

Could Vaccine Hesitancy be a Global Health Threat After Pandemics?: A Observational Study at Early Phase of COVID-19 Pandemic in 2020

Aşı Tereddütü Pandemi Sonrası Küresel Sağlık Tehdidi Olabilir mi?: COVID-19 Pandemisinin 2020 Yılı Erken Evresinde Gözlemsel Bir Çalışma

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Abstract

Introduction: World Health Organization stated that “vaccine hesitancy” is an essential global health threat worldwide. The aim of the present study is to establish the number of families that refuse the hepatitis B vaccine and evaluate the impact of the coronavirus pandemic and the debates about vaccines.

Materials and Methods: This retrospective study examined hospital's birth records covering the last ten years. The number of births per each year was recorded. A list was made of the patients who declared that they did not want their babies to be given the hepatitis B vaccine after birth.

Results: The total number of families who refused the first dose of hepatitis B vaccine was 103 in the last ten years. Vaccine refusal increased to 15 times in 2016, and 18.5 times in 2021, compared to the first years covered by the study. The most common reasons to refuse vaccination were websites (34.27%) and social media (24.51%). While the majority of the participants refused vaccination due to alleged harmful ingredients in the vaccine while others due to their religious or philosophical beliefs. The mothers had a significantly higher level of education with 71% having a bachelor's degree or higher.

Conclusion: Contrary to expectation of increased belief in vaccines during coronavirus pandemic, vaccine refusal has increased. Reasons for vaccine refusal are both traditional and social media features and both personal accounts and healthcare professionals in these sources can mislead the society with confusing claims. The failure to effectively provide accurate information leads to an exponential increase in false information, thus risking public health and the gains of long-lasting struggles.

Keywords

Vaccine, vaccine refusal, COVID-19, pandemic

Anahtar kelimeler

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Öz

Giriş: Dünya Sağlık Örgütü, “aşı tereddütünün” dünya çapında temel küresel sağlık tehdidi olduğunu belirtti. Bu çalışmanın amacı, hepatit B aşısını reddeden aile sayısını tespit etmek ve koronavirüs pandemisinin etkisini ve aşı tartışmalarını değerlendirmektir.

Gereç ve Yöntem: Bu retrospektif çalışmada, hastanenin son on yılı kapsayan doğum kayıtları incelendi. Her yıl başına düşen doğum sayısı kaydedildi. Doğumdan sonra bebeklerine hepatit B aşısı yapılmasını istemediklerini belirten hastaların listesi yapıldı.

Bulgular: Son on yılda hepatit B aşısının ilk dozunu reddeden ailelerin toplam sayısı 103'tür. Aşı reddi, çalışmanın kapsadığı ilk yıllara kıyasla 2016'da 15'e ve

2021’de 18,5 katına çıkmıştır. Aşırı reddetmenin en yaygın nedenleri web siteleri (%34,27) ve sosyal medyadan (%24,51) edinilen bilgilerdi. Katılımcıların çoğunluğu aşının içerdiği zararlı maddeler nedeniyle aşlamayı reddetmiş, diğerleri ise dini veya felsefi inançları nedeniyle aşırı reddetmiştir. Reddeden annelerin %71’i lisans veya daha yüksek eğitim derecesine sahip olmak üzere önemli ölçüde yüksek eğitim düzeyine sahipti.

Sonuç: Koronavirüs pandemisi sırasında aşılarla olan inancın artması beklentisinin aksine aşı reddinin arttığı görülmektedir. Aşı reddine neden olan bilgilerin kaynağı hem geleneksel medya hem de sosyal medya mecralarıdır ve bu kaynaklarda yer alan kişisel hesapların ve sağlık profesyonellerinin kafa karıştıran iddialarla toplumu yanıltması mümkündür. Doğru bilginin etkin bir şekilde sağlanamaması, yanlış bilgilerin katlanarak artmasına neden olarak halk sağlığını ve uzun süreli mücadelelerin kazanımlarını riske atmaktadır.

Introduction

Many institutions and authorities consider the discovery of vaccines to be one of the inventions that has changed the course of human history, but it is one that has also led to strong objections from numerous sources. Once the importance of social immunity has been understood, the issue of “individual choice” becomes a public health concern, and it is necessary to consider it in terms of state policy.

