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Review

Vaccine Hesitancy and COVID-19

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ABSTRACT

Objective: Despite being a very effective weapon against many diseases since the 19th century, vaccines have been controversial for many people across the world. This hesitant approach has always threatened individual and community health. This study aims to comprehensively identify vaccine hesitancy, and its historical root and reveal the prevalence of hesitancy against COVID-19 vaccines as well as childhood vaccines. Furthermore, we aimed to offer several methods that can be beneficial for physicians who are consistently testifying to the problems of vaccine hesitancy.

Methods: Literature data published in PubMed and Google Scholar that covered "vaccine hesitancy and COVID-19" was reviewed by the authors independently and collectively. The data were collected from the 28 studies published in the past 20 years through Pubmed and Google Scholar.

Results: In this review, vaccine hesitancy and the story of this phenomenon are explained, along with why people embrace the idea despite ample evidence. Following up, the prevalence of vaccine hesitancy around the world and what can be done to diminish its effects on health are discussed.

Conclusion: Vaccine hesitancy has been a growing, complex and societal health-care problem nowadays. It may cause long-term consequences for public health, for example, the rise of vaccine-preventable diseases. It might be dealt with some methods that have been developed for instance Corroborate, About me, Science, Explain and recommendations from Strategic Advisory Group of Experts (SAGE).

INTRODUCTION

Vaccine hesitancy is a growing health-care concern worldwide adopted by a heterogeneous group of people who hold varying levels of hesitancy toward vaccines. This attitude is a complex and dependent phenomenon that needs to be comprehensively studied because it contains a realm of factors and it is crucial for individual and community immunity.[1]

After vaccine hesitancy is described, this article explains the historical part of vaccine hesitancy, its prevalence, the key factors (causes) responsible for this phenomenon, its impact on public health, and finally what can be done to eliminate or mitigate this movement.

This review is an update on our knowledge of vaccination including the history of vaccination, the history of the anti-vaccination movement across the world, vaccine hesitancy against COVID-19 vaccines, and other vaccines, The literature cited in this article consists of 28 studies conducted within the past 20 years was selected primarily from the PubMed and Google Scholar database based on a combined keyword search using "vaccine," "vaccine hesitancy," and "COVID-19."

Description and associated factors

Vaccine hesitancy is a term referring to a person or a parent who is delaying or refusing one or all types of vaccines due to multiple reasons such as personal, political, ideological, or belief-related. Recent studies have shown that this approach toward vaccines generally arises from beliefs (e.g., philosophical, religious, and naturopathy) and perception (e.g., of business or political motives).[1]

Reasons for vaccine hesitancy

According to the studies in the literature, reasons against vaccination can be divided into three subgroups: Reasons that originated from unscientific ideas due to lack of adequate information or exposing fallacious arguments about vaccines, especially for COVID-19 vaccines, through social media or conventional media. This first group is somebody who accepts all types of vaccines but still has some concerns that can be dispelled by physicians easily. Second, trust issues with the government, pharmaceutical companies, and health-care organizations. Third, hesitancy toward vaccines is due to political and religious reasons. These final and most radical group members are completely against all types of vaccines.[2]

The spectrum of vaccine hesitancy also varies from minimal hesitancy to complete refusal (Fig. 1).

History of anti-vaccination movements

The first attempt to vaccinate people against the severe infectious disease was in the 18th century by Jenner against the smallpox virus by inoculating 13-year-old boy with cowpox. Afterward in 1798, the first smallpox vaccine was developed.[3] Then, the vaccine became more common in society and was enforced to use against an epidemic that appeared in the USA (United State of America).

In the 19th century, some people perceived this enforcement as a violation of freedom and the anti-vaccination movement was formed as a result. Simultaneously in the United Kingdom (UK), an anti-vaccine movement was growing against compulsory vaccination. Afterward, this anti-vaccination movement expanded throughout European countries. Despite the growing anti-vaccination movement, several vaccines were developed including polio, measles, tetanus, pertussis, and tuberculosis. A huge number of people accepted vaccination because of the decrease in mortality and morbidity in those diseases achieved by vaccination. Later in 1974, vaccination rates went beyond 80% and childhood immunization became a social norm for most countries.[4]

