

Mothers' Perspectives on Childhood Vaccination Programmes after the COVID-19 Pandemic and Subsequent News/Rumours About Vaccination

Annelerin COVID-19 Salgını ve Aşılama ile İlgili Haberler/Söylentiler Sonrası Çocukluk Çağı Aşılama Programlarına Bakış Açıları

Mehmet Semih DEMİRTAŞ^{1,2}, Nihal YAMAN ARTUNÇ^{2,3}

¹Department of Pediatric, Aksaray University Faculty of Medicine, Aksaray, Türkiye

²Department of Social Pediatric, Hacettepe University Institute of Health Science, Ankara, Türkiye

³Department of Pediatric, İzmir Buca Seyfi Demirsoy Training and Research Hospital, İzmir, Türkiye



ABSTRACT

Objective: Vaccine hesitation in parents against the childhood vaccination is an important public health problem that affects the whole society, especially children. In this study, we aimed to evaluate vaccine hesitancy in mothers after COVID-19.

Material and Methods: The study consisted of a total 161 mothers who applied to the pediatric outpatient clinics of the Aksaray University Hospital between February and August 2023 for the follow-up of healthy children aged 0-2 years. Sociodemographic information was obtained through a questionnaire and the vaccine hesitancy scale (VHS) was used in the study.

Results: A total 75.8% of mothers considered the routine childhood vaccination programme safe. The rate of negatively affected by vaccine news/rumours after COVID-19 infection/pandemic was 23% in the hesitant group, while this rate was 2.5% in the safe group ($p < 0.001$). The VHS score was found to be higher in the group (22.5 ± 4.96) affected by vaccine news/rumours compared to unaffected group (17.3 ± 3.99) ($p < 0.001$). The VHS score of the mothers who found childhood routine vaccination safe (19.02 ± 4.45) was lower than the hesitant group (25.41 ± 4.66) ($p < 0.001$). We found that the VHS scores of mothers with high school education or above (21.39 ± 5.19) were higher than the other group (19.39 ± 4.59) ($p = 0.014$).

Conclusion: Mothers can be affected by news/rumours and posts on social media, and therefore parents need to be aware of digital parenting and health literacy. Mothers with higher levels of education do more research on vaccination and may be more hesitant about childhood vaccination. For mothers who are trying to make the most accurate and appropriate decision for their children, the most accurate information about early vaccination/disease should be provided from all health professionals, especially pediatricians.

Key Words: Childhood, COVID-19 vaccination, Immunisation, Social media, Vaccine hesitancy

ÖZ

Amaç: Ebeveynlerin çocukluk çağı aşılarına karşı aşı tereddütleri, başta çocuklar olmak üzere tüm toplumu etkileyen önemli bir halk sağlığı sorunudur. Bu çalışmada, COVID-19 sonrası annelerde aşı tereddütünü değerlendirmeyi amaçladık.

Gereç ve Yöntemler: Çalışmaya Şubat-Ağustos 2023 tarihleri arasında Aksaray Üniversite Hastanesi pediatri polikliniklerine 0-2 yaş arası sağlıklı çocuklarının takibi için başvuran toplam 161 anne dahil edildi. Sosyodemografik bilgiler bir anket aracılığıyla elde edildi ve çalışmada aşı tereddüt ölçeği kullanıldı.



0000-0003-2965-1811 : DEMİRTAŞ MS
0000-0002-0118-6439 : YAMAN ARTUNÇ N

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Contribution of the Authors / Yazarların katkısı: DEMİRTAŞ MS: Constructing the hypothesis or idea of research and/or article, Planning methodology to reach the conclusions, Organizing, supervising the course of progress and taking the responsibility of the research/study, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study, Taking responsibility in the writing of the whole or important parts of the study, Reviewing the article before submission scientifically besides spelling and grammar. **YAMAN ARTUNÇ N:** Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in necessary literature review for the study, Taking responsibility in the writing of the whole or important parts of the study.