Vaccination provides individual immunity; protecting the person from the disease and associated complications, thereby providing social immunity. As the number of vaccinated individuals in the society increases, the likelihood of unvaccinated individuals encountering the disease-causing agent, and consequently the incidence of the disease itself, decreases. Every unvaccinated individual could cause other unvaccinated individuals, who have not yet reached the vaccination period, or whose vaccination has not yet been completed, to encounter the disease-causing agent, which could sometimes lead to death (1,2).

It is generally accepted that in societies with a vaccination rate of >90%, individuals who cannot be vaccinated due to their age or medical conditions are protected. World Health Organization (WHO) data reports that the global immunization coverage, which has been around 85% for the last few years, prevents 2-3 million deaths every year. It is estimated that a further 1.5 million could be prevented by increasing the immunization coverage to the target level (3).

The history of objection to vaccines that have been objectively proven to have significant individual and social benefits, dates back almost to the same time as the invention of vaccines. Following the adoption of the act making the newly discovered smallpox vaccine compulsory in England, John Gibbs published a pamphlet in 1854, entitled “Our Medical Liberties”,

in which he interpreted the compulsory vaccination act as a violation of human rights (4). Almost 150 years later, on February 28, 1998, A.J. Wakefield et al. published a study in the Lancet magazine, claiming that the MMR vaccine causes non-specific colitis-like changes in the intestines and the excessive absorption of some substances, leading to a picture similar to autism, which has resulted in wide-reaching academic arguments. Due to the increasing trend, stemming from this and similar discussions, the WHO included “vaccine hesitancy” among the 10 global health threats requiring solution in 2019 (5).

In Turkey, commensurate with figures internationally, the vaccination rate of 98% in 2016 had declined to 96% by 2017. This decline led to a significant increase in those diseases that had been reduced by vaccination; in 2017, the number of children with measles was 85 nationwide, but this increased to 716 in 2018 and to 1958 in 2019. The Ministry of Health has announced that if the number of vaccine refusal cases reaches fifty thousand, the probability of an epidemic is quite high (6).

The leading arguments offered for vaccine refusal have been reported as follows:

- The benefit-to-harm ratio is low due to the side effects of vaccines,
- Due to the ingredients, vaccines are not safe and are harmful to the immune system,
- The diseases for which people are vaccinated are rare and regional; it is not right to vaccinate everyone (7).

Although there is enormous literature in regarding benefits of vaccines, the increase trend of vaccine hesitancy confuse people leading to avoid vaccination, might be mostly influenced by propaganda of anti-vaccine activists. Moreover, there were many information spreading via social media and conventional media without checked or controlled.

We thought that COVID-19 pandemic increase the “vaccine hesitancy” trend despite many event-based medicine researches published benefit and protective effects of COVID-19 vaccines. Due to the first dose of the hepatitis B vaccine is administered within 24 hours of birth in Turkey, our aim is to establish the number of families that refuse the hepatitis B vaccine in our hospital and to compare these figures with those of previous years in order to evaluate the impact of the coronavirus pandemic and the debates about vaccines in this present study.

Materials and Methods

This study was initiated following approval by the Turkish Ministry of Health Directorate General for Health Services and the approval of the local ethics committee, dated 04.02.2021 and numbered E-10840098-772.02-1284. An examination was made of our hospital’s birth records covering the last ten years. The number of births per each year was recorded. A list was made of the patients who declared that they did not want their babies to be given the hepatitis B vaccine after birth, signed the “rejection form” after the information was given by the physician and were discharged without vaccination. Of those families that had more than one child born at our hospital within the 10-year period, only the first child was included in the study. The others were excluded.

First, we determined the change in the number of diseases for which a vaccine was refused over the years.

The following information was collected by interviewing the patients:

- Reasons for vaccine refusal,
- The source of the information that influenced them making their decision,
- The mothers’ educational level.

The participants were asked to state the most important reason for vaccine refusal, and the source of the information that had most affected their decision.

Statistical Analysis

Descriptive statistics were presented as mean (\pm) standard deviation, median (minimum; maximum), frequency distribution and percentage. The normality of the continuous variables was tested using visual (histogram and probability plots) and analytic (Kolmogorov-Smirnov) methods. For categorical

variables, the chi-square test was used to compare the differences in frequency between the groups. The Runs test was conducted for the change in the results over time. The level of statistical significance was set at $p < 0.05$ in this study. An analysis was made of the data using SPSS statistical software version 25.0.

