The Social Significance of Vaccination and Infodemia in the Context of COVID-19

Günümüz Pandemisi Özelinde Aşılamanın Toplumsal Önemi ve İnfodemisi

Vasfiye Bayram Değer[1]

Derleme
Review

Geliş/Received : 09.12.2021
Kabul/ Accepted : 19.10.2022

DOI: 10.17942/sted.1034560

Abstract

The most important preventive health services for the individuals, one of the fundamental steps in protection and promotion of public health, is immunization. Vaccination has many benefits for both public health and socioeconomic aspects. Vaccines rank at the top of the most important breakthroughs in public health in the twentieth century. Currently, humanity is afflicted with a new pandemic. Today, humanity is in trouble with a new pandemic. There is no medication known to cure COVID-19 completely. It is currently treated symptomatically. Besides the social struggle such as social isolation, hygiene, mask, distancing, our sole weapon is vaccination and herd immunity. In countries succeeding in vaccinating against COVID-19 in the world, the rates of infection, need for intensive care and hospitalization and death toll are decreased with increases in vaccination rates above a certain level. However, recently, anti-vaccine attitudes, discourses and behaviors have started to constitute the agenda. It is vital to be vaccinated to protect the population from vaccine-preventable infectious diseases. Therefore, vaccine hesitancy, anti-vaccine and infodemic must be combated.

Key words: Vaccine, Anti-vaccine, COVID-19, Infection, Herd Immunity, Infodemic

Özet

Toplum sağlığının korunmasında ve yükseltilmesinde önemli basamaklardan biri olan kişiye yönelik koruyucu sağlık hizmetlerinin en önemlisi bağışıklama ve dolayısıyla da aşılamadır. Aşılamanın sadece toplum sağlığı alanında değil, sosyoekonomik açıdan da pek çok faydaları söz konusudur. Aşılar 20. yüzyılda halk sağlığı alanında gerçekleştirilmiş en önemli başarılar listesinde ilk sıradadır. Dünyamız ve insanlık tarihi günümüze değin pek çok pandemi deneyimlemiştir. Günümüzde ise insanlığın başı yeni bir pandemiyle derttedir. COVID-19'u kesin olarak tedavi ettiği bilinen bir ilaç henüz piyasada yoktur. Toplumsal mücadelenin yanı sıra (sosyal izolasyon, hijyen, maske, mesafe gibi) tek silahımız aşılama ve toplumsal bağışıklığın sağlanmasıdır. Dünyada COVID-19'a karşı aşılamada yol almış ülkelerde, aşı oranlarında belli bir düzeyin üzerine çıkan artışlarla, enfeksiyon, hastaneye yatış, yoğun bakım ihtiyacı ve ölüm oranlarında bir azalma etkisinin başladığı görülmektedir. Hal böyleyken son zamanlarda aşı karşıtı tutumlar, söylemler, davranışlar gündemi meşgul etmeye başlamıştır. Sonuç olarak aşılanmak ya da aşılanmamak bireysel bir karar değildir. Toplumu aşı ile önlenebilir bulaşıcı hastalıklardan korumak için aşılanmak önemlidir. Dolayısıyla aşı tereddüdü, aşı karşıtlığı ve infodemiyle mücadele edilmelidir.

Anahtar sözcükler: Aşı, Aşı Karşıtlığı, COVID 19, Enfeksiyon, Toplumsal Bağışıklık, İnfodemi

[1]*Doç. Dr., Mardin Artuklu Üniversitesi Sağlık Bilimleri Fakültesi (Orcid no: 0000-0002-7714-9087)*

