**Structured physical activity attenuates inflammation and immune activation in ART treated perinatally infected children with HIV-1.**

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Background

Low-grade chronic inflammation in treated HIV infectiondespitecomplete viral suppression leads to HIV-associated immune dysfunction and chronic immune activation leading to adverse outcomes.Regular physical activity can have anti-inflammatory effectsin healthy adults, however its benefits in HIV-infected children isunknown. This study aimsto evaluate the role of structured physical activity in reducing HIV-associated immune activation and inflammation in ART-treated children living with HIV.

Methods

HIV-infected children attending a care clinic in Bangalore, aged 8-16years, on ART for at least1 year, virally suppressed(HIV-1 RNA load <150 copies/ml) and asymptomaticfor ≥2yrs were included. CD4 count and viral loadwere measuredevery6 months.Aphysical activity questionnaire was assessed at baseline (study entry- Y0) and at year 2 (Y2). Children were categorized into exercisersand non-exercisers based on the physical activity level.Soluble biomarkers of inflammation(TNF-alpha, IL-6, IL-10,IFNγ) andimmune activation(sCD14, sCD163) were measured at Y0 and Y2 by ELISA (R&D systems).Biomarker levels at Y0 and Y2 were compared within the groups by Wilcoxon signed rank test and between the groups by Kruskal Wallis test. Statistical analysis was performed in Stata v13.

Results:Among72 eligible children, median age of exercisers(n=36) was 10yearsand non-exercisers(n=36),12years. Median ART duration at baselineof both groups was 3 years.The exercisers were from a community care centre where structured physical activities like running and Yoga (1hr/day) were practiced. No intentional physical activity was reported prior toY0.

Among exercisers,there was significant reduction in pro-inflammatory biomarker TNFαand immune activation biomarker sCD14 and sCD163at Y2 compared to Y0. (TNFα; Y0:2.7pg/ml, Y1:2.1pg/ml, p<0.00; sCD14; Y0:2357ng/ml,Y2:1875ng/ml, p<0.001; sCD163; Y0:690ng/ml,Y2:556ng/ml;p=0.001).Non-exercisers did not demonstrate significant change (TNFα;3.2vs 3.3pg/ml; sCD14;1978vs 2123ng/mlandsCD163; 556 vs471ng/ml) in Y2 compared to Y0.

**Conclusion**: Immune activation and inflammatory biomarkers were significantly reduced among exercisers compared to non-exercisers at 2 years after **structured physical activity initiation, indicating that structured exercise may prove beneficial for children chronically infected with HIV.**