Results

The total number of families who refused the first dose of hepatitis B vaccine in the last ten years was 103. While the number of vaccine refusal was very low at 2-3 per year, it increased to 15 in 2016, when the debate intensified, and increased 18.5 times in 2021, compared to the first years covered by the study, when the debate on vaccines increased due to the pandemic. The runs test analysis shows that birth admission of hospital in ten years was not differed ($p > 0.05$). Details of the data for each year are provided in Table 1, and the information is shown graphically in Figure 1. In the interviews with the families who refused the vaccination, they were initially asked to provide the sources of the information that led them to make this decision. As shown in detail in Figure 2, the most common reasons were websites (34.27%) and social media (24.51%).

The majority of the participants reported that the reason for refusal was the substances contained in the vaccine. According to the reasons given in detail in Figure 3, some families were of the belief that the ingredients were harmful to health, while others refused the vaccine content, due to their religious or

Table 1. Number of births and vaccine refusals by years

| Yıl | Number of births* | Number of vaccine refusal |
|------|-------------------|---------------------------|
| 2011 | 1894 | 2 |
| 2012 | 1997 | 2 |
| 2013 | 1982 | 3 |
| 2014 | 1879 | 6 |
| 2015 | 3919 | 6 |
| 2016 | 1922 | 12 |
| 2017 | 1512 | 15 |
| 2018 | 3222 | 17 |
| 2019 | 1736 | 9 |
| 2020 | 1520 | 31 |

*P=0.737; z=0.335; Runs test

philosophical beliefs. It was noted that the mothers of the babies included in the study had significantly high levels of education with 71% having a bachelor's degree or higher level of education (Figure 4).

Discussion

The increase in vaccine refusal as a result of global campaigns has led to a decrease in vaccination rates and an increase in vaccine-preventable diseases. While the total number of measles cases worldwide

in 2018 was 324,277, there were 74,338 measles cases in the first two months of 2019 (8). The global trend has also significantly affected Turkey within the last decade. During 2015 in particular, a lawsuit for "obtaining the consent of parents for vaccination" was won, leading to a significant increase in the number of families refusing vaccines in Turkey. According to the data of the Turkish Ministry of Health, the number of families who officially declared that they did not want to have their children vaccinated has increased substantially over the years (183 families in 2011,

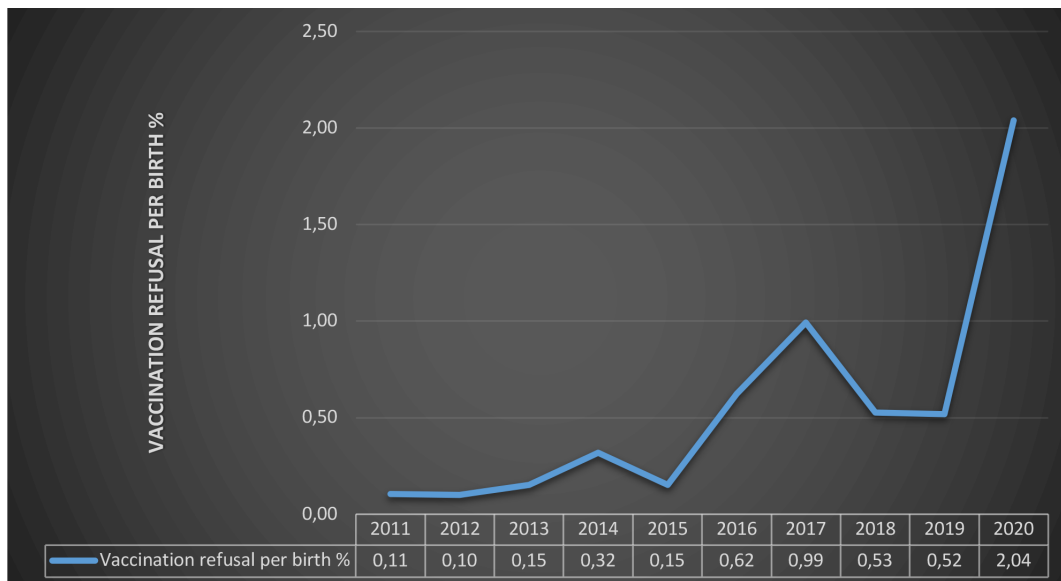


Figure 1. Percentage of people not getting vaccinated by years.

