The Role of Selected Serum Cytokines in the Pathogenesis of Simple and Complex Febrile Seizures

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INTRODUCTION

Febrile seizures (FS) are the most common type of convulsions experienced by children aged 6 months to 5 years. Studies show that 1 in every 25 children experience at least one episode of FS in their lifetime, while the frequency of **FS reported in Asian countries reaches 14%**. FS are associated with fever of >38 °C (rectal or tympanic), but without CNS infection, in the above age category.

They are classified as simple FS (SFS) and complex FS (CFS). SFS account for more than 70% of FS and can be differentiated by the duration, origin and frequency of the seizure (Fig 1).

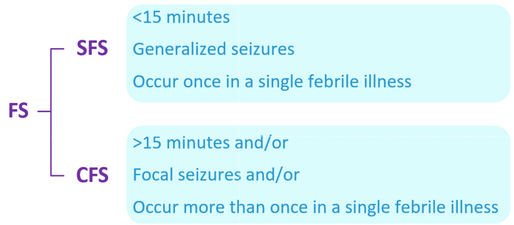

Fig 1: Classification of FS

Inflammatory mediators i.e., cytokines are believed to play a role in the pathogenesis of FS. Researchers suggest that cytokine-specific therapeutic agents may prevent the progression to epilepsy.

OBJECTIVE

- Compare the levels of serum pro-inflammatory (IL-1beta, IL-6) and anti-inflammatory (IL-4) cytokines of patients with SFS and CFS aged 6 months – 6 years, compared to patients with non-seizure febrile illnesses (controls).

METHODS

Hospital-based unmatched case-control study

Lady Ridgeway Children's Hospital, Colombo

Study Design and Setting

SFS (n=12), CFS (n=13) and controls (n=25)

Exclusion criteria: possible seizure mimickers, chronic diseases and immune-compromised diseases/treatment.

Patient Recruitment

Blood samples (~2.5ml) were collected within 72 hours of the seizure for cases/fever for controls. Serum was stored at -20 °C.

Sample Collection

Enzyme-Linked Immunosorbent Assay (ELISA)

Analysis of Cytokines

Statistical Package for Social Sciences (SPSS) version 26 was used for statistical analysis.

RESULTS

The results demonstrate the levels of pro-inflammatory and anti-inflammatory cytokines compared between FS and controls (Fig 2 and 3).

It further displays the concentrations (Fig 4) and correlations (Fig 5) of cytokines between CFS and SFS.

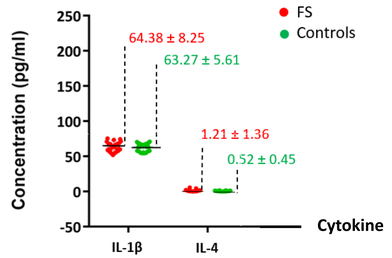

Fig 2: Serum cytokine levels in FS vs controls

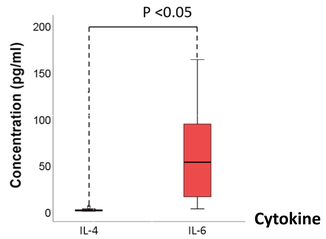

Fig 3: IL-6 vs IL-4 serum cytokine levels in FS

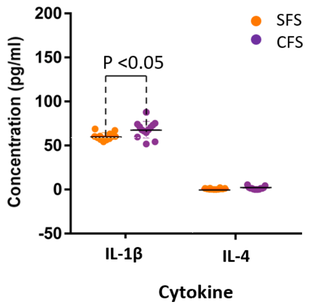

Fig 4: Serum cytokine levels in SFS vs CFS

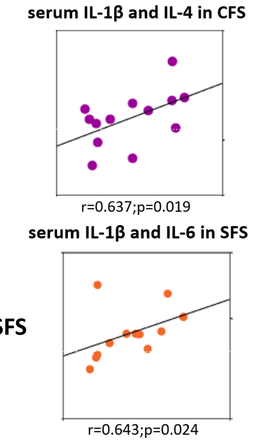

Fig 5: Correlations between serum cytokines in CFS and SFS

CONCLUSIONS

1. A trend towards a higher immune response by IL-1beta and IL-4 was observed in FS compared to the controls.
2. A pro-inflammatory-bias immune response was identified in FS.
3. A greater pro-inflammatory immune response was observed in CFS compared to SFS.
4. The immune responses in CFS and SFS were observed to be different to each other.

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