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Should I Be Vaccinated?

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Report Submitted to fulfill the requirements for Scientific Research Activity

Date of Submission: 15/February/ 2020

Abstract

Vaccines aim to protect individuals from infectious diseases. The importance of vaccine such as prevention of hospital infections, cost efficiency, and overall protection to infections. The disadvantage of administration of certain vaccines to the patient would be risk of anaphylaxis , thrombocytopenia, death ,and encephalopathy. The aim of this study is to explain vaccinations and to go over both the benefits and disadvantages of being vaccinated versus not.

Introduction

Immunization by vaccination has contributed for the global elimination of small pox and the extermination of poliomyelitis from the western hemisphere. According to the World Health Organization (WHO) in 2019, 90% of infants were vaccinated with diphtheria-tetanus-pertussis, in a total of 129 countries(1). Vaccines aim to induce protective immunity against its corresponding infectious agent. The goal of vaccination is the prevention of certain infectious diseases such as mumps, hepatitis b, polio, and rubella. Vaccines tend to be very safe and adverse effects are uncommon, but are serious. The importance of vaccination is apparent by the fact that they are demanded by certain countries upon entrance.(2) In 2019 WHO estimated that 19.4 million infants hadn't received vaccinations, leaving them to rely only on herd immunity. Vaccination are currently preventing 2-3 million deaths yearly.(1) Upon recent years the use of vaccines has been debated on, and whether it's safe or could be causing underlying complications.

Vaccines consist of a modified form of a natural immunogen, which could be consisting of the whole pathogen, one of its components, or a toxin. Instead of causing the specific disease at administration, the vaccine works to trigger a healthy host to accumulate a primary response. A primary immune response is a result of the bodies first encounter with an antigen, and the cells which will respond to the response will be naive B-cells and T-cells. In cases of natural primary immune responses, the patient becomes sick until effector T cells and/or antibodies can clear the attack. A vaccination induced primary response is going to work against epitopes

of the changed immunogen form, to create a large amount of memory B and T cells. Vaccinated patients will have an increased amount of pathogen-specific memory B and T cells, with pre-existing circulating antibodies already created before exposure to the natural pathogen. During an attack from the pathogen, the pre-existing antibodies are going to give the vaccinated individual a degree of immediate protection from the attacker. The increased memory B and T cells are going to activate and set off a secondary response. The secondary response will swiftly eliminate the infection prior to it causing a serious illness. This vaccination method is called prophylactic vaccination, due to its role in preventing disease.(3) The aim of this study is to explain vaccinations and to go over both the benefits and disadvantages of being vaccinated versus not.

Material and Methods

The WHO decided to study the incidence of the benefits and disadvantages of vaccines. During this experiment they reviewed and looked through patients who had been previously vaccinated and noted if there were any serious adverse effects. They made sure to confirm if the adverse effects were a complication of drug, disease already existing in individuals, genetics, etc.

Results

Throughout this study they noted the best incidence of the introduction of vaccines was the eradication of smallpox which took place in 1967, there were 10-15 million reported cases of smallpox per year. The WHO then started a global immunization program in-order to vaccinate the world's population, by 1976-1979 one case of smallpox was recorded. Currently a similar immunization program targeting rinderpest is propelling this pathogen into extinction. Serious diseases such as diphtheria, tetanus, pertussis, mumps, and rubella are currently being prevented by vaccination, in developed countries. It was noted that adverse effects from vaccines were extremely uncommon, with cases of complications of vaccines in individuals being less than 1%. (3)

Discussion

The topic of whether vaccines are safe or not has been rising, one could contribute it to the increase in vaccine coverage. With increased awareness also comes increased controversy, with people correlating serious adverse events back to the use of a vaccine. Some adverse effects of vaccines are either coincidental, but not due to vaccination or a true reaction.

With the ongoing controversy a National Childhood Vaccine Injury act of 1986 was created, which basically meant that if one was injured by a vaccine there would be a no-fault compensation process. The created Act commanded the Institute of Medicine to gather and review evidence regarding the consequences of vaccinating children. While reviewing, they found that the Hepatitis B vaccine in rare instances can result in life-threatening hypersensitivity reactions in some people. Also cases of anaphylaxis (a serious allergic reaction) was present in vaccine recipients, although the incidence rate was low with one case of anaphylaxis per 600,000 vaccines administered. In rare incidences inactivated poliovirus vaccine (IPV) was shown to share a correlation with paralytic poliomyelitis, and very rarely would lead to fatal paralytic poliomyelitis. In 5% of patients who were administered with measles-mumps-rubella (MMR) vaccine, transient rashes were present. Encephalitis and encephalopathy were reported in one case per each million doses administered. The MMR vaccine also puts children with personal or family history of seizures at risk for developing febrile seizures, and idiopathic epilepsy. Observation of adverse reactions indicated that MMR vaccine, in infrequent incidence can result in clinically apparent thrombocytopenia within two months of vaccination. Administration of MMR was shown to lead to hypersensitivity reactions, with 70 million doses being given and only 33 cases of anaphylactic reactions being reported. Eleven of the cases reported were shown to either have occurred immediately after vaccination or occurred in patient with symptoms of anaphylaxis. Diphtheria, Tetanus, and Pertussis (DTP) vaccine was shown to result in a palpable nodule at the site of injection for several weeks, with sterile abscesses being noted rarely. In temporal association with

DTP administration, while infrequent would result in prolonged convulsions or encephalopathy. (4)

Many argue that despite doubts about the safety of vaccine immunization, it's much safer to be vaccinated versus accepting the risks for the diseases which are prevented. (4) Although there is an enormous decline in the number of cases of several infectious diseases, due to vaccinations. International travels are easily able to spread diseases, to locals if unvaccinated. Also if a child isn't vaccinated they contribute to the spreading of disease, while putting other children who are too young to be vaccinated or with a weak immune system at a risk of acquiring it. Which would result in long term complications or death to those vulnerable. Vaccination is necessary for health-care workers, due to how often they are dealing with infected patients. The maintenance of immunity allows for prevention and infection control in the hospital. (5) One could also argue that vaccinations are much cheaper, then acquiring a disease while unvaccinated and having to fund therapy. MMR vaccine has been shown to significantly decrease the chances of developing subacute sclerosing panencephalitis.(4)

Conclusion

Taking everything into account although vaccines do have adverse effects, it's extremely rare to encounter them and much safer to be vaccinated. With all the negative side effects having such low incidence rates, versus the 2-3 millions of deaths being prevented yearly, one would choose to be vaccinated. I would wish to see vaccines become mandatory in countries, due to the chance of uninfected individuals affecting those unable to get vaccinated. In future work I hope to explore the role of genetics which are interacting with these vaccines to cause such vaccine complications.

References

1. Who.int. (2019). *Immunization coverage*. [online] Available at: <https://www.who.int/news-room/fact-sheets/detail/immunization-coverage> [Accessed 5 Feb. 2020].
2. International Travel and Health: Vaccination Requirements and Health Advice. (2001). [ebook] World Health Organization;. Available at: https://www.who.int/ith/ITH_EN_2012_WEB_1.2.pdf [Accessed 7 Feb. 2020].
3. Mak, T., Saunders, M. and Jett, B. (2014). *Primer to the immune response*. 2nd ed. Amsterdam: Elsevier.
4. Update: Vaccine Side Effects, Adverse Reactions, Contraindications, and Precautions: Recommendations of the Advisory Committee on Immunization Practices (ACIP). (1996). *PsycEXTRA Dataset*.
5. Immunization of Health-Care Workers: Recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). (1997). *PsycEXTRA Dataset*.