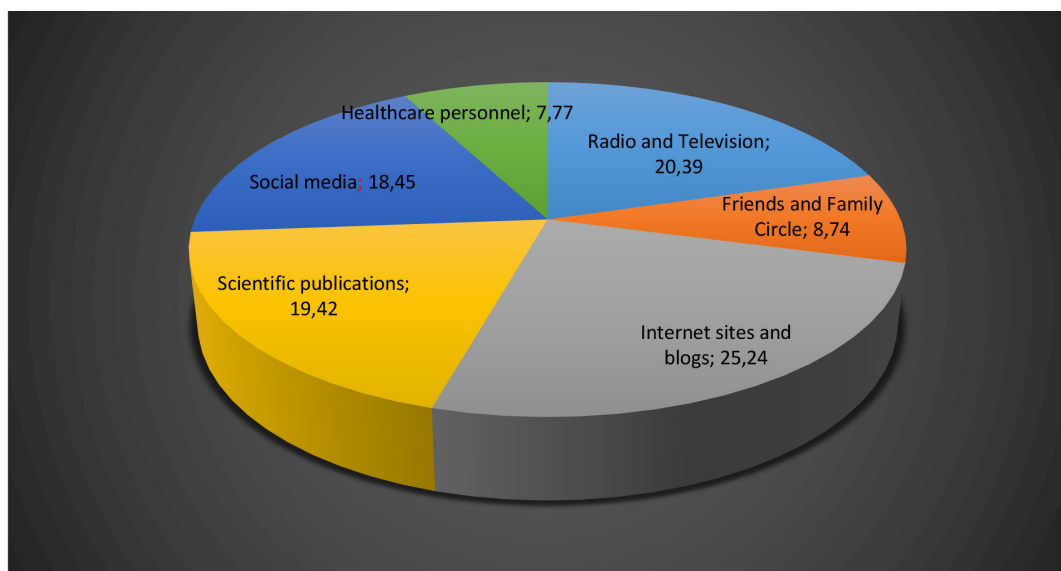


Figure 2. Information resources for those with vaccine refusal.

913 in 2013, 1,200 in 2014, 5091 in 2015, 10,000 in 2016, and 23,060 in 2017). In addition to these essential debate, COVID-19 pandemi may lead to deepen the vaccine hesitate due to propaganda of anti-vaccination supporters via social media, conventional media etc. There are several publications in the literature regarding the consequences of the decrease

in vaccinations. It has been reported that refusing the pertussis vaccine leads to a 22.8 times increase in being at risk of pertussis infection (9), and being at risk of varicella increases 8.6 times when the varicella vaccine is refused (10). Due to this and similar reasons, the WHO regards this issue as one of the leading health concerns.

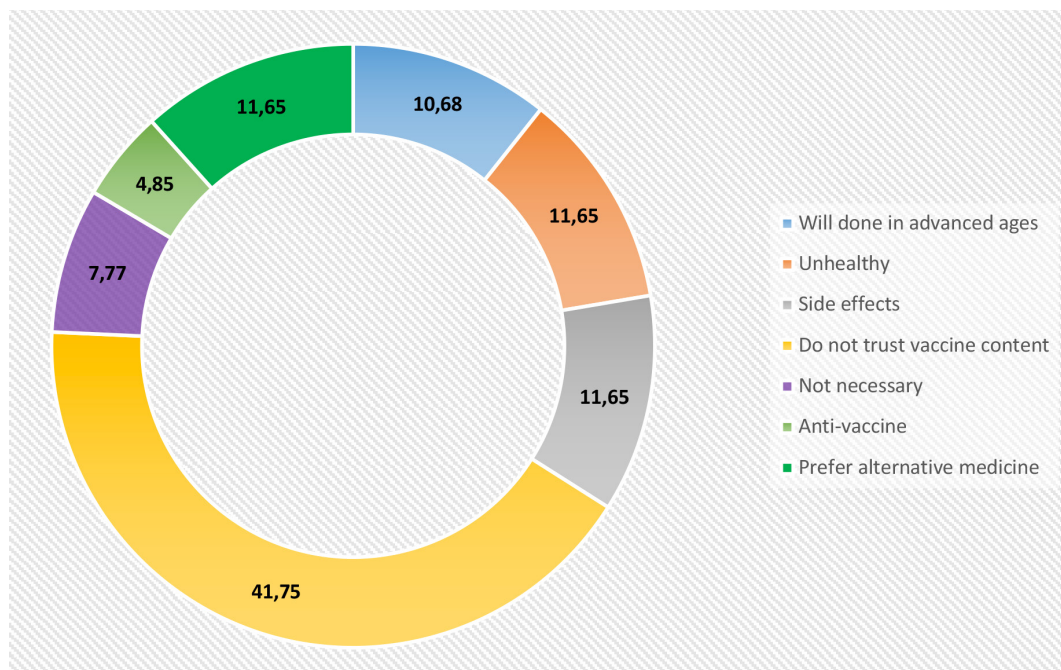


Figure 3. Reasons for vaccine refusal.