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Correspondence Address / Yazışma Adresi:

Mehmet Semih DEMİRTAŞ

Department of Pediatrics, Aksaray University Faculty of Medicine, Aksaray, Türkiye

E-posta: md.semihdemirtas@gmail.com

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Bulgular: Annelerin %75.8'i rutin çocukluk çağı aşılama programını güvenli buldu. COVID-19 enfeksiyonu/pandemisi sonrası aşı haberlerinden/söylentilerinden olumsuz etkilene oranı kararsız grupta %23 iken, bu oran güvenli grupta %2.5'ti ($p<0.001$). Aşı tereddüt ölçeği puanı aşı haberlerinden/söylentilerinden etkilenen grupta (22.5 ± 4.96), etkilenmeye gruba (17.3 ± 3.99) göre daha yüksek bulunmuştur ($p<0.001$). Çocukluk çağı rutin aşılamalarını güvenli bulan ebeveynlerin aşı kararsızlık ölçeği puanı (19.02 ± 4.45) kararsız gruptan (25.41 ± 4.66) daha düşüktü ($p<0.001$). Lise ve üzeri eğitime sahip annelerin aşı kararsızlık ölçek puanları (21.39 ± 5.19) diğer gruptan (19.39 ± 4.59) daha yüksek olduğu bulunmuştur ($p=0.014$).

Sonuç: Anneler sosyal medyadaki haber/söylenti ve paylaşımlardan etkilenebilmektedir ve bu nedenle ebeveynlerin dijital ebeveynlik ve sağlık okuryazarlığı konusunda bilinçli olmaları gerekmektedir. Eğitim düzeyi daha yüksek olan anneler aşılama konusunda daha fazla araştırma yapmakta ve çocukluk aşıları konusunda daha tereddütlü olabilmektedir. Çocukları için en doğru ve uygun kararı vermeye çalışan anneler için erken aşılama/hastalık konusunda en doğru bilgi başta pediatristler olmak üzere tüm sağlık profesyonellerinden sağlanmalıdır.

Anahtar Sözcükler: Çocukluk çağı, COVID-19 aşılması, Aşılama, Sosyal media, Aşı tereddütü

INTRODUCTION

SARS-CoV-2 coronavirus (COVID-19) infection has caused a pandemic, and the high mortality and morbidity rates have led to serious precautions such as lockdown and social isolation (1). Following the initiation and use of different types of vaccine studies in many countries in order to prevent the disease, discussions on the content and quality of vaccines have also developed. Speculative, misleading and misinformative news on social media and the internet without specifying the source have been effective in the spread of these concepts (2, 3). The spread of such news and the interactions of anti-vaccinationists on social media have led to an increase in vaccine hesitancy among the public and parents, which was identified by WHO as one of the top 10 problems posing a threat to global health in 2019 (4-6). With the debate against COVID-19 infection/vaccine, hesitation in childhood vaccines has increased among parents. This situation has become an important public health problem that may affect the whole society, especially unvaccinated children, against morbid and mortality diseases of childhood that can be prevented by vaccination (5, 7).

In this study, we aimed to investigate the vaccine hesitancy in childhood vaccination, which is an important public health problem and has increased among parents, more prominently after COVID-19 infection/vaccination.

MATERIAL and METHODS

This study was conducted as a cross-sectional and descriptive study.

The sample of the study consisted of a total of 161 mothers who applied to the Pediatric Outpatient Clinics at Aksaray University Training and Research Hospital in Turkey between February and August 2023 for healthy child follow-up aged 0-2 years.

Mothers of children with chronic diseases, premature infants, and children who were hospitalised due to infection/health problems were not included to study. A total of 161 out of 263 invited mothers whose child was aged 0-2 years who enrolled during the 6-month period and met the inclusion criteria participated in the study.

In the study, data were collected with a questionnaire consisting of 16 questions in total. The questionnaire was conducted face-to-face with the mothers at the time of their application to the outpatient clinic.

The questionnaire consisted of two parts. In the first part, infant's age (months), mother's and father's age and childbirth order were asked. Education level of parents was evaluated as primary, secondary, high school and university and above. In the second part of the questionnaire, mothers were asked about the routine childhood vaccination programme, COVID-19 and their vaccination ideas. Childhood vaccination information of the infant, and information about COVID-19 vaccination were asked. In addition, mothers were asked whether they were affected by social media news/rumours about vaccines about COVID-19 and vaccine-related information on social media platforms (such as Twitter, Facebook, Instagram) that today's users frequently use.

