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Aluminum Adjuvants and Childhood Disease Prevalence

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Abstract

This study investigated the relationship between aluminum adjuvant vaccines and the prevalence of 4 childhood diseases (Autism, Allergies, Asthma, ADD/ADHD) using data from the 2020-2021 National Survey of Children's Health (NSCH) [1] and the Centers for Disease Control National Immunization Survey (CDC NIS) [2]. The study found an association with aluminum adjuvant dosage and the prevalence of each disease studied (Autism, Allergies, Asthma, ADD/ADHD) through a weighted regression analysis of disease prevalence against the summed likelihood of aluminum adjuvant vaccine uptake.

Keywords: Aluminum Adjuvants, NSCH, NIS-Child.

1. Introduction

Many childhood diseases have reached levels of prevalence that allow the use of aggregate statistical models to help in identifying a cause. The NSCH tracks 8 chronic diseases with associated prevalence.

Disease	Prevalence
autism	3.0%
allergies	22.8%
adhd	6.5%
arthritis	0.15%
asthma	8.3%
diabetes	0.22%
epilepsy	0.9%
tourettes	0.16%

Table 1. Prevalence of Disease as Measured in NSCH

This study looked at 4 childhood conditions: autism, allergies, asthma, and ADD/ADHD and their prevalence by US state from the birth years 2011-2017. This type of study requires high prevalence to have the statistical power to find relationships. The metric mean(prevalence) - sd(prevalence) > 0 was used as the inclusion criteria for diseases with high prevalence which was met by 4 of the diseases covered by the NSCH. Correlations between the prevalence of these diseases suggest a common environmental exposure as each disease has a highly significant correlation to the others.

correlation	autism	allergies	adhd	asthma
autism	-	.16**	.32***	.16**
allergies	.16**	-	.52***	.51***
adhd	.32***	.52***	-	.48***
asthma	.16**	.51***	.48***	-

Table 2. Correlations Between Disease Prevalence

Note. This table presents Pearson correlation coefficients. * p<.05, ** p<.01, *** p<.001

The use of population statistics can be problematic for finding associations due to the ecological fallacy. However, a direct link between vaccines and asthma has already been identified in a previous observational study using individual data rather than population statistics [3]. A hypothesized model of childhood disease states that aluminum adjuvants from childhood vaccines travel through the lymph slowly over time after ingestion by monocytes, eventually accumulating in the brain and other organs causing various harm [4,5]. Most childhood vaccines contain aluminum adjuvants, including but not limited to DTAP, Hib, Hep B, PCV, IPV which were included in this study. Aluminum adjuvants are known to have a nonlinear dose response curve, suggesting the effects of a particular dose of aluminum adjuvants may be more or less significant depending on the age at which a vaccine was received as the dosage in mg/Kg naturally decreases with age [6].

This study finds evidence consistent with this model of disease in our dataset for each condition studied, using simply the summed likelihoods of vaccination by aluminum adjuvant vaccines at the population level at the ages of 6 months to 1 year to explain the prevalence of autism, allergies, asthma, and ADHD across the 50 states and DC from the birth years 2011-2017.

2. Methods

The 2020-2021 NSCH was used to determine the sample prevalence for each state and birth year cohort. Sample disease prevalence "<disease>_prev" was determined by the response to questions in the NSCH as ("yes")/("yes"+"no"). Value "99 - no answer" was ignored. In cases where there were multiple questions for one condition, the first response, "ever diagnosed", was used. The total samples ("yes"+"no") were used to estimate prevalence in "<disease>_count" for later use in a weighted regression. This was then joined with the CDC NIS data which contains estimates of vaccination coverage per dose per vaccine for multiple ages, and is also stratified by state and birth year cohort which enables us to perform the join. A dataset of 357 rows as the product of 51 regions (50 US states + DC) and 7 years (2011-2017) of overlap in the 2 datasets was obtained. The join was performed using C++ code found in the appendix.

For autism, there is a column "K2Q35A_1_YEARS" in the NSCH that tracks the age of diagnosis, using this column it was possible to compute prevalence at ages less than 3 years old which was recorded in the column "asd_prev3".