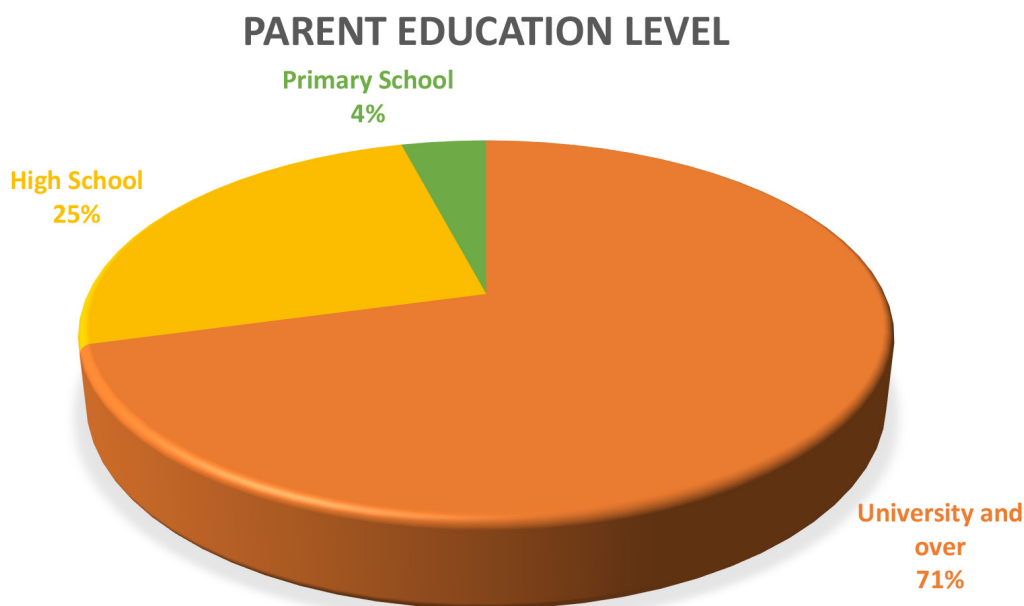


Figure 4. Education levels of mothers who refuse vaccination.

Since the SARS-CoV-2 infection, which was first identified in China in late 2019 and has in a short while become a pandemic, causing many more deaths than anticipated, vaccination studies have been completed and put into use at an unprecedented pace. Thus, vaccines have become the main topic of conversation worldwide, fueling the anti-vaccination debate. All sources of information provide a wide coverage on the general characteristics of vaccines and positive/negative opinions about vaccination campaigns. As a result of this, the discussion has gone far beyond the SARS-CoV-2 vaccine, and all vaccines have been discussed and questioned. The result is that vaccines have become a second public health problem.

Taking into account the figures revealed by our study and excluding the last one year, the rate of families refusing vaccination in the previous decade did not change significantly. Although there could be an “vaccine hesitancy” trend in worldwide, vaccine hesitancy was described as “among the 10 global health threats (5)” by WHO in 2019. However, when the pandemic became the main topic of conversation throughout the world in 2020, the number of families refusing the hepatitis B vaccine in newborn clinic increased significantly compared to previous years. A similar situation was seen in France during the H1N1 influenza vaccination campaign in 2009. With the impact of the discussions presented by the media and social networks, the vaccination rate of the population aged 18 to 75 years, which had been 90% in 2005, decreased to 61% in 2010 (11). Thus, we thought that this preliminary observation should be taken in consideration in regarding to public health policy. Furthermore, data about vaccination rate and vaccine refusal rate should be investigated in national and worldwide.

In Turkey, when the main sources of information relating to the increase in vaccine refusal are questioned, traditional and digital media seem to have a significant effect. Apart from these sources, the main channel that sustains families, who state that their decision is based on their research, are also online sources. While the primary source of the vaccine refusal group was their immediate environment and books in the early days, the internet and social media, which have increased in prevalence and accessibility in recent decades, have become more prominent.