The Turkish version of the "Vaccine Hesitancy Scale" (VHS) developed by Shapiro et al. (9) was used in our study (8). The VHS is a scale consisting of 9 questions in total, each question can be answered as "strongly disagree, disagree, undecided, agree and strongly agree" and can be scored between 1-5. After the questionnaire, the VHS was scored between 9-45 points. After scoring the VHS according to a special scoring system, vaccine hesitancy is found to be higher in those with higher scores.

Mothers were informed before the study and ethical permission was obtained with the decision numbered 2023/02-06-12-SBKAEEK of Aksaray Clinical Research Ethics Committee.

Statistical Analyses

In the current study, the data was analysed IBM Statistical Package for the Social Sciences, version 24.0 (SPSS Inc., Armonk, NY, IBM Corp., USA). The Shapiro-Wilk test was performed to determine the distribution patterns of the variables. Categorical variables were presented as number or percentages. The student's t test was used to compare continuous variables between VHS and affected and unaffected from vaccine news; and first birth and other births groups; education levels of parents; infant/mother/parent's age as appropriate. The Chi-square test was used in group comparisons of nominal variables. A p value of less than 0.05 was considered as statistically significant.

RESULTS

A total of 161 mothers with children aged 0-2 years were included in the study. The mean age of the infants was 7.4 ± 1.01 months, and the mean age of the mothers was 29.8 ± 4.3 years. Of the infants, 26.1% (n=42) were 0-5 months, 33.5% (n=54) were 6-11 months, 25.5% (n=41) were 12-17 months and 14.9% were 18-24 months. Among the infants included in the study, 28% (n=45) were the first, 35.3% (n=57) were the second, and 23% (n=37) were the third infants. While 21.1% (n=34) of the mothers were university graduates and 39.1% (n=63) were high school graduates, these rates were 19.9% (n=32) and 39.1% (n=63) for the fathers, respectively. Other sociodemographic data in the study are summarised in Table I.

Childhood immunisations of 96.9% (n=156) of the infants in the study were complete according to their age. Among the parents

Table I: Demographic Feature of Participants

Demographic Feature	
Infant's age (months)*	
0-5	42 (26.1)
6-11	54 (33.5)
12-17	41 (25.5)
18-24	24 (14.9)
Birth Order*	
1st	45 (28)
2nd	57 (35.4)
3rd	37 (23)
4th	19 (11.8)
≥5 th	3 (1.9)
Mother's Age*	
18-22	23 (14.3)
23-27	41 (25.5)
28-32	51 (31.7)
33-37	39 (24.2)
≥38	7 (4.3)
Father's Age*	
18-22	17 (10.6)
23-27	29 (18)
28-32	54 (33.5)
33-37	41 (25.5)
≥38	20 (12.4)
Mother's Education*	
Primary*	26 (16.2)
Secondary	38 (23.6)
High School	63 (39.1)
University and more	34 (21.1)
Father's Education*	
Primary	28 (17.4)
Secondary	38 (23.6)
High School	63 (39.1)
University and more	32 (19.9)
Features [†]	
Infant's age	7.4 ± 1 (1-23)
Mother's age	29.8 ± 4.3 (18-45)
Father's age	34.6 ± 5.4 (19-49)

*: n(%), †: Mean \pm SD (Min-Max), **Primary**: Combined with primary, dropout and no education.

Table II: Mothers' opinions about vaccination

Feature	
Vaccine Schedule Complete*	
Yes	156 (96.9)
No	5 (3.1)
Childhood Vaccinations*	
Safe	122 (75.8)
Hesitancy	34 (21.1)
Not safety, mandatory	3 (1.9)
Not safety, Refuse	2 (1.2)
After Covid-19 infection and vaccination, has your opinion changed about previous childhood vaccinations?*	
No, it hasn't changed	111 (68.9)
Yes, I have a negative opinion about vaccinations.	11 (6.8)
Yes, vaccine hesitation occurred	39 (24.3)
Have you been affected by social media news/rumours about vaccines after COVID-19?*	
Yes, my opinion about vaccinations has been negatively affected.	49 (30.4)
Yes, I have become hesitant about vaccinations.	52 (32.3)
No, I was not affected	60 (37.3)
How do you evaluate the news about childhood vaccinations by independent sources on social media?*	
They provide the public with untold information about vaccinations.	34 (21.1)
They are making false propaganda.	26 (16.1)
I think that they direct the public in a negative direction with false/misleading news about vaccines	19 (11.8)
They create information pollution without citing sources.	27 (16.8)
They mislead the public with false and biased sources.	30 (18.6)
They convey the truth to the public as an alternative to the one-sided information created by pharmaceutical/vaccine companies	25 (15.5)

*: n(%), Childhood immunisations were carried out in accordance with the age of the previous or current child

who participated in the study, 75.8% (n=122) answered that childhood immunisations were safe, 21.1% (n=34) answered that they were undecided but had them, and 1.2% (n=2) answered that they were not safe and did not have them (Table II).

