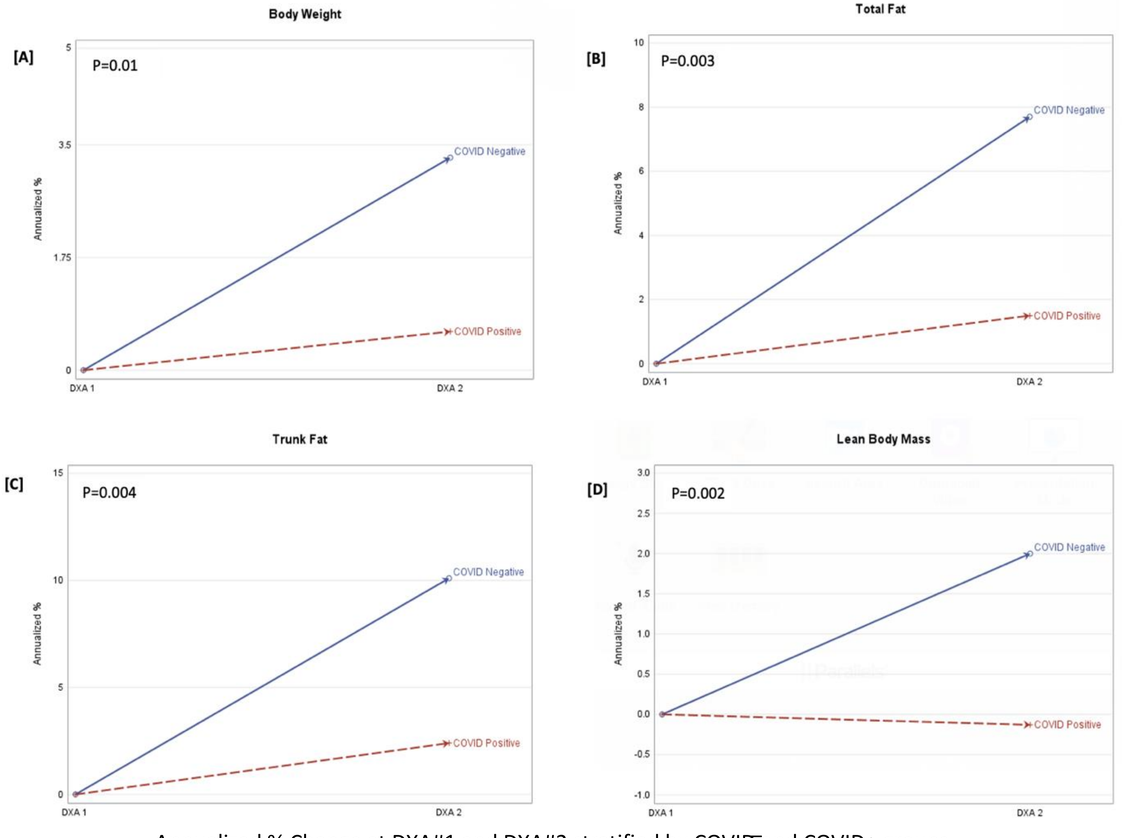
The effect of COVID-19 infection, versus the indirect effect of the COVID pandemic, on changes in body composition remains unclear. This study aims to investigate long-term changes in lean body mass, total bone mineral density, and total and trunk fat in COVID–19 survivors compared to a control group.

METHODS

- Prospective longitudinal study.
- Body composition measurements was done using whole-body dual energy X-ray absorptiometry (DXA) scan.
- Inclusion criteria: adult individuals with pre-pandemic whole-body DXA scan performed between 2017 and 2019 (DXA#1).
- A repeat whole-body DXA scan (DXA #2) was done on the same machine as DXA #1 and at least one year after the COVID-19 infection for COVID+ group
- Demographics, medical, COVID and PASC history were collected.
- COVID+ group had documented COVID-19 infection between DXA#1 and DXA#2.
- COVID^{-} group had negative nucleocapsid antibody and negative spike antibody if unimmunized
- Inflammation markers and fasting lipids at both pre- and post-pandemic visits were measured.
- Adjusted models included COVID and HIV status, age at DXA#1, sex, and race.

Regardless of COVID-19 infection status, participants gained total fat mass, trunk fat and weight during the pandemic period.

Only COVID-19 survivors lost lean body mass, independent of PASC status.



Annualized % Change at DXA#1 and DXA#2 stratified by COVID^{-} and COVID+ groups

RESULTS

- 160 adults were included with a 43.2 ± 14.5 years average age, 50% COVID+, 32.5% female, and 51.8% non-white race.
- 78% COVID^{-} and 58% COVID+ had well controlled HIV infection.
- The median number of days between DXA#1 and #2 among COVID^{-} was 500 days and 899 days among COVID+ (P<.0001).
- COVID^{-} participants had larger annualized increase in trunk fat (g) [922.5 vs. 159.7; P=0.01], total fat (g) [1564.3 vs. 199.9; P=0.2], and LBM (g) [974.9 vs. -64.5; P=0.0002] compared to COVID+.
- Among COVID+ individuals, 55% had PASC. Differences in annualized trunk fat, total fat mass, or LBM (p>0.05) were not significantly different regardless of PASC status.
- Total BMD didn't change in both groups.
- Increases in VCAM (71.5 ng/mL; P=0.06) and oxLDL (33.5 U/L; P<.001) among COVID+ group were observed without correlation to change in body composition.

CONCLUSIONS

- The observed increase in total fat, trunk fat, and weight over the study period in both groups is potentially linked to lifestyle changes during the pandemic.
- The observed decline in lean body mass in all COVID-19 survivors regardless of PASC status and increase in several inflammatory biomarkers over the same period, suggests a direct impact of COVID-19 on muscle cells which may be related to enhanced inflammation.

ADDITIONAL KEY INFORMATION

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