A report prepared in France in 2016 on this matter demonstrated that family physicians, the internet and social media were the most influential factors (12). In similar study conducted in 2020, the sources of information were healthcare professionals (83.6%), internet (37.4%), and immediate environment/relatives (20.1%) (11). The degree of internet influence in our study was almost the same as that reported by Charron et al. (11), and that of obtaining information from the immediate environment was close. We believe that the difference in the number of families receiving information from healthcare professionals was due to the easier access to child development specialists, which is not very common in Turkey. Furthermore, the study examined the vaccine information sources in general, while in the present study the parents were specifically asked about the source of their decision to refuse the vaccine. A study conducted in 2020 showed a strong relationship between the refusal of the MMR vaccine and the use of the Internet as a source of information (11). In a previous study from Turkey, 39.3% of families who refused vaccinations reported that they obtained the information from healthcare professionals and social media/blogs (13).

When the reasons for vaccine refusal are questioned, distrust in the content of the vaccine appears to be significant. The featuring arguments reported by various studies include distrust in content, potential side effects due to vaccines, insufficient efficacy of vaccines, and vaccines being against belief systems/religious beliefs. These concerns, which reached 63% in total in our study, were found to be at a very similar rate in a study from Australia. In a 2017 study, the leading reasons for vaccine refusal were fear of the side effects (35.9%), suspected efficacy of the vaccine (35.9%) and distrust in the pharmaceutical industry (23.1%) (14). In a similar study from Turkey, 46.7% of the participants believed that the substances contained in vaccines were harmful, while 22.8% believed that the vaccine content were against their religious beliefs (thinking it to be sinful). The same study found the rate of not believing that vaccines were beneficial/necessary to be somewhat higher (22.8%) than the rate (8%) we established in a similar study, conducted previously (15). In the study of Topçu et al. (13), 51% of the parents expressed that the vaccines could be dangerous and they had a distrust of vaccines, while

39% had the belief that vaccines were not beneficial, which principally suggests distrust in the content.

Beyond the anti-vaccination debate, the rate of preferring alternative treatments (and prevention methods) was found to be considerably higher in some studies (16-18), this rate was relatively low in our study. This may be due to the differences in social tendencies or the unwillingness of people who use such methods in our country to share this reality. Our study observed that the rate of vaccine refusal increased considerably with the increasing level of parental education, which is consistent with several studies in the literature. Our findings clearly demonstrate that the increase in the level of maternal education is correlated with the increase in the rate of vaccine refusal. There are several studies in the literature that report similar rates, and a study conducted in Italy in 2020 reported the same result as our study (19).

The European Centre for Disease Prevention and Control has reviewed 7492 articles published in Europe since 2004 and assessed the results of 29 articles. According to the findings of the study, groups who are doubtful and hesitant about vaccination could affect society (20). When all these data are evaluated together, it is very important to inform parents accurately through effective channels in order to prevent vaccine refusal, which is an important public health issue, and to achieve the desired level of vaccination rates.

There are some concerns restricting the our findings. Our study included only the first child of the families who had more than one child in our hospital within 10 years. Since the refusal of vaccines for the next child of these families were not taken into account, the data for the following years might have a negative margin of error. Another important limitation is the range of birth admission. Although range of birth admission to our hospital was mostly between 1500-2000, number of admission in 2015 and 2018 was much higher than other days. However these higher admission was not statistically significant. The patients were asked to give a single-item response to the questions about the reason for vaccine refusal and the source of information. In general, there may be more than one reason for both of these issues. Lastly, our study sample was recruited from one hospital, thus, our results should be interpreted cautiously.

Conclusion

While it could be anticipated that people who have faced the realities a pandemic with the coronavirus epidemic, would have an increased belief in vaccines, on the contrary, vaccine refusal has increased, which is not the result we would have expected or one to which we would particularly wish to draw attention. With this study, our findings showed that the main sources supporting the increase in vaccine refusal are both traditional and social media features and that both personal accounts and healthcare professionals in these sources can mislead the society with confusing claims. The failure to effectively provide accurate information leads to an exponential increase in false information, thus risking public health and the gains of long-lasting struggles. We think that in the future it would be revealing to investigate whether the families who refused childhood vaccines have had their own coronavirus vaccines.

Ethics

Ethics Committee Approval: This study was initiated following approval by the Turkish Ministry of Health Directorate General for Health Services and the approval of the local ethics committee, dated 04.02.2021 and numbered E-10840098-772.02-1284.

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