

ORIGINAL ARTICLE

Thimerosal exposure and disturbance of emotions specific to childhood and adolescence: A case-control study in the Vaccine Safety Datalink (VSD) database

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ABSTRACT

Background: This study evaluated Thimerosal-containing childhood vaccines and the risk of a diagnosis called disturbance of emotions specific to childhood and adolescence (ED). Thimerosal is an organic-mercury (Hg)-containing compound used in some vaccines.

Methods: A hypothesis-testing prospective, longitudinal case-control study evaluated Hg exposure from Thimerosal in hepatitis B vaccines administered at specific times within the first 6 months of life and its association with medically diagnosed ED (313.xx) ($n = 517$) in children born between 1991–2000 in comparison to controls ($n = 27\,491$) in the Vaccine Safety Datalink (VSD) database.

Results: Cases diagnosed with ED were significantly more likely than controls to have received increased Hg exposure within the first month of life (odds ratio (OR) = 1.3384), the first 2 months of life (OR = 1.3367) and the first 6 months of life (OR = 2.37). When the data were separated by gender, similar significant adverse effects were observed for males, but not females. On a per microgram Hg basis, cases diagnosed with ED were significantly more likely than controls to have received increased exposure within the first 6 months of life (OR = 1.025 per microgram Hg).

Conclusions: The results show a significant relationship between Hg exposure from Thimerosal-containing childhood vaccines and the subsequent risk of an ED diagnosis.

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Introduction

The International Classification of Diseases, Ninth Revision (ICD-9) code 313.xx is entitled, 'Disturbance of emotions specific to childhood and adolescence' (emotional disturbances (ED)). The following comprise the different types of ED diagnoses: (1) over-anxious disorder specific to childhood and adolescence; (2) misery and unhappiness disorder specific to childhood and adolescence; (3) shyness disorder of childhood; (4) introverted disorder of childhood; (5) selective mutism; (6) relationship problems specific to childhood and adolescence; (7) oppositional defiance disorder; (8) identity disorder of childhood or adolescence; (9) academic underachievement disorder of childhood or adolescence; (10) other emotional disturbances of childhood or adolescence; and (11) unspecified emotional disturbance of childhood or adolescence [1].

According to a 2005 analysis, as of 2004, there were ~ 450 000 students diagnosed with an ED in the US population, ~ 9% of all students [2]. They also reported that over 75% of youth classified as having an ED diagnosis were boys, and there was a wide range of co-morbid diagnoses, including anxiety, bipolar disorder, depression, oppositional behaviour, psychosis, attention deficit hyperactivity disorder (ADHD) and learning disability (LD). Approximately two-thirds had a co-morbid diagnosis of ADHD and approximately one-fourth had a co-morbid diagnosis of LD. In addition, children diagnosed with an ED have

poorer societal outcomes than the general population and have high rates of criminal justice involvement [3].

At the present time there is no consensus on the cause of ED. Investigators previously described that interacting genetic, environmental and social factors are important determinants. Mercury (Hg) is a neurodevelopmental toxicant and extensive laboratory and clinical studies of Hg demonstrate the unique vulnerability of the developing brain to Hg [4].

In considering the sources of Hg exposure to infants, Thimerosal (sodium ethyl-Hg thiosalicylate, $C_9H_9HgNaO_2S$) is an ethylmercury-containing compound (49.55% Hg by weight) that was and continues to be utilized in vaccines that are routinely administered to pregnant women and infants in the US and worldwide [5].

In the US, prenatal exposure to Hg results from the routine recommendation to administer influenza vaccines to pregnant women at any time during pregnancy [5]. In addition, post-natal exposure to Hg results from the routine recommendation to administer three doses of influenza vaccine during the first 18 months of life, and then throughout childhood on an annual basis [5]. It is estimated that about half of the doses of influenza vaccine in the US still contain Thimerosal [5]. Worldwide, and in particular in developing nations, Thimerosal is still present in many vaccines routinely administered to infants/children [5]. It was previously estimated that ~ 50% of the Hg dose that some infants receive is from Thimerosal-