HEALTH PROMOTION

Identification of Community Vaccine Hesitancy: A Descriptive-Cross-Sectional Study

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Keywords

Vaccine • Vaccine hesitancy • Cross-sectional studies • Public health

Summary

Background. *Vaccine hesitancy has become one of the ten global health challenges to be addressed, given its increasing global prevalence.*
Aim. *This study aimed to identify community vaccine hesitancy and the factors influencing vaccine hesitancy in a provincial center.*
Methods. *This descriptive cross-sectional research was conducted with 215 adults seeking care at a family health center for any reason. The data collection instruments included the Descriptive Characteristics Questionnaire and the Vaccine Hesitancy Scale. Determinants of vaccine hesitancy were examined through multiple regression analysis (enter model). The STROBE (cross-sectional research model) guidelines were employed for reporting research data.*
Results. *Among participants, 35.3% had a bachelor's degree or higher, 62.3% were employed, and 76.7% had children. 71.2% of the participants had not received education about vaccines, with only 45.6% considering all vaccines necessary and beneficial. Additionally, 16.2% of the participants with children were identified as having under-vaccinated children. Belief in the necessity and benefits of all vaccines (β = -0.245, 95% CI: -4.715 to -1.453), belief in making vaccination mandatory (β = -0.137, 95% CI: -4.873 to -0.083), receiving the COVID-19 vaccine (β = -0.169, 95% CI: -5.925 to -0.947), and receiving the flu vaccine (β = -0.158, 95% CI: -3.828 to -0.429) were determined to be protective against vaccine hesitancy. These variables explained 24.3% of vaccine hesitancy.*
Conclusions. *The assessment revealed that the community exhibited moderate vaccine hesitancy and did not perceive all vaccines as necessary and beneficial. Considering the impact of vaccines on preventing infectious diseases, reducing disabilities, and preventing deaths, it is recommended to provide information about the seriousness of the diseases prevented by vaccines and the importance of vaccines.*

Introduction

One of the most critical public health practices among primary preventive measures for preserving health, promoting its enhancement, and preventing infectious diseases is vaccination. It is estimated that vaccination prevents 3.5-5 million deaths annually [1]. Despite the recognized significance of vaccination in curbing infectious diseases, global vaccine hesitancy has been on the rise in recent years, leading to a decline in immunization rates. The increase in vaccine hesitancy and the decrease in immunization rates have resulted in a surge in infectious disease cases in many countries, such as the United States, the United Kingdom, Egypt, and India, with notifications of various epidemic diseases, particularly measles [2-6].
In response to the global increase in vaccine hesitancy, the World Health Organization (WHO) established the Strategic Advisory Group of Experts on Immunization (SAGE) [7]. Addressing vaccine hesitancy has been recognized as one of the ten global health challenges [8]. Concerns have been raised that if the current pace of increase in vaccine hesitancy continues, immunization rates may fall below critical levels within the next five years, leading to the resurgence of infectious diseases and potential epidemics and deaths [9]. Recognizing the potential implications of vaccine hesitancy on significant public health issues, SAGE has emphasized the need for further research in this area [10].
Vaccine hesitancy can be influenced by diverse factors, including the level of knowledge and awareness about vaccines, past vaccination experiences, the influence of prominent community figures, the activities of anti-vaccine advocates, and accessibility to healthcare [10]. Notably, in contemporary times, a significant number of individuals have limited exposure to vaccine-preventable infectious diseases, and they focus more on the potential side effects and safety risks of vaccines rather than the severity of vaccine-preventable diseases [11]. The increased use of the internet as a primary source of information has facilitated the rapid spread of 'vaccine injury claims' worldwide, causing vaccine hesitancy and refusals within communities. Moreover, the promotion and marketing of traditional and alternative medicine products such as cupping therapy, acupuncture, honey, pollen, royal jelly, and organic products instead of vaccines have become more widespread, further causing the rise in vaccine hesitancy [12, 13].
In Turkey, similar to the global trend, vaccine hesitancy and refusals are on the rise [14]. Specifically, the

percentage of children who have received all their vaccines has decreased to 67%, and only 50% of 24-35-month-old children have been vaccinated appropriately since 2013 [14]. Examining vaccine hesitancy and its reasons is crucial for preventing infectious and epidemic diseases and safeguarding public health [15]. In the context of this study, it is deemed essential to explore the community's perspectives on vaccination and vaccine hesitancy. A review of relevant literature on vaccine hesitancy in Turkey reveals a predominant focus on investigating parental vaccine hesitancy [15-17]. However, there is a notable dearth of research addressing community-based vaccine hesitancy and identifying its associated risk factors [18], highlighting a significant gap in the existing literature.