After the COVID-19 infection, 6.8% (n=11) of the mothers stated that they were negatively affected, 24.3% (n=39) were unhesitant. Of the participants, 30.4% (n=49) stated that they were negatively affected, 32.3% (n=52) were hesitant, and 37.3% (n=60) were unaffected by the COVID-19 vaccine news (Table II).

Mothers stated that 16.1% (n=26) of the vaccine news on social media contained false propaganda, 16.8% (n=27) created information pollution, 11.8% (n=19) provided false and misleading information, 21.1% (n=34) presented information

Table III: Evaluation of the mothers' opinion about childhood vaccination programs.

Feature	Safe* 122 (75.8)	Not Safe*† 39 (24.2)	p
Vaccination News/rumours			
Affected	28 (23)	21 (53.8)	0.001
Hesitancy	41 (33.6)	11 (28.2)	
Not affected	53 (43.4)	7 (17.9)	
Birth Order			
1 st	30 (24.6)	15 (38.5)	0.070
2 nd and more ^B	92 (75.4)	24 (61.5)	
Vaccine Opinion†			
Negative	3 (2.5)	8 (20.5)	<0.001
Hesitancy	21 (17.2)	18 (46.2)	
Not affected	98 (80.3)	13 (33.3)	
Infant's age			
<12 month	74 (77.1)	22 (22.9)	0.638
≥12 month	48 (73.8)	17 (26.2)	
Mother's age			
<33 year	89 (77.4)	26 (22.6)	0.450
≥33 year	33 (71.7)	13 (28.3)	
Father's age			
<33 year	74 (76.3)	23 (23.7)	0.852
≥33 year	48 (75.0)	16 (25.0)	
Mother's Education			
8 years of education and below	54 (78.1)	10 (21.9)	0.572
High school and above	68 (74.2)	29 (25.8)	
Father's Education			
8 years of education and below	70 (73.7)	25 (26.3)	0.457
High school and above	52 (78.8)	14 (21.2)	

*: n(%), †: After COVID-19 infection/vaccination, *Combined with vaccine hesitancy and negative impacted, †: Combined with 2, 3, 4, 5 and more

that was not told to the public, and 15.5% (n=25) presented alternative and different information that was not provided by pharmaceutical/vaccine companies (Table II).

No significant results were found when the age of the mothers, the birth order of infants, and maternal education level were compared with the status of being affected by vaccination news ($p=0.398$, $p=0.283$, $p=0.316$, respectively).

When childhood routine vaccination was compared with the change of opinion after COVID-19, 80.3% of those who considered childhood routine vaccination safe stated that their opinions were not affected and 2.5% stated that their opinions were negatively affected, while these rates were 33.3% and 20.5%, respectively, in the undecided group ($p<0.001$). Likewise, when compared with vaccination news, 43.4% of the mothers who considered vaccination safe were not affected by vaccination news and 23% were negatively affected, while this rate was found to be 17.9% and 53.8% in the undecided group ($p=0.001$) (Table III).

The VHS score in the study was 20.57 ± 5.27 (Table IV). When the VHS score was compared between the group affected and unaffected by vaccine news, the vaccine scale score was found to be 22.5 ± 4.96 in the group affected by vaccine news/rumours, while the scale score was found to be 17.3 ± 3.99 in the unaffected group ($p<0.001$). When mothers with the first child and parents with 2 or more children were compared, the VHS score was found to be 21.24 ± 6.03 and 20.3 ± 4.93 , respectively ($p=0.313$) (Table V).

