

Factors affecting the choice of vaccination during pregnancy

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Abstract

Maternal immunization has been reviewed and proven to be quite beneficial in reducing sickness in pregnant women and neonates, Nevertheless, such programs have had limited uptake in some countries. Despite the numerous advantages that vaccines bring to humanity, people may harbor anti-vaccine beliefs for a variety of reasons, including a lack of knowledge about vaccines, worry, and fear. The purpose of this literature review was to determine the spectrum of concerns, trust, and access difficulties that influence the choice of vaccination during pregnancy.

Keywords: Maternal immunization; Pregnancy; Recommended Vaccines; Transplacental antibodies transfer

1. Introduction

One of the most beneficial discoveries ever created for humans is the vaccine, a preventative measure that allows the body to build immunity to a disease [1]. With the current global coronavirus pandemic and the reappearance of old diseases such as pertussis, tetanus and diphtheria, vaccines and their outcomes are once again a hot topic. Resistance to vaccination and refusal to receive vaccinations, particularly in pregnant women, have emerged for a variety of reasons [2]. According to the World Health Organization (WHO), vaccines are one of the most effective and affordable interventions to prevent infectious diseases and improve their outcomes. As a result, approximately 2–6 million lives are saved globally each year [3]. To date, there are vaccines to prevent more than 20 life-threatening diseases, helping people of all ages to live longer and better. They prevent deaths each year from diseases such as diphtheria, tetanus, pertussis, influenza and measles. Ideally, vaccinations should have been completed before pregnancy, or the necessary booster doses should have been given. This protects the mother from infections such as rubella, measles, and others that can harm the fetus if she becomes ill during her pregnancy.

In addition to the numerous advantages that vaccines bring to humanity, people may harbor anti-vaccine beliefs for a variety of reasons, including a lack of knowledge about vaccines, worry, and fear. Vaccination reluctance, vaccination refusal, and vaccine rejection are examples of anti-vaccine attitudes [4-5].

2. Mechanism of action of vaccines in pregnancy

Vaccination during pregnancy can induce a state of immunity such that the woman and her fetus are protected after exposure to the virus for which she has been immunized. In addition, vaccination at certain weeks of gestation provides passive protection of the neonate for the first few months of life through the transplacental transfer of antibodies. Transplacental antibody transfer depends on the concentration of antibody in the mother, the antibody type (significant amounts of IgG but not IgM, IgA, or IgE are transferred), the IgG subtype (IgG1 is preferentially transferred), and

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gestational age [6]. In particular, maternal IgG transfer to the fetus occurs by active transfer from the 17th week of gestation.

However, the concentration of maternal IgG in the fetus is much lower than the concentration in the mother during the first half of pregnancy. It increases to 50% of maternal levels at 28-32 weeks gestation, equals maternal levels at 36 weeks gestation, and exceeds maternal levels at the end of gestation. The reason for this increase is not entirely clear but is thought to be due to a gradual increase in Fc receptor expression in the syncytiotrophoblast during gestation. Because maternal IgG levels peak approximately four weeks after vaccination, gestational age at vaccination is an important factor in achieving passive immunization in the neonate (e.g. pertussis vaccine). In these cases, the ideal vaccination timing is at the beginning of the third trimester to achieve maximum maternal antibody levels and maximum antibody transfer before delivery.

2.1. Vaccines recommended before pregnancy

Anyone considering pregnancy should have had all routine vaccines as recommended by the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP) [7].

The measles, mumps, rubella (MMR), and chickenpox (varicella) vaccines are very crucial for anyone who may become pregnant and is not already immune to these viruses. These vaccinations protect against illnesses that can affect the developing fetus or the pregnancy; however, because they are live virus vaccines, they cannot be given during pregnancy or in the month preceding conception. Before becoming pregnant, every woman should ensure that she is immune to these infections. If she is not immune, she should get the MMR vaccine and wait at least one month before attempting to conceive. Contracting measles, mumps, or rubella during the first trimester of pregnancy might result in a miscarriage. Similar to MMR are the recommendations for chickenpox (varicella).

