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Short Review

On Childhood Vaccinations, Autism and Parental Opinion

Avinoam Shuper*

Department of Neurology, Tel Aviv University, Israel

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Corresponding author:
Avinoam Shuper,
Tel Aviv University, 14th Yahalom St. Petah-Tikva, Israel, Tel: + 972548041138;
Email: Prof.shuper@gmail.com

ABSTRACT

Both genetic contributions and environmental factors are considered as being contributory to the etiology of autism spectrum disorder. Childhood vaccinations have for decades been blamed for causing autism, although in a very small number of children. The claim that vaccines against diphtheria and measles-mumps-rubella caused autism has been rejected outright. The last claim of vaccination being linked to autism was against a hepatitis B vaccine (Sci-B-Vac), and it was made by parents who used Facebook as the conduit to publicize their case.

The objective of this review is to evaluate parental opinions about childhood vaccinations, in regard to their potential ability to cause autism.

A literature search was conducted, for neurological complications and side effects of childhood vaccinations, using PubMed and Google Scholar.

DTwP and DTaP vaccines are blamed for causing neurological damage in a very small numbers of children. No data were found to support a relationship between MMR and autism. The potential ability of Sci-B-Vac to cause gastro-intestinal disease was found to be smaller than other anti-hepatitis B vaccinations, and thus may not be disregarded.

Parental authority is pivotal to the successful execution of vaccination programs. Even if there were a sound basis for the association with autism, it should in no way deter parents from having their children vaccinated. Nevertheless, their anxieties over a possibility that some childhood vaccinations may cause autism will not be assuaged until the roles of genetic and environmental factors in autism will be better clarified.

INTRODUCTION

There is not even the slightest question about the enormous importance of childhood vaccinations in preventing, if not eradicating, dangerous contagious diseases in children. For many years, millions of children have been vaccinated with only minimal side effects, if any, and without any disturbance to their growth and development. At the same time, in parallel with the ongoing use of childhood vaccinations, there have been parental claims that their previously healthy infant had been neurologically injured by vaccinations. In 2008, De Long [1] concluded that autism and speech or language impairments could be side effects of vaccination. Twelve years later, Fombonne et al[2]. Reported that one out of every six caregivers who participated in a national survey believed that childhood immunizations could have been a cause of autism in their child.

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition, which is characterized by cognitive, behavioral, and social dysfunction, and is of a poorly understood etiology. It is a multifactorial disease, and both genetic and environmental factors are believed to account for its development. 35% to 40% of autism cases were reported to be explained by genetic factors, and a long list of candidate genes was created, which can potentially be associated with autism. It was estimated that environmental elements taking place during prenatal, perinatal and postnatal time could be of influence on the remaining 60 % to 65% of autism cases, [3] in addition to the potential genetic basis of the disease.

It can be very well understood that parents whose child was diagnosed with ASD will try to understand why this happened to the family, as well as whether someone or something can be blamed as responsible for the situation. In this line since the introduction of childhood vaccinations, parents are sueing medical authorities for potential responsibility to the situation.

THE DTWP AND DTAP VACCINES

Parental complaints that their previously healthy child became neurologically injured by childhood vaccinations were heard as early as the beginning of the 19th century. The first inoculation to be blamed involved the pertussis vaccine. Wentz and Marcuse[4] claimed an association between the diphtheria, tetanus, and pertussis (DTP) vaccine and serious acute neurologic illness, and estimated that the magnitude of that association was probably one case per million immunizations. They also reported not knowing whether the DTP vaccine causes permanent brain damage and, if it does, it causes brain damage even more rarely than it causes serious acute neurologic illness. The publication of their work came after considerable controversy over these issues in the medical literature. They were ultimately resolved when parental pressure led to switching the cellular component of the pertussis vaccine to an a cellular component. Historically, the development of a cellular pertussis vaccines resulted from concerns about the safety of less purified whole-cell pertussis vaccines. Those concerns led to popular anti-vaccination movements in several countries, with decreased acceptance of the whole-cell vaccine, decreased pertussis vaccine coverage in these populations, and consequently increased rates of pertussis. Although medical authorities -and presumably vaccine manufacturers as well -denied this connection, the use of the cellular DTP ceased at the end of the 19th century and it was replaced by DTaP. The latter vaccine was associated with a very marked reduction in neurological side effects (surprisingly, to some people). Indeed, this change of the vaccine component was an important victory of public opinion over medical authorities[5-7].

The burning question is whether a childhood vaccine can cause autism. Ratajczak8wrote: “There are many controversies about vaccines and autism, one hypothesis of the cause of autism is that the …pertussis toxin creates a chronic autoimmune monocytic infiltration of the gut mucosa... In turn, the non-specific branch of the immune system is turned on and, without retinoid switching, cannot be down regulated.”These speculations were not supported by further research but they show how far researchers agreed with the notion of association between the vaccine and autism.