There were no significant differences between the groups when VHS scores were compared according to maternal, paternal

Table IV: Vaccine Hesitancy Scale

Vaccine Hesitancy Scale	Strongly Disagree*	Disagree*	Hesitant*	I agree*	Absolutely I agree*
1. Childhood vaccinations are important for my child's health	0 (0)	0 (0)	20 (12.4)	70 (43.5)	71 (44.1)
2. Childhood vaccines are effective	0 (0)	1 (0.6)	22 (13.7)	60 (37.3)	78 (48.4)
3. Having my child vaccinated is important for the health of others in my community	1 (0.6)	2 (1.2)	31 (19.3)	56 (34.8)	71 (44.1)
4. All childhood vaccines offered by the government to our society are beneficial.	0 (0)	4 (2.5)	52 (32.3)	42 (26.1)	63 (39.1)
5. New vaccines carry more risk than old vaccines.	6 (3.7)	8 (5)	43 (26.7)	40 (24.8)	64 (39.8)
6. The information I have received about vaccines from the vaccination programme is reliable and trustworthy.	0 (0)	10 (6.2)	49 (30.4)	51 (31.7)	51 (31.7)
7. Vaccination is a good way to protect my children from diseases.	0 (0)	1 (0.6)	25 (15.5)	77 (47.8)	58 (36)
8. I usually do what my doctor or other health professionals (midwife, nurse, etc.) recommend for my children about vaccines.	0 (0)	7 (4.3)	27 (16.8)	81 (50.3)	45 (28)
9. I am concerned about serious side effects of vaccines	67 (41.6)	42 (26.1)	36 (22.4)	9 (5.6)	6 (3.7)
Feature					
Vaccine Hesitancy Score†	20.57 ± 5.27 (9-31)				

*: n(%), †: mean ±SD (Min-Max)

Table V: Evaluation of the vaccine hesitancy scale score in groups.

Feature	Number	Mean ± SD	t	df	p*
Vaccine news/rumours					
Affected [†]	101	22.50±4.96	6.92	144.85	<0.001
Not affected	60	17.30±3.99			
Opinion on Childhood Vaccination					
Safe	122	19.02±4.45	-7.7	61.67	<0.001
Not Safe [†]	39	25.41±4.66			
Birth Order ^β					
1	45	21.24±6.03	1.01	68.05	0.313
Multiple birth order ^β	116	20.30±4.93			
Infant's age					
<12 month	96	20.08±5.09	-1.44	131.05	0.154
≥12 month	65	21.29±5.45			
Mother's age					
<33 year	115	20.10±5.11	-1.80	77.82	0.075
≥33 year	46	21.74±5.50			
Father's age					
<33 year	97	20.48±5.03	-0.29	124.35	0.774
≥33 year	64	20.72±5.62			
Mother's Education					
≤8 years [‡]	64	19.39±4.59	2.47	145.52	0.014
≥High school [§]	97	21.39±5.19			
Father's Education					
≤8 years [‡]	66	19.95±5.58	1.38	118.42	0.170
≥High school [§]	95	21.04±4.42			

*: Student t-test, †: Vaccine hesitancy and negative impacted were combined ‡: 8 years of education and below were combined, §: High school and university graduates combined, β: 2,3,4,5 and more birth order were combined

and infant age ($p=0.075$, $p=0.774$, $p=0.154$, respectively). When mothers who were hesitant about routine childhood vaccination and those who did not find it safe were formed into a group and compared, the scale score of the parents who thought it was safe was 19.02 ± 4.45 , while this score was 25.41 ± 4.66 in the other group ($p<0.001$). When maternal and paternal education level was compared with high school and above and others, VHS scores were not different in the paternal group ($p=0.170$), whereas in the maternal group, a significant difference was found in favour of higher hesitancy for the group with high school and above (21.39 ± 5.19 vs 19.39 ± 4.59) education ($p=0.014$) (Table V).

DISCUSSION

Vaccine hesitancy means delaying vaccination or accepting that the vaccine will work but hesitating to vaccinate (10). It is possible to say that digital platforms play an important role in the rise of vaccine hesitancy, and that the anti-vaccine discourses that individuals encounter in the digital environment have a significant effect on vaccine hesitancy (11, 12). The lack of a scientific standard for posting/sharing health information in digital media and the fact that the information in these media can be easily changed, distorted or created anonymously with misleading statements cause a lot of inaccurate content and even various conspiracy theories about vaccination to spread rapidly among users (13, 14). Parents, who make the final decision in

providing the most accurate and best health service for their children, often prefer social media due to its easy accessibility in obtaining information (15). Anti-vaccination campaigns that are encountered within the scope of digital parenting increase the risk perception of vaccines in parents, and this situation results in parents refusing or delaying vaccination (16, 17). In this study, we found that the percentage of being affected by vaccine news/rumours after COVID-19 was 53% and the VHS score (22.5 ± 4.96) was higher in mothers who were hesitant about childhood vaccination compared to the other group ($p = 0.001$, $p<0.001$, respectively). This result shows us that mothers can be affected by news and posts on social media. Therefore, parents should be aware of digital parenting and health literacy.

