



The Microbiome and Autism Spectrum Disorder (Asd) : A Case Study of Help Through Probiotics.

Deepali V. Deshmukh

Research Scholar, Indian Institute of Education ,J.P.Naik Path, Kothrud, Pune 411 038.
 (e-mail deepalideshmukh71@gmail.com)

Abstract:

Microorganisms – thousands of species of bacteria present in our body is collectively called the – Microbiome –leading to a healthy existence. The site is mainly gastrointestinal (GI) and the colon. As the fetus prepares for birth ,healthy bacteria begin to populate. Breast feeding produces a healthy digestive ecosystem. Antibiotics administered cause disruption of the natural ecosystem in the digestive tract and has been recommended as a preventive strategy in ASD. Leading researchers in this field regard destruction of natural flora as the main causative agent/factor in ASD. Dysbiosis (too much bad bacteria) results in food allergies and sensoral sensitivities.. Probiotics are health supplements which regulate inflammation and generate immune function leading to healthy development. A number of studies point out to inflammation as the second most important factor causing ASD, ADHD and neurological disease. A study where probiotics were introduced as a therapeutic agent in an autistic male child, followed up from the age of 2 years to 7 years was taken up which has shown promising results. Here selective mutism was the cause of treatment and worry/anxiety for the parents and the psychologist. The dosage was fixed at the standard of 15-30 billion IU per day and the dosage was varied as per response to stimulus. Initially the child was hyperactive , did not speak though he understood every thing which was spoken/command given to him in bilingual mode. He was strongly anti-social and exhibited Dabrowski's hyperactivity mode often (Deshmukh,D.V.,2013). He was allergic to cow's milk, lactose ,fructose as also gluten. All clinical standard investigations showed normal anatomy, physiology and biochemistry. Hence during treatment all such food was avoided. By the 4 th year the child started speaking and playing with other children at the 6 th year. The negative part was inability to express basics such as toilet and hunger needs – response mode was crying loudly. This change brought about by probiotics needs further investigation as also statistical validity. Translational Research along with a convergence of multidisciplinary science and technology assist is already being attempted – microbes in our gut to chemicals in our brain using data mining and predictive modeling. This has gained importance with the Caltech – mouse model for autism- with emphasis on the gut-microbiota brain interaction. This model has shown that gut bacteria may cause ASD-like symptoms previously not known. *Bacteriodes fragilis* (L)an experimental probiotic has a history of improved behavioural symptoms prompting exploration. These aspects are elaborated at length and the findings of the study are discussed. (The author is an exploratory practising biological psychologist.)

Keywords: Microbiome, autism (ASD), probiotics, mouse model, *Bacteriodes fragilis* (L)

Introduction

“Contrary to popular medical belief, Autism is reversible”.

It is necessary to diagnose autism as early as possible and follow early intervention methods. It is also necessary to investigate medical causes taking place in each individual as no two cases of autism are the same. The rule to treat the cause of the problem and avoid continued inflammation . The result is to ingrain new neural pathways that allow recovery to take place.

Some facts at present regarding autism:

About 1 in 68 children have been identified with autism spectrum, disorder (ASD) according to estimates from CDC's Autism and Developmental Disabilities Monitoring (ADDM) Network (CDCP,2016).

Parents who have a child with ASD have 2-18 % chances of having a second child who is also affected (Ozonoff, S. et al.2011 ; Sumi,S, et al ,2006).

ASD tends to occur more often in people who have a certain genetic or chromosomal conditions (DiGuseppi et al.2010; Cohen,D,et al ,2008;Zecavetti,N and Spence,S.J.,2009).

Almost half the children (44%) identified with ASD has average to above average intellectual ability (Lerner,P.,2015) . Fathers may have an indirect effect on the child's developing competencies.

Autism diagnosis at age two can be reliable, valid and stable.

The median age for diagnosis is – Autistic spectrum disorder (ASD) –3 years 10 months, Pervasive Developmental Disorder (PDD)– 4 years 1 month, Asperger disorder – 6 years 2 months.

Probiotics – are supplements that contain healthy microorganisma that populate the digestive tract (Doherty,S.2015). They are essential for healthy digestion and hence regulate inflammation and immune function.. Presently research using *Bacteriodes fragilis*, used as an experimental probiotic in animal models is successful and now used in human viability studies (Mazmannian,S.K. et al. 2016). They wrote in “Cell” – “...the G-I tract of autistic like mice were 'leaky' which means they allow material to pass through the intestinal walls and into the blood stream.”

The present case study in Indian environmental and nutritional conditions was studied with a view to understand whether such type of probiotic

therapy can help Indian children suffering from autism given the fast changing climatic conditions also. A parallel type of investigation needs to be taken up to study genetic abnormalities and chromosomal anomalies to make the concept of inclusion in society and education at school and college level, successful. Till now children with borderline problems are assigned to special schools where they live in an environment with severely affected of a wide spectrum of disorders, which retards all development and hence joining mainstream once again becomes almost impossible.

Material and Methods:

In Autism Spectrum disorder studies, the case study method is the only one possible as no two cases are alike/similar, the range of symptoms being very wide.

The child was selected for the case study and extensive investigations – primarily because it was a borderline case where the chances of success was very high and the parents were willing to participate in the exploratory research investigation (they willingly signed the consent form) and I was allowed unlimited access to the child for the full investigation. The parents made available all results of the previous extensive medical, biochemical and physiological investigations carried out at the various institutes, medical colleges and Institutes of National Importance such as NIMHANS, Bangalore. I had worked previously in my career with children affected with ASD. Hence the basic procedure was well known to me. The child was suffering from over excitability syndrome classified and identified by Dabrowski and Piechowski (Deshmukh, D.V., 2013). All medical investigations had given 'normal' status to the child. Hence it was possible to focus on this specific probiotic mode of treatment.