The human papillomavirus (HPV) vaccine is recommended for all adults aged 9 to 26 who are not pregnant, as well as for those nonpregnant people aged 27 to 45 who may have been exposed to HPV and have not previously been vaccinated. Although the HPV vaccine is not recommended during pregnancy, research suggests that it is safe if a pregnant woman obtains it accidentally (for example, before she knew she was pregnant) [8]. If a woman is pregnant and still has to get or finish this vaccine series, the HPV vaccine can be administered after she has given birth.

2.2. Vaccines essential for every pregnancy

Preventing infections in the pregnant woman, the fetus, and the neonate is an important part of antenatal care. WHO has classified pregnant and breastfeeding women into high-risk groups. Factors thought to increase susceptibility to infection during pregnancy are associated with physiological changes, including immunological changes, increased cardiac output, and increased oxygen consumption [3].

More specifically, the period of pregnancy is characterized by disturbances of the immune status where during the 1st and 3rd trimester we have a predominance of pro-inflammatory reactions while in the 2nd trimester, the anti-inflammatory reaction predominates. Consequently, in the 2nd trimester, the pregnant woman is particularly susceptible to viral infections. In general, regarding pregnancy, according to the U.S. Centers for Disease Control and Prevention (CDC) guidelines, vaccines containing inactive viruses or microbes can be given safely [7].

Pregnant women and young infants are more vulnerable to influenza complications. All pregnant women who are or will be pregnant during the flu season should get the injectable (intramuscular) seasonal influenza vaccine (the "flu shot"). Getting the flu vaccine while pregnant has no known negative consequences on the fetus. Moreover, it not only protects pregnant women, but it also protects neonates from influenza in the first six months after birth, before they are mature enough to receive the flu vaccination.

The tetanus, diphtheria, acellular pertussis, or "Tdap" vaccine is advised for all pregnant women, even if they have already had it. It should be administered between 27 and 36 weeks of pregnancy. Neonates are especially vulnerable to serious consequences from pertussis, and this vaccine protects them from infection and complications.

Compared to non-pregnant people, pregnant people are more prone to get serious diseases as a result of COVID-19. Pregnant women are advised to get vaccinated to lessen their risk of infection and the severity of their disease. The COVID-19 immunizations don't harm a growing fetus or increase the chance of miscarriage. Vaccines appropriate for immunization during pregnancy are shown in Table 1 [9] (Table 1).

Table 1 Vaccines recommended in pregnancy

Vaccine - Route of administration	Vaccine composition	Recommendation in pregnancy
Influenza (IM)	Inactivated	It is recommended to all pregnant women in the second and third trimester of pregnancy during the flu season (October-March) and to pregnant women with respiratory diseases regardless of gestational age.
Tetanus - Diphtheria (IM)	Toxin	It is indicated for unvaccinated pregnant women or pregnant women who have not received a booster dose in the last 10 years.
Tetanus - Diphtheria- Pertussis (Tdap) (IM)	Toxin - acellular	Td is recommended for the prevention of tetanus and diphtheria, in 2 doses, with additional safety against pertussis in the 3rd dose (Tdap). Preferably in the 2nd and 3rd trimester of pregnancy.
COVID-19	mRNA	COVID-19 vaccination is recommended for women who are pregnant, might become pregnant, recently pregnant or breastfeeding.
Hepatitis B (IM)	Recombinant	Recommended for pregnant women at risk of infection.
Hepatitis A (IM)	Inactivated virus	There is not enough information about the safety of the vaccine in pregnancy. Because of the theoretical risk, it is only given if there is a risk of infection in the pregnant woman.

2.3. Vaccines recommended for certain pregnant women

Pregnant women who are at a high risk of contracting a certain infection from travel or another source should think about getting additional vaccinations, such as Hepatitis A vaccine, Hepatitis B vaccine, inactivated polio vaccine (IPV), pneumococcal vaccine, yellow fever vaccine, etc [10].