Given this background, the primary objective of this study is to assess vaccine hesitancy in a provincial center in Turkey and ascertain its influencing factors, thereby contributing to the existing literature. The research sought answers to the following questions:

1. What is the prevailing community perception regarding vaccination?
2. What is the level of vaccine hesitancy in the community?
3. What are the factors influencing vaccine hesitancy in the community?

Methods

Purpose and Study Design

This research was designed as a descriptive cross-sectional study to determine vaccine hesitancy and the influencing factors among the community in a provincial center in Turkey. The STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines were used in the presentation of the research data [19].

Study Setting and Participants

The population of the study consisted of individuals aged 18 and above residing in the provincial center of Artvin, Turkey. The reason for conducting the study in Artvin was the absence of prior research on vaccine hesitancy in this region, highlighting a gap in the existing literature. The research was conducted at a primary healthcare center frequently utilized by the community for their healthcare needs. During the research process, adults seeking services at the primary healthcare center for any reason were invited to participate, and the research was concluded with the inclusion of 215 adults. For data analysis, multiple regression analysis was utilized. The literature suggests that 10-20 data points are necessary for each independent variable in multiple regression analysis [20]. Consequently, the sample size in this study is considered adequate for conducting the analyses.

Data Collection Tools

The research data were collected using the Descriptive Characteristics Questionnaire and the Vaccine Hesitancy Scale.

Descriptive Characteristics Questionnaire

Prepared by reviewing the literature [15-22], this questionnaire consists of three sections: a) Sociodemographic Information Section, b) Childhood Vaccination Section, and c) Individual Vaccination Practices and Thoughts on Vaccines Section. The Sociodemographic Information Section includes 8 questions on some characteristics of the participants such as age, gender, marital status, and employment status. The Childhood Vaccination Section comprises 12 questions investigating parents' administration of childhood vaccinations and specific vaccines for their children. The Individual Vaccination Practices and Thoughts on Vaccines Section includes 12 questions assessing participants' education on vaccines, the most frequently used source of information about vaccines, following vaccine-related content on social media platforms, receiving vaccinations for COVID-19, Hepatitis A, tetanus, and influenza, as well as thoughts on vaccine benefits and administration.

Vaccine Hesitancy Scale

The scale is a measurement tool developed by the SAGE working group to determine parental vaccine hesitancy regarding childhood vaccinations. It has undergone validity and reliability studies by Shapiro et al. (2018) [23]. The scale, adapted by Luyten et al. (2019) to assess hesitancy towards all vaccines in the community, has been validated for Turkish culture by Yılmaz et al. (2021). The Turkish version of the scale is reported to be a valid and reliable measurement tool for identifying vaccine hesitancy in the community. The scale consists of a total of 9 items rated on a five-point Likert scale (1: strongly disagree, 5: strongly agree). There is no cut-off point for the scale, and the total score ranges from 9 to 45. An increase in the total score on the scale indicates a decrease in vaccine hesitancy. The Cronbach's Alpha for the scale was reported as 0.874 [22]. In this study, the Cronbach's Alpha was calculated as 0.835.

Data Collection Procedure and Inclusion Criteria

The data were collected by the researchers between June 1, 2023, and September 30, 2023. Adults aged 18 and above, seeking services at the family health center for any purpose, were informed about the research theme and procedures, and subsequently, they were invited to take part in the study. Those adults who willingly volunteered to participate were provided with the data collection instruments and subsequently incorporated into the research. The response time for completing the data collection tools was 4-5 minutes, and the research data were collected after obtaining ethical committee and institutional approval.

Data Analysis

The research data were analyzed using the Statistical Package for Social Sciences (SPSS) 25.0 software. Descriptive statistics, including number and percentages,

Tab. I. Sociodemographic characteristics of the participants (n: 215)..					
Characteristics	Number	Percentage	Characteristics	Number	Percentage
Level of Education			**Place of residence**		
Primary or middle school	76	35.5	City	170	79.1
High school	63	29.3	Town	31	14.4
Bachelor's degree or above	76	35.3	Village	14	6.5
Perceived income			**Presence of social security**		
Income lower than expenses	35	24.2	Yes	178	82.8
Income equal to expenses	124	57.7	No	37	17.2
Income higher than expenses	39	18.1			
Family type			**Experiencing difficulty in accessing healthcare services**		
Nuclear family	174	80.9	Yes	24	11.2
Extended family	28	13.0	No	191	88.8
Single-parent family	13	6.0			
Employment status			**Presence of children**		
Yes	134	62.3	Yes	166	77.2
No	81	37.7	No	49	22.8

Tab. II. Childhood Vaccination Practices of Parents (n: 166).