Despite the huge success of vaccines, the first anti-vaccination movement appeared in the UK and the whole-cell pertussis vaccine was questioned afterward in the United State (US) with the release of a documentary called "diphtheria, tetanus, and pertussis (DTP): Vaccination Roulette" in 1982. The documentary claimed that DTP vaccines are responsible for severe neurological disorders after vaccination. This documentary is not the only one that is linking neurological disorders with vaccines. In 1998, Andrew Wakefield who is a former physician and anti-vaccine activist published an article linking autism with measles, mumps, and rubella (MMR) vaccines and it created a worldwide crisis.[5]

Prevalence of vaccine hesitancy and low vaccination rates

Vaccination ratio has been one of the most important indicators of the quality of a country's healthcare system. If a large proportion of citizens are vaccinated, this is considered a great development for the health-care system of a country. Although in many countries, most vaccines are available free of charge, some people and parents remain skeptical about vaccines or refuse all types of vaccines. For instance, in the USA, it is estimated that 0.8% of 19–35 months aged children in the USA are unimmunized and 20% of parents are refusing or delaying one or more vaccines.[6]

Research conducted in Europe reported that mean vaccination rates have decreased in recent years. For the polio vaccine, the rate decreased from 2009 (96.4%) down to 2017 (93.9%) at the age of 24 months. The percentage of three doses of DTP at 24 months old has the same downside trend. The percentage for three doses of DTP decreased from 2009 (96.8%) to 2017 (95.1%). This study stated that vaccine hesitancy is responsible for this downward trend.[7]

There are global data from the World Health Organization (WHO) shows that in 2020, 17.1 million infants did not receive an initial dose of the DTP vaccine worldwide

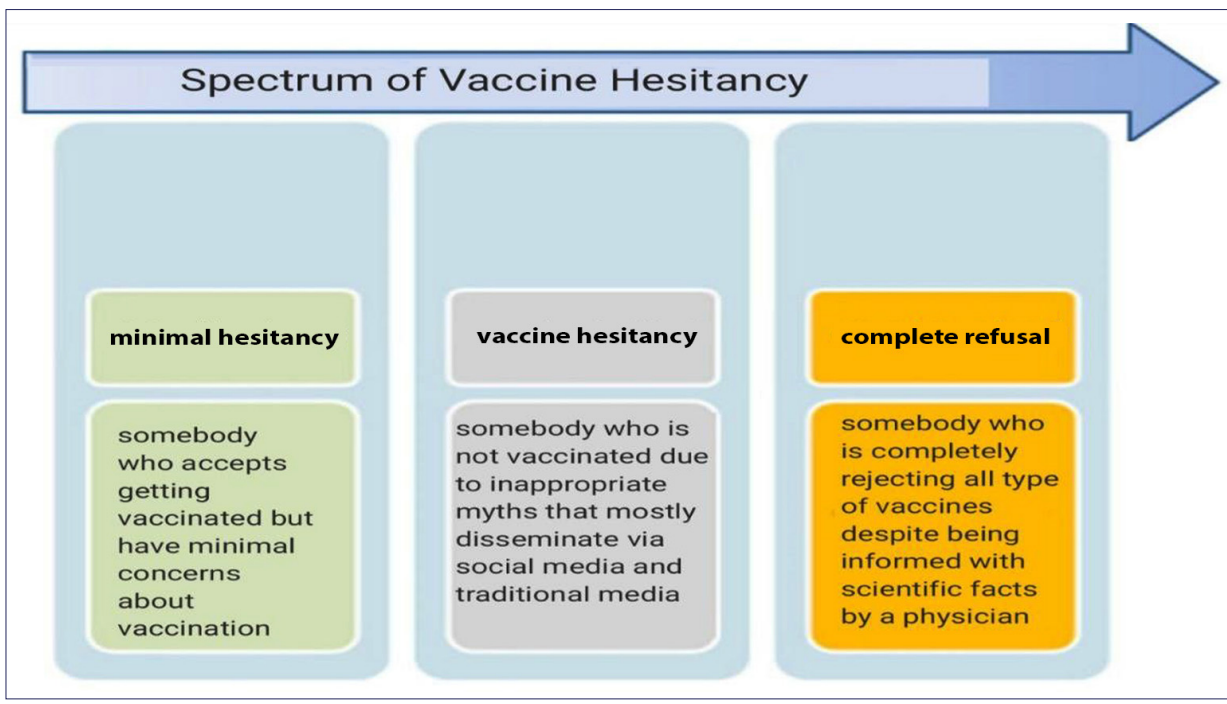

Figure 1. Types of vaccine hesitancy.

and an additional 5.6 million are partially vaccinated. These numbers are mostly associated with low rates of access to health-care services.[8]

Vaccine hesitancy against COVID-19 and other vaccines

Vaccine hesitancy is a complex and multifactorial phenomenon. People who are hesitant about vaccines have different reasons and beliefs. We believe that comprehending these reasons is pivotal to being able to understand this phenomenon.