The child was undergoing Occupational Therapy (OT) from age 4 but no significant change or improvement was encountered, The child was admitted in play school for 1 year and the child managed to accommodate himself in the restriction less atmosphere. It could be called successful preschooling. After that he was admitted to a regular school where he could not fall in with the routine and rigorous learning methods. After 8 months the regular school was discontinued on the advice of the class teacher and the school psychologist. He could not adjust to class room regulations. In the classroom, no violent behaviour was exhibited though the child was a loner. The child also had food allergy, lactose intolerance and gluten (Not detected) but assumed by the parents and the

psychologist. There was a try with KLE 1738 (Evtetpia gabavorous) but was not suitable for the child. Hence Bacteroides fragilis was chosen due to wide adaptability.

Methods

ASD in the child was diagnosed by a team of clinical psychologists in the city of New Delhi, attached to Institute of Applied Behaviour, Dilshad garden and Sir Gangaram Hospital, Rajinder Nagar. Afterwards the child was taken to NIMHANS (National Institute of Mental Health and Neuro Sciences) and an extensive screening was done. The clinical department concluded it was border line autism. This was based on the diagnostic test CAST (Childhood Autism Spectrum Test) formerly known as Childhood Asperger's Syndrome Test) devised by Cambridge University (Scott et al., 2002), a modification which was one by NIMHANS for Indian conditions which also confirmed as border line autism. In a validation study (Williams et al., 2005), the questionnaire was shown to have excellent sensitivity and specificity, proportion of children scoring above the cut off was 100%. The 31 items derived from behavioural descriptions from ICD 10 and DSM IV (APA 1994) (WHO-1994) which assesses 3 core features of ASD (social impairment, communication disorders and repetitive/restrictive behavioural interests, Sentence complexity was measured at age 4 by parental rating. This scoring test is still under construction for achieving a high level of validity and universality.

Probiotic

The Probiotic containing Bacteroides fragilis was administered orally due to 2 reasons – it is best suited for the Asian Environment and it suits the Indian food habits/ingredients. Dosage was adjusted as per body weight and growth, based on the International Units (IU) basis.

Observation and Results

Considering that medically and anatomically this child presents no pathological symptoms of disability, the emphasis was on physiology and microbiology. Focus was on the gut flora where bacteria play an important therapeutic role. On a similar line, treatment of autism with camel milk, a line of treatment prevalent in Northern and western India, though, showing a wide latitude of encouraging results, was not suited for this child. Why certain children respond to certain foods, considering sensitivity, allergy and immunity is not yet understood and needs detailed biochemical investigation. This child was allergic to camel milk.

The child under study for the period of 5 years, who showed all the symptoms of mild to medium

ASD responded to probiotic well and at present is able to attain normal schooling with normal behavioural and social peer adjustments. The study is still in progress due to erratic recession to hyperactive excitability state.

Discussion/Conclusion

The motivation for this study arose from the need to find a therapy mode for borderline autistic children. In the light of the Right to Education Act (2009) RTE,2009, this gains significance as these children can benefit immensely from mainstreaming.. The main finding which has emerged is that there is improvement with probiotic therapy. Since awareness about autism in India is very meagre, the study has its limitations due to finding a suitable population (N) for validity studies

The child, where all practical therapy available in India including OT was used proved unsuccessful. With probiotic the child has started speaking words, sentences and making known his needs and wants... Social adaptability – mixing and playing with other children of his age and class has been a hope in improvement for the parents.

This investigation is not concluded and modified OT with probiotic therapy is being carried out presently.

References :

American Psychological Association (APA) (1994) Diagnostic and Statistical Manual of Mental Disorders, DSM –IV, Edn.,Washington D.C.:APA.
Bronfenbrenner ,U. (1974) The Origins of Alienation. Sci. Amer. 231, 53-61.

Cohen,D., Pichard,N. Tordjman,S, Baumann,C., Burglen, L.,Excoffier,E., Lazar,G., Maze t,P., Pinquier,C.,Verloes,A.,and Heron,D. (2005) Specific genetic disorders and autism:Clinical contribution towards their identification. J. Autism Dev. Disorder 35(1),103-116.

Deshmukh,D.V.(2013) Case study of a child affected with Dabrowski's over excitability syndrome. Proc. Natl. Conf. Edn., pp 23-27, Pune

DiGuiseppe,C., Hepburn,S., Davis, J.M.,Fidler,D.T., Hartway,S., Lee, N.R.,Millar,L, Rutte nberg,M. and Robinson, E (2010) : Screening Autism spectrum disorders in children with Down's syndrome. J.Dev.Behav.Pediatr. 31, 181-191.

Scott,F., Baron- Cohen,S., Bolton, P, and Brayne,C (2002) The CAST (Childhood Asperger Syndrome Test) preliminary test for mainstream primary school age children. Autism 6 :8-31.

Williams,J.,Scott, F.J.,Stott,C.M.,Allison,C., Bolton, P and Baron-Cohen,S. The CAST (Childhood Asperger Syndrome Test): test accuracy. Autism 9, 45-68.

World Health Organisation (WHO) (1994) International Classification of Disease ICD-10 th Edn.Geneva:WHO.

Zeccavatti,N., Spence, S.J.,(2009) Neurometabolic disorders and dysfunction in autism spectrum disorders. Curr.Neurol,Neurosci. Rep. 9(2):129-136.