Characteristics	Number	Percentage	Characteristics	Number	Percentage
Incomplete Vaccination			**CPV**		
Yes	27	16.3	Yes	146	88.0
No	139	83.7	No	20	12.0
Vaccination card			**MMR vaccine**		
Present	86	51.8	Yes	162	97.6
Not present/lost	80	48.2	No	4	2.4
Special vaccination			**Oral polio vaccine**		
Yes	53	31.9	Yes	152	91.6
No	113	68.1	No	14	8.4
Hepatitis B vaccine			**Tetanus vaccine**		
Yes	155	93.4	Yes	159	96.4
No	11	6.6	No	6	3.6
BCG vaccine			**Hepatitis A vaccine**		
Yes	163	98.2	Yes	157	94.6
No	3	1.8	No	9	5.4
Pentavalent vaccine			**Chickenpox Vaccine**		
Yes	147	91.6	Yes	160	96.4
No	18	8.4	No	6	3.6

BCG: Tuberculosis vaccine, CPV: Conjugate pneumococcal vaccine, MMR: Measles, mumps, rubella vaccine.

were utilized for the evaluation of descriptive data. The distribution of the total scores of the Vaccine Hesitancy Scale was assessed using the Kolmogorov-Smirnov test, and it was determined that the assumptions of normal distribution for the dataset were met, allowing for the use of parametric tests. Multiple regression analysis (enter method) was employed to examine the determinants of vaccine hesitancy. Categorical variables included in the model were transformed into dummy variables (with zero as the reference), and protective factors for vaccine hesitancy were investigated. There were no missing data in the research, and no data imputation methods were employed. A significance level of $p < 0.05$ was considered in the interpretation of all analysis results.

Ethical Considerations

Prior to the research, ethical committee approval (Number: E-18457941-050.99-68822, Date: 01.11.2022) and institutional approval (Number: E-17720518-514.01.02-216530312, Date: 29.05.2023) were obtained. Before initiating the study, participants were informed about the research and its content, and their consent was obtained. This research was conducted in accordance with the principles of the Helsinki Declaration.

Results

Of the participants, 35.3% have a bachelor's degree or higher, 62.3% are employed, and 76.7% have children (Tab. I). The average age of the participants is 41.7 ± 12.4 (Min: 19, Max: 71), and the average number of children is 2.5 ± 1.6 (Min: 1, Max: 5).

Regarding the immunization status of the participants' children, it was found that 16.3% of the children were incompletely vaccinated, 48.2% did not have a vaccination card, and 31.9% had received special vaccinations for their children (Tab. II).

The analysis of the participants' vaccine knowledge and certain vaccination practices revealed that 71.2% had not received any education about vaccines, 33% acquired vaccine information from social media, and

Tab. III. Participants' Sources of Vaccine Information, Thoughts on Vaccines, and Certain Vaccination Practices (n: 215).

Characteristics	Number	Percentage	Characteristics	Number	Percentage
Receiving Vaccine Education			**Willingness to Receive Vaccine Education**		
Yes	62	28.8	Yes	128	59.5
No	153	71.2	No	87	40.5
Obtaining Vaccine Information from Social Media			**Following the Official Accounts of Public Institutions on Social Media**		
Yes	71	33.0	Yes	79	36.7
No	144	67.0	No	136	63.3
Receiving Vaccine Information from Primary Healthcare			**Vaccine Information Source**		
			Doctors and Nurses	100	46.5
Yes	158	73.5	WHO and Ministry of Health	33	15.3
No	57	26.5	Internet and Social Media	46	21.4
			Newspaper, Magazine, TV	36	16.7
Tetanus vaccine			**Flu vaccine**		
Yes	167	77.7	Yes	69	32.1
No	48	22.3	No	146	67.9
Hepatitis A vaccine			**COVID-19 vaccine**		
Yes	111	51.6	Yes	192	89.3
No	104	48.4	No	23	10.7
Thoughts on vaccines			**Thoughts on Mandatory Vaccine Administration**		
All beneficial and necessary	98	45.6			
Beneficial but not necessary	100	46.5	Should be mandatory	185	86.0
Not beneficial and not necessary	7	3.3	Should be optional	30	14.0
I have no opinion	10	4.7			

46.5% considered healthcare professionals, particularly doctors and nurses, as their primary source of vaccine information. Furthermore, 77.7% of participants received tetanus vaccination, and 32.1% were administered influenza vaccination. Regarding vaccine attitudes, only 45.6% believed that all vaccines were necessary and beneficial, while 86% expressed the view that vaccine administration should be a mandatory practice (Tab. III). The participants' mean score on the Vaccine Hesitancy Scale (VHS) was determined to be 30.6 ± 6.3. The determinants of vaccine hesitancy were explored through multiple regression analysis. The belief that all vaccines are necessary and beneficial (β = -0.245) contributed to a decrease of 3.0 points. Additionally, the belief that vaccine administration should be mandatory (β = -0.137) led to a reduction of 2.4 points. Receiving the COVID-19 vaccine (β = -0.169) resulted in a decrease of 3.4 points while receiving the flu vaccine (β = -0.158) contributed to a reduction of 2.1 points. Overall, these factors resulted in a lower total scale score. The model explains 24.3% of the variance in vaccine hesitancy (Tab. IV).