Childhood vaccination programs have been crucial to decreasing rates of mortality and morbidity among children for decades. Even though these vaccines are very effective tools against vaccine-preventable diseases, some people are remaining hesitant toward these vaccines. Some concerns play a huge role in this hesitancy. For instance, some parents express the immediate or long-term side effects as reasons for delaying or refusing the vaccines.[9] A study indicates that parents of younger than 6-year-old children associated their concerns with adverse reactions to vaccines such as pain during injections and fever after injections.[10]

Concerns about vaccines extend beyond local or immediate side effects. One of the most known is a so-called association between vaccines and neurological diseases. The measles vaccine is known among parents as responsible for autism. In addition to this erroneous assumption, the influenza vaccine is held responsible for Guillain-Barre syndrome although these unsubstantiated claims have been disproven by science itself.[9]

These concerns stated above are not only common among parents who are not Health Care Workers (HCW) or physicians. They are common even among physicians. A study conducted in Switzerland refers to that almost 5% of physicians (non-pediatrician) have refused or delayed MMR or DTP vaccinations for their children.[11] A survey conducted with 540 healthcare workers in Canada has demonstrated that a significant proportion of participants believe that "children are exposed to too many vaccines" and "a good lifestyle can eliminate the necessity of the vaccines."[12]

Vaccine-hesitant individuals have a host of concerns regarding COVID-19 vaccines. For instance, a study has shown that some people are concerned about the rapid development of the COVID-19 vaccines and their long-term adverse effects.[2] In addition, the same study found that Black participants also stated mistrust of the healthcare system and racial injustice as reasons for vaccine hesitancy.[2] This study has indicated that trusting in a healthcare institution is one of the most important determinants for vaccination decision-making.

Suspicions about vaccines are not only common among patients. Despite working in the healthcare system, a big proportion of healthcare workers are skeptical about the healthcare institution and government policies in Southern California.[13] In the same study, healthcare workers expressed their concerns about vaccination including safety, efficacy, and preference for herd immunity.[13]

Another broad survey conducted by Thunström et al.[14] shows that people stated similar reasons for declining COVID-19 vaccines. Most of the participants claimed that "Vaccine for COVID-19 is too new" or "I worry about the side effects. Although a host of studies has proved, those vaccines are actively used against many diseases such as diphtheria, hepatitis B, influenza, measles, meningitis, mumps, pertussis, poliomyelitis, rubella, tetanus, tuberculosis, and have great success on the COVID-19 pandemic that many participants still advocated that "the vaccine will not protect me."[14]

From another large-scale study with 1,341,682 participants, it is observed that concerns about COVID-19 vaccines generally originated from similar reasons such as long-term side effects and adverse reactions.[15]

As an example, a study that was performed in Canada found that roughly 45% of Canadians stated they would not get the COVID-19 vaccine rapidly despite the availability of the vaccine.[16] Another study from the USA reported similar rates but currently, in the USA, 67% of people have completed the initial protocol of COVID-19 vaccines, and 11% of them have been partially vaccinated.[17] The rates of COVID-19 vaccination are higher in Canada; this is promising for the countries' health-care systems.

Another survey from Romania, performed with 650 people, found intriguing outcomes that a large proportion of people have been vaccinated through the national vaccination program (94.9%).[18] However, a significant number of respondents believe the most common conspiracy theories which cause them to avoid getting COVID-19 vaccines. For instance, 47% of participants believe that there is a world occult organization that controls the world and wants to reduce the population of Earth. In addition, 33.2% of the respondents believe that doctors are paid by this occult organization to administer vaccines that would help to reduce the population. In this study, they reported that, in Romania, 62% of the population is not vaccinated and these conspiracy theories play a big negative effect on the health-care system.[18]

Data collected from 649 vaccine-hesitant HCWs who are employed at Dr. Lütfi Kırdar City Hospital in Istanbul creates different perspectives in terms of vaccine hesitancy among HCWs. The writers of this study indicated three main factors that cause vaccine hesitancy toward COVID-19 vaccines among HCWs. First, a big proportion (68.8%) of HCWs stated "fear and lack of confidence with regards to COVID-19 vaccines." Second, a relatively small proportion (4.3%) of HCWs stated that "I do not perceive a need or value of COVID-19 vaccines" and lastly, they stated that "I had difficulties in accessing the vaccines."[19]