Introduction

The most important preventive health services for the individuals, one of the fundamental steps in protection and promotion of public health, is immunization and thus vaccination. The vaccines are medical agents providing protection against infectious diseases thereby building immunity. By another definition, vaccination refers to the acquisition of artificial immunity by injecting weakened viruses or bacteria or their antigenic components into the body (1). The vaccines reduce the burden and impact of infectious diseases by protecting the society against them. Vaccination offers both public health and socioeconomic benefits, reducing social inequality, ensuring equity, and strengthening health systems as a whole. According to the CDC (Center for Disease Control and Prevention), vaccines rank at the top of the most important breakthroughs in public health security in the past two centuries (2). It is stated in the reports of WHO and CDC that vaccines provide prominent declines in the incidence of infectious diseases. This situation is confirmed by the CDC report that, following the advent of vaccines in the 20th century, significant decreases were recorded in the average morbidity rates of infectious diseases. Moreover, the implementation of the extended vaccination program alone prevents the death of three million children from vaccine-preventable infections per year (3). WHO announced that Turkey was decontaminated from polio in 2002, and maternal and neonatal tetanus in 2009 thanks to an effective vaccination program (4). This is also supported by a dramatic decline in the incidence of other diseases. Although the vaccines are also regarded as a medical intervention, they function differently, protecting not only the individuals' health to be administered but also that of the whole society (5). Owing to the widespread use of vaccines, it has been possible to eliminate and even eradicate many diseases like smallpox. However, the success here is directly related to the rate of vaccination (6).

So far, humankind has experienced many pandemics such as smallpox, plague, cholera, and Spanish flu, surviving from them with serious losses and some with the discovery of vaccines. For instance, the smallpox was eradicated by the vaccine. Today, humanity is threatened and depressed by a new pandemic. The outbreak emerged in Wuhan, the capital of the Hubei region of China, in December 2019. Following the onset of pneumonia developing without an identifiable reason and not responding to treatments, it was recognized that the disease called SARS-CoV-2 was caused by a new coronavirus, and the disease evolved into an epidemic, spreading to Europe, North America, Asia-Pacific and eventually the whole world. On March 11, 2020, this infection was declared as "a pandemic" (6). Although there is no known cure for COVID-19 yet, it is treated symptomatically with combinations of drugs such as antivirals (lopinavir/ritonavir, remdesivir, protease inhibitors), hydroxychloroquine, vitamin C infusion, and steroids if cytokine storm is observed (7). Fortunately, although various vaccines have different protective rates, the vaccine that we have been waiting impatiently for has finally been developed.

Besides the social struggle such as social isolation and distance, personal hygiene, preventing spread, use of personal protective equipment, our sole weapon in the combat against COVID-19 pandemic is vaccination and ensuring herd immunity. Without obliging anyone to make a choice between COVID-19 and meeting their basic needs, exposure to the virus must be prevented and vaccination campaigns that will provide and maintain collective (social) immunity without creating victims of inequality must be launched immediately (8).

In countries that have made substantial progress in vaccination against Covid-19, it is obvious that declining rates of infection, hospitalization, need for intensive care and death cases commences with increases in vaccination rates above a certain level. This effect was more prominent in those

countries taking intensive protection measures with vaccination.

However, recently, anti-vaccine attitudes, discourses and behaviors have started to occupy the public agenda. Although anti-vaccine movement is not a new concept today, it started with the introduction of vaccines. The first vaccines were based on studies on cowpox by Edward Jenner in England in 1796. The movement of anti-vaccination also emerged for the first time during these vaccine studies.

During this period, a religious scholar named E. Massey claimed that diseases were sent by God to punish humans, so trying to prevent diseases was equivalent to revolting against God, describing vaccination attempts as obeying the devil (2). In the 1700s, some theologians called smallpox as the God's whip and opposed to the vaccination research on the grounds that it hindered the will of God (2).

The first vaccination law in history was enacted in England in 1840. Under this law, vaccination was made legal and the poor were granted free access to the vaccine. However, due to the fact that the vaccination rate was not at the desired level, vaccination was rendered compulsory in England in 1853 (2,9). A 64-page booklet titled "Our Medical Freedoms", which could be considered as the beginning of the anti-vaccine movement, was written in 1854 by John Gibbs, who criticized this law (10). During these period, many anti-vaccine groups and associations were established and many books, magazines and newspapers were published by these groups (9). The first anti-vaccine demonstration in history took place in Leicester, England, in 1885 with a large mass of participants (9). Following this, a new "Vaccination Act" was enacted in 1898, which introduced the concept of "conscientious objector" to the British legal system for the first time, and by this law, cumulative penalties were abolished and parents who opposed to vaccination were also entitled to obtain an exemption certificate. This law granted parents the right to a conscience-based exemption status. In the second half of the nineteenth century, several anti-vaccine movements were synchronously flourishing in many European countries. In this period, another compulsory vaccination law was enacted in the USA as in the UK. The first anti-vaccine conference was held in the USA in 1907 by J. Pitcairn, which was followed by the establishment of the American Anti-Vaccination Association (9).