The dataset was then loaded into R (see appendix for R code). For each vaccine an age based window was chosen for vaccine doses which was 6-12 months for aluminum adjuvant vaccines. Specifically,

DTAP = DTaP.3Doses.13 - DTaP.3Doses.7
HepB = (HepB.2Doses.13 - HepB.2Doses.7) + (HepB.3Doses.13 - HepB.3Doses.7)
Hib = (Hib.2Doses.13 - Hib.2Doses.7) + (Hib.3Doses.13 - Hib.3Doses.7)
PCV = PCV.3Doses.13 - PCV.3Doses.7
Polio = Polio.2Doses.13 - Polio.2Doses.7

The variable format above strips special characters and should be read as (shot name).(≥N Doses).(M months of age) as found in rows of CDC NIS.

A weighted regression was performed for each individual disease looking at the summed likelihood of aluminum adjuvant vaccine uptake against disease prevalence. The formula is:
"<disease>_prev ~ I(DTAP + HepB + Hib + PCV + Polio)"

A similar computation was done for each age range found in the NIS, of which there are 7: 0-2 months, 2-4 months, 4-6 months, 6-12 months, 12-18 months, 18-24 months, 24-36 months.

Finally, each year was looked at individually to remove any temporal effects including bias due to missing data or changing trends in vaccination over time. A t-test was then performed on the correlation coefficients to prove that similar significance can be found through this method as with the collapsed analysis.

3. Results

Each regression of childhood disease prevalence against the summed likelihoods of aluminum adjuvant shots in the 6-12 month period resulted in highly significant p-values.

Disease	p-value	t value	R^2
Autism	< .001	4.449	0.041
Allergies	< .001	3.99	0.046
Asthma	< .001	3.777	0.03
ADD/ADHD	< .001	5.243	0.075

Table 3. Summed Likelihoods as a Predictor of Disease Prevalence

Not only are the summed likelihoods significant, but also the likelihood of each of the individual shots is significant for each disease. The likelihood that each of these correlations would be positive just by chance, let alone most of them highly significant, is improbable to say the least. This relationship is also not simply an artifact from the high correlation of the likelihood of vaccine uptake. Hib and HepB likelihoods are negatively correlated in this time period at -.16.

correlation	DTaP	HepB	Hib	PCV	Polio
Autism	.18***	.15**	.17**	.16**	.17**
Allergies	.18***	.16**	.12*	.16**	.16**
ADHD	.22***	.25***	.23***	.24***	.22***
Asthma	.14**	.24***	.11*	.16**	.12*

Table 4: Correlation of Vaccine Likelihood Between 6-12 Months and Individual Diseases

Note. This table presents Pearson correlation coefficients. * p<.05, ** p<.01, *** p<.001

The complete set of correlations for each time period in the NIS compared to the summed likelihoods of aluminum adjuvant vaccine uptake was also computed.

correlation	0m-2m	2m-4m	4m-6m	6m-12m	12m-18m	18m-24m	24m-36m
Autism	-.05	-.11*	-.06	.22***	-.03	.06	.01
Allergies	.00	-.06	-.01	.17***	-.06	.09	.06
ADHD	-.10	-.16**	-.03	.25***	-.12*	.13*	.08
Asthma	-.04	-.08	-.02	.19***	-.09	.11*	.00

Table 5: Results for Each Time Period of Vaccination

Note. This table presents Pearson correlation coefficients. * p<.05, ** p<.01, *** p<.001

There is a decidedly non-random pattern in the table above. By chance alone you would expect to see slightly more than 1 significant value and far less than 1 highly significant value. Instead 4 highly significant values are seen that exist in the same timing band. If it were true that the peak of aluminum adjuvant translocation occurred in humans between 6-12 months of age, one would expect to see this pattern emerge, particularly since doses received between 6-12 months often represent missed doses from 0-6 months. Similarly, a vaccine taken between 12-18 months often represents a missed dose from 6-12 months.

One limitation of this study is there is not a constant follow up time when looking at 7 birth years of data sampled in 2020-2021. Many children will be diagnosed with these conditions in later years and there is a bias that later years will be missing more data. The age of diagnosis for autism exists however, and if the prevalence metric is limited to children with autism diagnosed at less than 3 years old there is no missing data. Although this removes ⅔ of the autism cases and limits the statistical power it is still significant with a p-value of 0.011 when compared to the likelihood of receiving aluminum adjuvant vaccines taken between 6 months and 12 months of age.

