Seroprevalence of vaccine derived Hepatitis B antibodies in Germany: Results from the German Health Interview and Examination Survey for Children and Adolescents, 2014-2017

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BACKGROUND AND AIMS

- 3 monovalent or 4 polyvalent doses of Hepatitis B virus (HBV) vaccinations were recommended for children in Germany until 2021, with 6 months between the 2 last doses (defined as a protective series)
- Since then, 3 poly- or monovalent doses have been recommended. A successful vaccination series is defined as having anti-HBs levels ≥100 IU/ml 4-6 weeks after vaccination (defined by the German Standing Committee on Vaccination)

We aimed to estimate the proportion of vaccinated children (3-17 years) in Germany with an anti-HBs titre <10 IU/ml, 10<100 IU/ml and ≥100 IU/ml by vaccination status, and to assess if protective series are associated with an anti-HBs titre ≥10 IU/ml (a protective response according to the World Health Organization)

METHODS

- We used data from a national population-based cross-sectional study (2014-2017) of children aged 3-17 years (KiGGS) including vaccination information collected from vaccination cards
- We excluded unvaccinated participants, or participants with unknown vaccination date, or with unreadable or incomplete vaccination cards and anti-HBc or HBsAg positive participants
- We defined a protective series as having ≥3 vaccine doses with 6 months between the last 2 doses
- We did descriptive analyses of categorical variables
- We calculated weighted proportions stratified by anti-HBs titre, and calculated crude and adjusted Odds Ratios (OR) for having anti-HBs titre ≥10 and their 95% Confidence Interval (CI) using STATA

RESULTS

- We included 2,489 vaccinated participants who fulfilled the inclusion criteria for the anti-HBs analyses
  - 50.7% were female
  - Mean age: 10.6 years (median age: 11 years)
  - Living in Eastern part of Germany (incl. Berlin): 64.1%
  - Migration background (at least one parent): 21.5%

RESULTS CONTINUED

Table 1: Anti-HBs level by vaccination status at time of examination (N=2,489)

	Total N	Anti-HBs titre <10 IU/ml		Anti-HBs titre 10–99 IU/ml		Anti-HBs titre ≥100 IU/ml	
Protective series		**N**	**% [95%CI]**	**N**	**% [95%CI]**	**N**	**% [95%CI]**
Total	2,489	959	38.0 [35.7-40.4]	900	35.6 [33.2-38.0]	630	26.4 [24.5-28.4]
Protective series							
Yes	2,130	818	37.6 [35.1-40.3]	764	35.5 [32.8-38.2]	548	26.9 [24.8-29.1]
No	359	141	40.1 [34.4-46.0]	136	36.0 [30.2-42.3]	82	24.0 [19.4-29.2]
Protective series							
3 doses	454	201	45.4 [39.8-51.1]	147	32.2 [27.0-37.8]	106	22.4 [17.9-27.7]
4 doses	1,644	610	35.7 [32.8-38.7]	610	37.0 [33.9-40.2]	424	27.3 [24.9-30.0]

- Estimated proportion of participants with levels of anti-HBs ≥10 were comparable among those with and without protective series, and also among those with 3 versus 4 doses (Table 1)
- Having a protective Hepatitis B Vaccination series was not associated with having a anti-HBs titre ≥10 (Crude: OR 1.1 [95%CI 0.84-1.46] and when adjusted for time since last vaccination dose: OR 0.9 [95%CI 0.68-1.21])
- Having 4 versus 3 (ref. category) doses was positively associated with having a anti-HBs titre ≥10 (Crude: OR 1.5 [95%CI 1.2-1.9], direction of association changed when adjusted for time since last vaccination dose: OR 0.67 [95%CI 0.5-0.9])

CONCLUSIONS

- We found that having a protective series was not associated with anti-HBs titre ≥10 compared to non-protective series
- We found a positive association for 4 versus 3 doses, but when adjusting for time since last dose OR shifts towards 0 (protective series) and below 0 (4 versus 3 doses) indicating that the effect is explained by the time since the last dose
- There is correlation between type of vaccine (mono- or polyvalent and Hexavac® or Infanrix hexa®) and time since the last dose[1,2] which needs to be taken into account in further analyses of data in cross-sectional studies
- More research is needed to understand factors influencing anti-HBs levels post childhood vaccination
- Information on the effect of the number of doses and time between doses on anti-HBs response is important to be able to inform future decisions around vaccination against HBV in children

1 Jorgensen, P., et al., Low hepatitis B immunogenicity of a hexavalent vaccine widely used in Germany: results of the German Health Survey for Children and Adolescents, 2003-2006. Epidemiol Infect, 2010. 138(11): p. 1621-9.

2 Harder, T., et al., Background paper to the revised recommendation for hepatitis B vaccination of persons at particular risk and for hepatitis B postexposure prophylaxis in Germany. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz, 2013. 56(11): p. 1565-76.