2.4. Benefits of vaccines during pregnancy

Vaccination during pregnancy protects the mother from preventable infections that could otherwise cause health complications during pregnancy and be transmitted to the fetus or infant causing serious harm [11]. Pneumococcus, meningococcus, and Hepatitis A and B viruses are causes of serious morbidity for pregnant women who can be protected by vaccination.

Spontaneous abortion, fetal death, premature delivery, congenital anomalies, and low birth weight are some of the complications that studies have reported after pregnant women contract various infections such as the influenza virus.

Several vaccines are not licensed for use in newborns and infants. In addition, neonatal age and the first six months of life in infants are a period of vulnerability to infections and serious complications. Nature has provided, and the mother's antibodies are given to the fetus during pregnancy, particularly in the third trimester, via the placenta. This of course requires that the mother has developed the antibodies for diseases that can be dangerous to her and her neonate. Vaccines in pregnancy aim to provide a dual benefit: to ensure both the protection of the woman and the fetus and to enhance the passive transfer of antibodies to the neonate, so that it is protected until it receives its first vaccines.

2.5. Factors affecting the choice of vaccination

Globally, vaccination rates among pregnant women are low [12]. Concerns about vaccine safety persist and fear of birth defects remains the dominant barrier to vaccination. Additional possible explanations include lack of education of healthcare workers. In general, the most important factor for a woman to decide to get vaccinated during pregnancy is to have a clear recommendation from a healthcare professional

Pregnancy is an intense period of information seeking in which pregnant women are acutely aware of the influence of their health decisions on their fetuses; the sensitivity of this decision increases vulnerability to misinformation [13]. The majority of qualitative studies reported on the perceived influence of health professionals on decision-making, and to a lesser extent, other social networks or the Internet. During an antenatal visit, an offer (or lack thereof) of vaccination was frequently a major element in the final behavior of pregnant women [12, 14].

Most studies found that being informed of maternal vaccination and/or the relevant disease, regardless of source, was critical to taking the vaccine but seldom sufficient [15-16]. Furthermore, some studies identified an information gap unique to vaccine knowledge during pregnancy, showing a general lack of understanding among pregnant women about maternal vaccine recommendations and advantages [17]. Some studies underlined that a recommendation by a health professional was not always adequate [18] and according to studies, one of the causes of poor vaccination rates among pregnant women is a lack of clear advice from maternity care providers [19].

In many studies, participants may have accepted immunizations in general, but not during pregnancy [15, 20]. Rumors in the community and cultural norms also influenced pregnant women's vaccination attitudes [21].

Furthermore, some research [12, 14] found preferences for natural immunity or a healthy lifestyle during pregnancy as grounds for declining immunizations. Maternal vaccination decisions were also linked to a variety of emotions and attitudes, including fear, worry, or anxiety, responsibility for pregnancy outcomes and culpability if something goes wrong, and ambiguity about vaccine dangers. Finally, the fear of perceived vaccine harms (including notions of unknown hazards for novel vaccines) was used to explain maternal immunization refusal, despite a related dread of the disease it was intended to protect against [18].

3. Conclusion

It is crucial to administer the advised vaccinations during pregnancy and to inform women about this subject beginning in the prenatal period. According to the literature, pregnant women who are educated about the benefits, risks, and effectiveness of vaccines are more likely to receive them, and they also seek out the most accurate and trustworthy information from their medical providers.

Therefore, pregnant women make for a prime target group for whom vaccination-related trust-building programs may be created. These strategies should concentrate on enhancing the role of medical professionals, especially midwives, in providing information on vaccines, improving their ability to manage vaccine hesitancy in parents, but also addressing hesitant behaviors among health professionals themselves, and on the involvement of various media tools, which continue to serve as the primary information source for the majority of women. Adapting interventions should be done in light of a context-specific understanding of the factors that influence them.

Compliance with ethical standards

Disclosure of conflict of interest

The authors have no relevant financial or non-financial interests to disclose.

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