The relationship can be looked at year by year where statistical power is lost yet again, but there is no longer a need to worry about bias.

correlation	2011	2012	2013	2014	2015	2016	2017
Autism	.18	.09	.35*	.37**	-.15	.38*	.19
Allergies	.18	-.04	.01	-.13	.21	.10	.23
ADHD	.08	.07	.27	.16	.23	.17	.22
Asthma	.21	.16	.10	.01	-.03	-.03	.27

Table 6. A year by Year View of the Relationship of Summed Likelihoods and Disease

The distribution of correlation coefficients skews positive such that the average is .13 and the only significant relationships exist on the positive side. This is an expected result given the loss of statistical power when looking at 51 data points per year instead of 357 combined. The t-test of these coefficients shows that they are highly significantly different from 0, with a p-value of < .001. This is in line with the collapsed analysis which gives confidence that the study is not just picking up temporal artifacts in the collapsed analysis.

4. Discussion

The known nonlinear dose response curve of aluminum adjuvants regarding its ability to translocate from the injection site gives a biologically plausible connection to these diseases. In previous work it was identified that aluminum adjuvants increasingly translocate in a dose dependent manner up to a point at which a granuloma forms and translocation begins to drop with higher doses [4-6]. Temporal effects can be ruled out as significance can be found to the same degree in the year by year analysis.

There is also no obvious alternative hypothesis, no other known environmental exposure is likely acting as a hidden variable. There is not a strong relationship between overall vaccination rates and these diseases (the correlation between getting the combined 7 vaccine series by 35 months and autism is -0.009, not statistically different from 0), it is very specific to aluminum adjuvant vaccines received in a relatively narrow timing band which lines up very well with the known biology of aluminum adjuvants. No other vaccine ingredient is known to have such a nonlinear dose response curve, which makes it less likely than any other possible vaccine ingredient is responsible for this association. The dose response curve of aluminum adjuvants has been studied in rodents [4-6]. Although such translocation studies have not been conducted in humans, it can be speculated that the peak of aluminum adjuvant translocation in humans may occur somewhere in the 6 month to 1 year of age window. The fact that the prevalence of 4 diseases can be explained by a single variable should be concerning regarding the safety of aluminum adjuvants, which have never been studied in a placebo controlled trial with long term follow up in children.

Some would point out that the amount of aluminum in the diet vastly exceeds the tiny amount that is received through vaccination. This ignores the biology of ingested soluble aluminum vs injected insoluble aluminum. Typically gastrointestinal absorption of aluminum from diets is < 1% [7,8]. Ingested aluminum is also rapidly eliminated from the body should it make it into the blood and has limited means of crossing the blood brain barrier via transferrin. This is not the case for injected aluminum which is persistent for long periods of time and has a proven means of crossing the blood brain barrier via the lymph [4,5]. There is also no evidence that dietary aluminum intake has increased remarkably over the same years these diseases have seen order of magnitude increases in prevalence. Whereas many have noted the correlation of chronic childhood conditions with increasing aluminum adjuvant vaccinations [9,10]. There is no good reason to believe that aluminum adjuvant vaccination uptake in the 6 month to 12 month age range would have any correlation with dietary aluminum uptake.

For the same reason, we can exclude access to health care as a possible cause of this relationship. If that were the case, overall vaccination rates would correlate strongly with later disease, which was not found. The relationship is specific to a narrow window of vaccination and the relationship was not found at all for the MMR which does not contain aluminum, only vaccines with at least some brand containing aluminum. It was also statistically significant for each of 5 individual vaccines containing aluminum adjuvants against each of 4 childhood diseases. In total that's 17 highly significant associations and 3 significant associations, with no insignificant associations shown in table 4.

One weakness of this study is the inability to know the brand of vaccine that was taken. Some Hib vaccines contain no aluminum at all and different brands may have more or less aluminum, but since this study is looking at the population level this is not a large concern. Certainly Hib vaccination is providing these populations with some injected aluminum exposure and this study is looking at aggregate statistics at that same population level. This research provides a specific hypothesis for further research at the individual level. The total dose of aluminum adjuvants received between 6-12 months of age should be compared with future childhood disease.

5. Conclusion

Aluminum adjuvants taken between 6 months to 12 months of age are associated with autism, allergies, asthma, and ADHD in the time period studied. This research result is consistent with the hypothesized model of several childhood diseases being caused by aluminum adjuvants in childhood vaccines. Though it cannot prove causation, further research should be done at the individual level to definitively prove or disprove this association.

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Appendix

Code and data used:
https://github.com/kmokeddem/nsch_nis