The debate about pertussis vaccine, which began in the mid-1970s, is considered as the triggering incident that led to the resurgence of active anti-vaccine opposition in modern times (11). This movement appeared in the United Kingdom after the publication of a report from Great Ormond Street Hospital for Sick Children, London, claiming that 36 children suffered from serious neurological conditions following DTP vaccination (12). This report attracted a great deal of attention from mass media and caused excessive public concern.

The Association of Parents of Vaccine Damaged Children was founded in the UK in 1974, playing a key role in bringing attention to this supposed safety issue with the whole-cell pertussis vaccine (13). By 1977, vaccine coverage for children in the UK had decreased from 77% to 33%. This was soon followed by three major pertussis epidemics, with more than 100,000 cases and the death of at least 36 children (11). Despite the assurances of the vaccine's safety by the UK Joint Commission on Vaccination and Immunization, based on a large scale study examining every child hospitalized with neurological diseases in the UK, great opposition to the vaccine continued to linger. Attempts to reassure the public continued, but the controversies in the mid-1980s swept through much of Europe and Japan, the United States, the Soviet Union, and Australia (14). In Japan in 1975, after the death of two children with the DPT vaccine, the Ministry of Health suspended the use of whole-cell pertussis vaccine for infants, which was followed by major pertussis epidemics (15). This concern about the safety of the whole-cell pertussis

vaccine has led to the development of less reactogenic cell-free pertussis vaccines.

On the other hand, the anti-vaccine debates began in the US with Emmy-winning 1982 documentary "DTP: Vaccine Roulette", which claimed that the pertussis component causes severe brain damage, seizures, and mental retardation. As in the UK, anxious and infuriated parents formed victim advocacy groups such as the National Vaccine Information Centre, which is still active today (16). Various lawsuits were initiated against vaccine manufacturers, resulting in increased vaccine prices and a decrease in the number of companies producing the vaccines. In response to these events, the U.S. Congress passed the National Childhood Vaccination Injuries act in 1988 to protect manufacturers from lawsuits by establishing and maintaining an accessible and efficient error-free alternative to the traditional tort system for individuals found to have suffered injuries from certain vaccines. The Vaccine Adverse Event Reporting System, which is a passive surveillance system where suspected side effects of vaccines can be reported by parents and health professionals, was also formed in accordance with this law (17).

Nearly 25 years after the DTP debate, the UK again became the focus of another major public crisis in vaccine trust. This time was teemed with claims of a supposed link between MMR vaccination and autism. As observed in the previous pertussis vaccine scare associated with reduced immunization rates, low MMR fears were accompanied by measles outbreaks and deaths (18).

Despite the immense amount of scientific knowledge about vaccines and advances in vaccine production technology and the development of safer vaccines in terms of side effects during the twentieth century, doubts about vaccines, anti-vaccine opposition and controversies about vaccines could not be terminated in the previous century (19). The opposition to vaccines in nineteenth century is different from those in the twentieth century. In the former, the most important reason for the opposition to vaccines is to provide safer vaccines to the aristocratic class who were granted medical privileges, exempted from compulsory vaccination and favoured unlike those who did not get vaccinated, resulting in developing resistance to the vaccine among the working class. Therefore, this resistance has increased on the axis of individual freedoms rather than the vaccine itself. The latter entails anti-vaccination opposition, which started in the twentieth century and continues until today, questions the efficacy and risks of the vaccines (9).

During the first decades of the 20th century, anti-vaccine movements gradually declined. After the mid-1920s in the United States, it became rare for courts to appeal against the mandatory laws. The 1950s and 1960s marked the "golden age of vaccination acceptance" with the introduction of new universal vaccination programs against polio, measles, mumps and rubella (20). Although strong oppositions to the vaccines still exist, widespread use of vaccines has resulted in dramatic falls in outbreaks of vaccine-preventable diseases, and rates of morbidity and mortality (20).