THIMEROSAL

Thimerosal is a sulphur-containing material which has been widely used as the vehicle of the vaccine in injections since 1930. Claims of untoward side effects related to its use took a different direction than that of the DTwP and DTaP vaccines. Thimerosal, which has been extensively used as an antibacterial agent in vaccines, was implicated as a cause of autism. Not only is every major symptom of autism documented in cases of mercury poisoning, but biological abnormalities in autism are also very similar to the side effects of mercury poisoning. These include psychiatric disturbances (e.g., impairments in sociality, stereotypic behaviors, depression, anxiety disorder, and neuroses),increased incidences of allergies and asthma, increases in the presence of IgG auto antibodies against brain and myelin basic proteins, reductions in natural killer cell function, and increases in neopterin levels (indicative of immune activation) [8]. Geier and Geier[9]reported having found an association between neurodevelopmental disorders and thimerosal-containing DTaP vaccines. That claim, however, was rejected when it became clear that the rate of autism continued to rise after thimerosal was removed from the vaccines.

MEASLES VACCINE

The live measles virus is suspected to be another organism that could adversely affect children's health. It is postulated that following vaccination against measles, the child is depleted of its vitamin A supply. Thus, retinoid receptors may be negatively impacted and as a consequence autistic individuals may suffer distorted vision [8]. Contrarily, the connection between vaccination and autism was rejected in other studies. Parental reports of the rate for six vaccines (DPT/DTaP, hepatitis B, Haemophilus influenza type B, polio, Measles-Mumps-Rubella (MMR), and varicella) were analyzed in 2755 children with ASD, and the findings did not support any connection between regressive-onset ASD and vaccines in that cohort [10].Gerber and Of fit reviewed 20 studies performed by investigators and epidemiologists in different countries, who used a variety of statistical tests to evaluate the data. They considered the large size of the studied populations to afford statistical power sufficient to detect even rare associations. They found them to show that neither thimerosalnor MMR vaccine causes autism. In concert with the biological implausibility that vaccines overwhelm a child's immune system, they dismissed the notion that vaccines cause autism [11].

AUTISM

This controversy reappeared in Israel with a hepatitis B vaccine (Sci-B-Vac), which was blamed for causing autism and even death. While parental claims with regard to the above-cited vaccines were mediated through the medical authorities, those concerning Sci-B-Vac were mediated by social networks, such as Facebook. Their position was in vast contrast to the results of the search engines in the medical literature, which yielded no comparable evidence whatsoever of long-term side effects of this vaccine. Nevertheless, the authors of one study regarding Sci-B-Vac [12]stated unequivocally that in both study arms, no patient experienced any severe adverse events related to vaccine administration. Nevertheless, three adult patients, two from ENGERIX-B and one from Sci-B-Vac group were hospitalized due to exacerbation of Crohn's disease during the study period. Those admissions were considered not to be temporally associated with vaccine administration, as they occurred two–three months following the second dose of vaccine and thus, were not attributed to the vaccines. It may be argued that naturally the signs of autism are not temporally associated with childhood vaccine administration, as autism in general manifest after the end of childhood vaccinations period. We suggest that as happened with the DTwP / DTaP, the voices of parents should be heard. Although on one hand there is no scientific evidence for cause and effect in regard to Sci-B-Vac and autism, on the other hand, and as stated by Wentz and Marcuse,4 in small numbers of children, one may not easily reject the possibility of autism due to this vaccine.

CONCLUSION

The medical literature provides no clear evidence-based claims to support the notion that childhood vaccinations can cause autism. Yet, it is well accepted that vaccines do affect the central nervous system. For instance, it was found that vaccination can lead Dravet syndrome to first appear earlier than usual among children, and that the vaccine can lead to the manifestation of febrile convulsions. If one accepts the idea that autism can have a genetic basis which will first manifest once it meets an environmental factor (genotype–environment interaction),it follows that the vaccine can serve as the additional environmental factor that is needed to cause the full clinical picture of autism in some children. Parental claims have led to changing the DTwP vaccine to DTaP. Contrarily, many parents complained that the MMR vaccine can cause autism and their claims were rejected. Can Sci-B-Vac be responsible for the development of autism? The use of this vaccine has already been discontinued, but the significance of this question persists. It is suggested, that in a small, even very small number of vulnerable children, the possibility that the vaccine can serve as the pivotal environmental factor to propela child towards the presentation of full clinical picture of autism may still be a viable option.

Childhood vaccinations are safe. Nevertheless, a potential relationship between them and autism, still survive in parental opinions. As environmental factors are a potential cause of autism, this subject continuously struggles to find a proof, for or against these claims.

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