They also divided these participants based on their occupational groups. The most vaccine-hesitant HCWs are permanent workers (63%) who are also referred to as "non-professional support staff" in different studies. The

second group was nurses (45%). Physicians were dramatically less in proportion to other groups with a 10% ratio also the writers of this study indicated that "the more physicians have scientific knowledge and education with regards to the vaccines, the lower of vaccine hesitancy rates they have".[19]

We want to add our observations as an HCW on the causes of vaccine hesitancy. In Turkey, there is an aversion to certain vaccine brands. For instance, we have encountered various arguments grounded in unempirical ideas. Some of our patients perceive messenger ribonucleic acid (mRNA) vaccines as a reason for mutation on the deoxyribonucleic acid, although no evidence supports this idea and they are more likely to prefer dead-virus vaccines such as CoronaVac (Sinovac Life Sciences, Beijing, China) vaccine. As opposed to that, a substantial number of our patients consider the pandemic as a "plandemic" and they stated that the virus is created by the Chinese government therefore they are very strict about not getting vaccinated with the CoronaVac vaccine besides they usually have the same suspicion against the other brand's vaccines.

The analogous reasons for the COVID-19 vaccines exist in other countries. A quote from a participant who is in the study conducted in the Philippines can enlighten the similarity of suspicions toward mRNA vaccines. The participant indicated that the technology of the mRNA vaccines is just not mature; therefore, he refused to get vaccinated with mRNA vaccines.[20] Another participant from the same study emphasized that his last preference would be Sinovac due to having a distrust of the Chinese government. Besides, he added that "I do not believe in China because of the dispute between China and the Philippines."[20]

The consequences of vaccine hesitancy

Since vaccines are a cost-effective weapon against diseases, refusal of or delaying vaccines can be very harmful to both individuals and society. Therefore, understanding the cost part of vaccine hesitancy has been crucial for countries since the rising trend of vaccine hesitancy has been endangering countries' economies. For example, a study shows that even a 5% decrease in MMR vaccine acceptance can cost millions of dollars to the US economy.[21]

Economic consequences are very important for countries; however, there is a greater risk of vaccine hesitancy for individuals and especially for children whose parents delay or refuse to get vaccinated their children. It has been indicated that children who were not vaccinated or delayed vaccination of DTaP (diphtheria, tetanus toxoids, and acellular pertussis) were 4.4 times more likely to be diagnosed with pertussis compared to children who were vaccinated as they should be.[22]

Another dramatic consequence of vaccine hesitancy is undoubtedly outbreaks. One of the recent outbreaks was the Disneyland measles outbreak that occurred in the USA in 2014 due to an unvaccinated population. Until this outbreak, vaccination rates among children aged 19–35 months were 70.4%. It is noted that these rates should be nearly 95% to maintain herd immunity and prevent outbreaks.[23]

A modeling study simulated that over 2 years with a high vaccine-hesitant population can cause up to a 30.4% increase in hospitalization and a 27.2% increase in mortality.[24]

How to deal with vaccine hesitancy?

As a physician, dealing with vaccine-hesitant parents and individuals can be challenging. Thus, convincing people to get vaccinated requires a multi-faceted approach. There are a couple of methods that a physician can follow. A method published by The Strategic Advisory Group of Experts (SAGE) includes several recommendations which can be very helpful to physicians. The first recommendation is about diagnosing the problem, its magnitude, and its causes. Gathering information about vaccine hesitancy is essential in combat against vaccine hesitancy and should be disseminated to help the public health community, organizations, physicians, and countries that are dealing with vaccine hesitancy.[25] Furthermore SAGE developed a matrix that identifies the determinants of vaccine hesitancy. The second recommendation focuses on structures and organizations and their role in decreasing hesitancy and increasing acceptance of vaccines at global and local levels. It is emphasized that organizations such as WHO and The United Nations Children's Fund, and experts from different areas such as sociologists, behavioral psychologists, anthropologists, communication, and disease experts need to work collectively while fighting against vaccine hesitancy.[25] The third recommendation states the importance of sharing lessons based on experiences from various countries and developing new tools such as monitoring, diagnosis, intervention, evaluation of impact, cost, and community acceptability. In addition, they strongly suggested a tool developed by the WHO for globally using which is called Tailoring Immunization Programs.[25] It is offered that these tools need to be tested in different settings, and with different groups from various countries.