The most sensational medical hoax of the twentieth century emerged from the publications of Andrew Wakefield and his cohorts in Lancet in 1998, suggesting that there was a relationship between measles, rubella, mumps (MMR) vaccine and autism. Wakefield et al. claimed that twelve children exhibited autistic symptoms one month after MMR vaccination. They also hypothesized that all the children included in the study had gastrointestinal symptoms and lymphoid nodular hyperplasia demonstrated on endoscopy, and based on this observation, the measles-rubella, mumps (MMR) vaccine caused inflammation in the intestines, whereupon impermeable peptides passed into the bloodstream and brain, affecting development (21). This was the beginning of the MMR vaccine shortage that swept throughout the world. The scientific limitations of the study included the lack of a control group, no blind endoscopic and neurological evaluations, unsystematic data,

and not covering all the cases. The families of all the children included in the study sued the state on the grounds that the MMR vaccine harmed their children's health, and it was revealed that the law firm conducting the case bribed Wakefield to prove that there was a relationship between the vaccine and autism. Wakefield was banned from the medical profession after it was divulged that he had committed scientific fraud by distorting the data. He took the rare step of retroactively retracting his article on in The Lancet (22). Following Wakefield's claim, multiple epidemiological studies have been conducted, none finding any link between the MMR vaccine and autism (23).

The popularization of the Internet in the early 2000s offered anti-vaccine activists an unprecedented opportunity to spread their message to a much wider audience and gain new members. The Internet has allowed people to easily share links to scientific studies and articles, allowing the findings of studies to be disseminated outside the scientific community, often using striking headlines, without providing details of scientific information or contextual elements. In fact, studies examining vaccine-related content on websites or social media platforms have shown that the quality of information is highly variable and embedded with a significant amount of misinformation.

It is estimated that 2.4 billion people had Access to the Web in 2012. What is disturbing is concealed in the trend of searching for health information on more conventional user-generated sites (Web 2.0), such as online newsgroups and blogs, rather than evidence-based vaccine information sites (24). The Internet is also regarded as one of the main sources of information on immunization for parents in the studies conducted in different countries. Immunization experts apprehend that "many parents may switch their attitudes from vaccine hesitancy to resistance and from resistance to direct opposition" as the online vaccine debates intensify (25).

There is still limited information on parents' use of online immunization information and its impact on decisions regarding childhood vaccinations (26). The relatively few studies in this field entail experiments based on fictitious websites and/or hypothetical vaccines. The results of these experiments showed that viewing anti-vaccine websites and reading personal stories about negative consequences of vaccination increased users' perceptions of risk regarding vaccination. For example, Betsch et al. revealed that viewing an anti-vaccine website promoted negative beliefs about immunization whereas viewing a pro-vaccination website had a minimal effect on these beliefs. Five months after the study, the children in the experimental group (viewing anti-vaccination website) had significantly lower vaccination coverage rates than those in the control group (viewing vaccination website) (27).

All in all, despite changes in time periods, safer and more effective vaccines, and better control of post-vaccination adverse events, anti-vaccine opposition still retains its status as deeply rooted problem as it was two centuries ago. Some of the arguments used by anti-vaccine activists in the 1800s are still used today: Vaccines are ineffective or cause disease. They are used to make a profit. They contain dangerous substances. The harm caused by vaccines is concealed by the authorities. Vaccination orders violate civil rights. As innate immunity is better than the immunity induced by vaccines or natural approaches to health, and alternative products (e.g. homeopathy, vitamins) are superior to vaccines for preventing disease (28).

However, there are distinct differences between past and current anti-vaccine promoters. Whereas the anti-vaccine activists of the past were mostly proletarians who opposed to the governmental intervention in their own and children's bodies (9), in today's world, the anti-vaccine groups are mostly well-educated, middle class and upper-income parents who claim the right to make an 'informed decision' about vaccination (16). Many contemporary anti-vaccine groups were also

formed by the parents who believed that their children had been seriously harmed by the vaccine in order to seek compensation from the industry or the government. Other anti-vaccine groups are led by alternative practitioners who oppose to biomedicine and sell "natural remedies" to replace vaccination (29). The Internet also provides a bigger platform and a wide range of media for voicing ideas louder than it was 100 years ago, possessing the potential to reach and influence far more parents. Another significant difference is associated with the "marketing strategy" of anti-vaccine groups. In the past, anti-vaccine advocates called themselves 'anti-vaccine'. However, in today's world, these marketing-savvy groups endeavour to remove this label from themselves by claiming that they are not anti-vaccine. Actually, unlike the anti-vaccine leagues of the 1800s, most contemporary anti-vaccine groups use neutral names like 'Vaccine News', 'National Vaccine Information Center' or 'Australian Vaccine Network' (30) Hence, they appear as vaccine information websites rather than anti-vaccine political websites.

