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Review Article

Serum Interleukin-10 Levels in Children with Stuttering

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Abstract

Introduction: Stuttering is a speech disorder delineated by an interruption in the fluency, regulating normal speech. There are many reports about stuttering but pathophysiology is unclear. Accumulating documentation indicates towards the participation of autoimmune identity theories in the pathophysiology of stuttering. This survey was carried out to examine whether childhood stuttering is conjoined with modified function of the immune system.

Methods: Serum interleukin-10 (IL-10) levels were determined in 30 children with stuttering and 20 age-sex matched controls.

Results: In stuttering group, we found a significant reduce in creation of IL-10 ($p < 0.01$) in comparison with control subjects.

Conclusions: Decline in IL-10 degrees proffers a possible function of altered immune function in the pathophysiology and threatment of stuttering.

Keywords: stuttering; child; interleukin-10; immune system; pathophysiology

Introduction

Stuttering is a disease influencing the smoothness of speech. The World Health Organization describes stuttering as "a disorder in the rhythm of speech in which the individual knows precisely what he or she wishes to say, but at the same time may have difficulty saying it because of an involuntary repetition, prolongation, or cessation of sound.''(Yaruss & Quesal , 2004) The aetiology of stuttering is disputable. The predominating theories direct to measurable neurophysical dysfunctions that interrupt the exact organization in producing speech. Nowadays, there is increasing documentation that immune organizations may be instantly associated in the pathophysiology of stuttering (Swedo et al., 1998). Seriously, many neuroimmune disorders also comprise inadequate communicating/bioaccessibility of interleukin-10 (IL-10) (Krakauer et al., 2008). IL-10 is a effective antiinflammatory cytokine discharged by immune cells and glia, which controls the organization of many anti-inflammatory systems (Heine et al., 2014; Tesse et al.; 2012). Despite the feasibility of an instinctive liaison between an immune reaction and the pathophysiology of stuttering, the research of IL-10 in children with stuttering has been limited to date. We planned this study to evaluate the neuroimmune pathophysiology in the etiology of stuttering by measuring IL-10 levels.

Method

A total of 50 subjects (between 7–12 years of age) included in this study that had been approved by the University of Health Sciences Hamidiye Faculty of Medicine Ethical Review committee (Turkey). Thirty children with stuttering, and twenty healthy, age-sex matched controls gave voluntary, written informed consent. The American Psychiatric Association is currently in the process of modifying the classification and description of stuttering for Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR): Childhood Onset Fluency Disorder, was used to ascertain **that patient** met the DSM criteria of the stuttering diagnosis, and that healthy controls were free of psychiatric diagnoses. (Available from: www.dsm5.org; Retrieved January 15, 2023). The diagnosis of stuttering was made based on a detailed clinical interview by Child and adolescent psychiatrist.

Children with concomitant psychiatric disorders (such as attention deficit/hyperactivity disorder, major depressive disorder, and social anxiety disorder); neurological, endocrine, or chronic disease; and a history of drug use were excluded from the study. Otorhinolayngologic examinations of individuals in two groups were performed by otorhinolaryngologist.

Medical and neurological examinations, including standard laboratory tests and electrocardiograms, ensured that all subjects were medically healthy. In our study, venous blood samples were collected at 9 am under sterile conditions. The samples that were obtained after the blood collection were centrifuged and stored in polypropylene tubes at -80°C. IL-10 levels were measured with an enzyme-linked immunosorbent assay (ELISA) using Acro Biosystem® kits (Acro Biosystems, Delaware, USA) according to the

manufacturer's recommendations. Mean values and standard deviations (SD) of the parameters recorded were calculated. For comparison between the study groups and healthy controls the Mann–WhitneyU-test and analysis of variance ANOVA was applied. P Values<0.05 were assumed to be significant.

Results

The results of the measurements of IL-10 in patients and controls are depicted in Table 1.

Demographic data		Stutterer group n=30 (mean ± SD)	Control group n=20 (mean ± SD)	P value
Age (years)		9.6 ± 2.2	9.8 ± 2.1	0.05
Sex	Male	25 (83.3%)	16 (80%)	0.05
	Female	5 (16.7%)	4 (20%)	
IL-10 levels (pg/ml)		1.72± 0.58	3.65± 2.31	< 0.01

Table 1: Sociodemographic features and IL-10 levels of the stutterer and control groups

There was no significant difference between the stutterer and the control groups in terms of age and sex (t=0.25, P.0.05; $\chi 2$=0.086, P.0.05, respectively). There were significantly lower IL-10 levels in study group when compared with control subjects ($p < 0.01$).

Discussion

A variety of factors may influence stuttering events, although the etiology of the condition is unclear. Possible contributing factors include cognitive processing abilities, genetics, sex of the patient, and environmental influences. Stuttering increases in individuals under stress. There are many studies about the alteration of immune parameters in individuals under stress (Gonzalez &Kuehn, 2021; Christian, 2014) In addition, stuttering varies considerably between the genders. There are also many articles about the differentiation of sex hormones and immune parameters (Straube & Briese,1989; Doukas et al., 2013). Our finding supports the impact of sex type on stuttering. However, this is first study on the relationship between speech disorders and immune parameter. Interventions for different neurological diseases have been improved, but notably, most patients persist either partially or fully refractory to treatment (Ali etal., 2013; Swanson et al., 2021; Castro-Marrero et al., 2021). IL-10 is recommended for use in the treatment of many resistant neurological diseases (Kettenmann et al., 2011; Ledeboer et al., 2007; Moore et al., 2001).

Based on the low IL-10 level in stuttering individuals that we found in our study, it would not be wrong to expect that IL-10 can also be used in the treatment of resistant stuttering individuals in the future. A limitation of the study to be addressed is the smaller sample size. To resolve, although the analysis and clinical meaningfulness of immunological correlates conjoined with neuropsychiatric disorders is still uncertain, this study supports the notion that alterations in immune function, either directly or indirectly, may play a role in the pathophysiology of stuttering. Further studies with larger sample sizes are needed to clarify the role of the immune system in stuttering.

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