In studies on vaccine hesitancy/refusal and parental education levels, there are different studies showing that vaccine hesitancy/refusal increases with decreasing and increasing education levels of mothers (18-22). Opel et al. (23) In their study conducted in the USA, it was reported that vaccine hesitancy increased 3.72 times in mothers with a higher level of education, and similarly, in the study conducted by Facciola et al. (24) in Italy, it was reported that vaccine hesitancy was higher in mothers with a higher level of education. In our study, we found no difference between the level of maternal education and trust in the routine childhood vaccination programme ($p=0.572$), but we found that VHS score was higher in mothers with high school and above education ($p=0.014$). This result made us think that mothers with a higher level of education

did more research on vaccines and had more hesitations about most childhood vaccines with the information they obtained from different information sources they encountered.

The effect of parental age on childhood vaccination programme varies. Experience and expertise play a role in this, as well as the influence of parents on social media and news (25, 26). In a large-scale study conducted in sub-Saharan Africa, it was shown that vaccination hesitancy increased by 5% for every 1-year decrease in maternal age (27). In a vaccine hesitancy study conducted in Turkey, it was shown that vaccine hesitancy was higher in mothers aged 18-30 years compared to mothers aged 31-40 years (28). In a study on routine childhood vaccination conducted in India, it was found that maternal age did not show any effectiveness between 19-25 years and 26-35 years and above 35 years (29). In our study, although we determined that the VHS score of the <33 age group was lower than the other group, we found that maternal age had no effect on vaccine hesitancy ($p=0.075$).

Childhood vaccination aims to prevent morbid and mortal diseases in the childhood age group and to protect not only the vaccinated children but also the whole society with herd immunity (30). In this context, each country has its own childhood vaccination programmes, and vaccination programmes are revised according to regional and national health conditions (31, 32). According to the 2008-2013 and 2018 Turkey Demographic and Health Survey (TDHS) data, there is a remarkable decrease in the age-appropriate vaccination rate between 12-23 months in our country (77%, 74% and 67%, respectively) (33). Parents' attitudes, experiences and knowledge about vaccination, as well as their attitudes and concerns about vaccine safety, are all influential in determining whether or not a child should be vaccinated (34,35). Families' experiences and knowledge of childhood illnesses influence parents' attitudes towards vaccine-preventable diseases and their perceptions of the likelihood of their children being affected (35). In our study, we found that the rate of being affected by COVID-19 vaccine news/rumours was significantly lower in those who considered childhood vaccination safe (2.5%) compared to the undecided/hesitant group (23%) ($p<0.001$). This result may be related to that mothers who have knowledge and confidence about diseases and vaccination are less affected by the news.

Strength and Limitations

Our study is an important study in the field of vaccine hesitancy, which is a basic public health issue and increased after COVID-19, and we consider it as a pioneering study for cohort studies. One of the limitations of our study was that it did not start before the COVID-19 pandemic and was not conducted as a cohort study with the same participants longitudinally until the end of the pandemic. Other limitations were that it was not a multicentre study and the number of volunteer participants was not high.

CONCLUSION

Vaccination for vaccine-preventable diseases in childhood also shows that mothers are affected by news/rumours reports in social media that are not based on basic scientific basis. The fact that we found that mothers who have knowledge about vaccine/disease and trust the vaccination programme are less affected by the news and have lower vaccine hesitancy scale scores shows us that mothers should be informed about vaccine/disease in the early period of childhood. It is revealed that mothers with higher levels of education do more research on vaccination and have more hesitations on this issue, therefore, it is necessary to answer the hesitations/questions of families about vaccination during routine child visits and to inform families more about the vaccines administered. For mothers who are trying to make the most accurate and appropriate decision for their children, the most accurate information about vaccination/disease in the early period should be provided by all healthcare professionals, especially pediatricians.

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