Conclusion and Implications

Vaccines are one of the greatest achievements of public health practice. The anti-vaccine movements have led to lower vaccine acceptance rates and an increase in vaccine-preventable diseases and epidemics. Opposition to vaccination could be against a single vaccine or all types of vaccines. There is a serious level of disinformation in society about vaccines. In response to these drawbacks, there is no evidence that vaccines cause autoimmune diseases and infertility. Moreover, there are some differences between vaccinated and unvaccinated children in terms of health indicators, and those who are vaccinated have better health indicators than those who are not. Scientific data show that administering different vaccines at the same time does not create a negative effect on the immune system, and the side effects do not exacerbate. In addition to all these, owing to the technological developments, while the number of vaccines has increased in the last century (by purifying the vaccines), the amount of antigen in them has been gradually reduced. There are no negative effects of aluminum on human health in the vaccine content, which is thought to be harmful to human physiology. We also take the required aluminum into our bodies with food, air and drinking water. Aluminum is an omnipresent mineral found in industrial fumes, car exhaust gases and even cigarette smoke. Breastfed infants receive an average of 10 mg of aluminum until they are six months old. If they are fed with porridge, the aluminum level can rise to 40 mg. However, aluminum entering the body through vaccines within the same period is only 4 mg. Scientific studies have shown that this amount of aluminum does not produce any toxic effects. The point that has a toxic effect on human physiology is molecular structure and dosage of the substance (2).

In addition to these findings, getting vaccinated is not an individual decision, affecting all people due to its impacts on herd immunity. In order to prevent epidemics, it is necessary to reach the herd immunity threshold. In this way, the individuals who cannot be vaccinated are protected. The herd immunity thresholds required to protect the patients who are in the risk groups and thus cannot be vaccinated, including those with cancer, organ transplant patients, those with immune system failures, the elderly, pregnant women, and infants from a possible epidemic range between 80-95%. When vaccination rates fall below these figures, epidemics begin to occur in that community. It is important to be vaccinated to ensure that the population is protected from vaccine-preventable infectious diseases.

Anti-vaccination movement ranks among the most important global health problems that WHO plans to resolve. By reducing morbidity and mortality from vaccine-preventable diseases throughout life, one of the ultimate goals of the 2030 agenda is to strengthen immunization services at

all stages of health services, especially in primary care, by ensuring that everyone, can benefit from new vaccines in an equitable manner everywhere and at all ages, without excluding anyone.

In the 21st Century vaccines have been victims of their own feats since humanity has forgotten how much it suffered from infectious diseases

Consequently, the high rate of childhood vaccination coverage in most countries indicates that vaccination remains a widely accepted public health measure. However, these national estimations may foreshadow masses of poorly vaccinated individuals. Many recent outbreaks of vaccine-preventable diseases have been associated with under-vaccinated or unvaccinated populations. Many studies have shown that parental decisions about whether to vaccinate or avoid vaccinations for their children are complex and multidimensional, including contextual determinants, determinants of vaccination services, and individual determinants such as parents' knowledge, attitudes and beliefs, or sociodemographic characteristics.

While a minority of parents may have strong anti-vaccine beliefs, the rate of those classified as vaccine hesitants may be on the rise. Even parents who vaccinate their children can have significant doubts and fears about vaccination. Anti-vaccination is as old as vaccination itself and is unlikely to die out completely. Thanks to the internet, the anti-vaccine movements are reinforced much stronger than ever, having the potential to reach and influence many parents. Despite significant efforts, few public health strategies have been effective and long-lasting against the anti-vaccine movements. It is high time to move beyond the 'lack of knowledge model' to develop innovative responses to address anti-vaccine sentiments. The first and an important step in developing effective strategies is to understand both the causes and contexts that lead to vaccine hesitancy and objection. The interventions should be tailored to address specific concerns in a particular context, time and vaccine type.

İletişim: Doç. Dr. Vasfiye Bayram Değer
E-Posta: vasfiyedeg@gmail.com

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