We want to add that increasing knowledge alone among society will not change behaviors instead these methods, mentioned above, need to be used collectively to be successful globally.[26]

There is another method that can be employed by physicians and nurse practitioners. It is the Corroborate, About me, Science, and Explain (CASE) method developed by Alison Singer. It is found to be very successful.[27] In the "Corroborate" part, the physician or nurse practitioner listens to parents' or patients' concerns about vaccination and acknowledges those concerns. For "About me," Practitioners mention their experiences with vaccines such as vaccinated children or vaccine-preventable diseases. For "Science," the patient or parent is informed about current vaccine science terms without being taken down. In the last part, the conversation is summed up with several pieces of advice and the practitioner asks if there is any

question that has not been answered.[27] Since vaccine hesitancy is a complex and societal problem it is offered that policymakers should create laws against the anti-vaccination movement.[28]

We also want to give a couple of recommendations for HCWs. We interpret this "health issue" as more of a problem of society itself. To decrease vaccine hesitancy rates among societies across the world, the first aim needs to be focused on fighting with wrong knowledge disseminated by conspiracy theorists who are driven by motives rooted in the culture of the society. These motives can be many things across the world but the most common forms can be readily identified such as religious, political, and anti-scientific motives. Beyond any doubt, this will be a challenge for physicians but this challenge must be handled carefully because strong restrictions through government toward these conspiracy theorists can cover the problem itself rather than diminishing its effects and might reinforce the anti-vaccination movement directed by the conspiracy theorists. To confront that kind of challenge, it must be administered rationally via media, social communication tools, and counter-arguments that are supported by scientific data. Furthermore, the scientific data needs to be explained by physicians on a level that the public can easily understand it.

CONCLUSION

Vaccine hesitancy has been a growing health-care problem for many years. It is a common health-care issue in many countries and physicians are the one who deals with this problem and its long-term consequences such as the rise of vaccine-preventable diseases. To prevent these unwanted results, some methods have been developed for instance CASE and recommendations from SAGE. Besides, there have been promising information technologies that specifically aim at patients' concerns about vaccination.

Highlight key points

Vaccine hesitancy has been a growing, complex, and societal health-care problem nowadays. 2. It may cause long-term consequences for public health, for example, the rise of vaccine-preventable diseases 3. It might be dealt with some methods that have been developed for instance CASE and recommendations from SAGE.

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Conflict of Interest

None declared.

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Aşı Tereddüdü ve COVID-19

Amaç: 19. yüzyıldan beri birçok hastalığa karşı çok etkili bir silah olmasına rağmen, aşılar dünya çapında birçok insan için tartışmalı olmuştur. Bu tereddütlü yaklaşım her zaman birey ve toplum sağlığını tehdit etmiştir. Bu çalışma, aşı tereddüdünü, tarihsel kökenini kapsamlı bir şekilde tanımlamayı ve COVID-19''un yanı sıra çocukluk çağı aşılarının yaygınlığını ortaya çıkarmayı amaçlamaktadır. Ayrıca, aşı tereddüdü sorunlarına sürekli olarak tanıklık eden hekimler için faydalı olabilecek birkaç yöntem sunmayı amaçladık.

Gereç ve Yöntem: PubMed'de ve Google Akademik'de yayınlanan 'aşı tereddüdü ve COVID-19'u kapsayan literatür verileri, yazarlar tarafından bağımsız ve toplu olarak gözden geçirildi. Veriler, son 20 yılda yayınlanan 28 çalışmadan Pubmed ve Google Akademik aracılığıyla toplanmıştır.

Bulgular: Bu derlemede, aşı tereddüdü ve bu fenomenin hikayesi, insanların bu fikri neden geniş kanıtlara rağmen benimsediği açıklanmaktadır. Takipte, aşı tereddüdünün tüm dünyada yaygınlığı ve sağlık üzerindeki etkilerini azaltmak için neler yapılabileceği tartışılmaktadır.

Sonuç: Aşı tereddüdü günümüzde büyüyen, karmaşık ve toplumsal bir sağlık sorunu haline gelmiştir. Aşı ile önlenebilir hastalıkların artması gibi halk sağlığı için uzun vadeli sonuçlara neden olabilir. Örneğin CASE (Corroborate, About me, Science, Explain) ve SAGE (Strategic Advisory Group of Experts)'den öneriler gibi geliştirilmiş bazı yöntemlerle ele alınabilir.

Anahtar Sözcükler: Aşı; COVID-19; tereddüt.