Discussion

Vaccines stand as one of the most effective public health interventions, contributing to numerous successes in the history of medicine. Despite the multitude of achievements attributed to vaccines, coupled with statistically validated outcomes, there is a growing global trend of vaccine hesitancy, resulting in a reduction in vaccination rates [6]. Recognizing that vaccine hesitancy and refusals can result in significant public health issues, the Strategic Advisory Group of Experts on Immunization (SAGE) emphasizes the importance and necessity of further research on the subject [10].

This research, conducted in an urban center, aimed to investigate the community's perspectives on vaccines, vaccine hesitancy, and the factors influencing them. The study revealed that factors such as education level, perceived income, and place of residence did not emerge as determinants of vaccine hesitancy. While existing literature frequently emphasizes the significance of sociodemographic characteristics in vaccine hesitancy [2, 3, 15], the observed disparity in this study's results is attributed to the prevalent and widespread nature of vaccine hesitancy within the community.

The research revealed that getting flu and COVID-19 vaccines is a protective factor against vaccine hesitancy. The literature reports that adults who receive vaccines tend to have lower vaccine hesitancy [2, 4, 24]. The analysis of the SAGE vaccine hesitancy continuity matrix reveals that vaccine hesitancy and vaccine demand are inversely related, indicating that an increase in vaccine hesitancy leads to a decrease in vaccine demand [25]. The research findings indicate that adults who choose to get vaccinated demonstrate increased awareness of the individual health advantages associated with vaccination, leading to reduced vaccine hesitancy and greater acceptance of vaccine applications. Additionally, the optional and fee-based administration of these vaccines in adulthood implies that individuals possess knowledge about these vaccines and their associated benefits. Considering the effectiveness of vaccination in reducing infectious diseases, it is recommended to provide information about the benefits of vaccines and increase awareness about the gains achievable through individual vaccination. Moreover, it is anticipated that such information will be effective in reducing vaccine hesitancy.

Tab. IV. Determinants of vaccine hesitancy (enter model).

Independent variables	Unstandardized Coefficients		β	t	p	95.0% CI
	B	SE				
Level of education (0: Bachelor's degree and above)	-1.379	0.872	-0.105	-1.581	0.115	-3.099 – 0.340
Perceived income (0: Income higher than expenses)	-1.379	1.009	-0.108	-1.742	0.083	-3.749 – 0.232
Place of residence (0: Village)	-0.849	1.583	-0.033	-0.536	0.592	-3.970 – 2.272
Having received training on vaccines (0: Yes)	-1.391	0.909	-0.101	-1.530	0.117	-3.183 – 0.401
Having received COVID-19 vaccine (0: Yes)	-3.436	1.262	-0.169	-2.722	0.007	-5.925 – -0.947
Having received tetanus vaccine (0: Yes)	0.078	1.080	0.005	0.072	0.943	-2.051 – 2.206
Having received Hepatitis A vaccine (0: Yes)	-0.135	0.913	-0.011	0.148	0.883	-1.935 – 1.665
Having received flu vaccine (0: Yes)	-2.128	0.863	-0.158	-2.469	0.014	-3.828 – -0.429
Vaccine practices (0: Beneficial and all necessary)	-3.084	0.827	-0.245	-3.728	< 0.001	-4.715 – -1.453
Thoughts on vaccine administration (0: Mandatory)	-2.478	1.215	-0.137	-1.339	0.043	-4.873 – 0.083

CI: confidence interval; SE: standard error; β: standardized regression coefficient.
Durbin-Watson = 1.943; F = 10.808, p < 0.001; R = 0.517, R2 = 0.268 Adjusted R2 = 24.3%
* The significance level was accepted as p < 0.05.

The current study unveiled that the community acquires information about vaccines through the internet/social media (21.4%) and television/newspapers (16.7%), with a relatively low percentage following official social media accounts (36.7%). These findings highlight deficiencies in accessing reliable sources of information about vaccines within the community. Moreover, the limited number of participants who received education about vaccines implies educational and informational gaps in the community's understanding of vaccines. It is reported in the literature that individuals who receive information about vaccines from sources other than healthcare professionals, and those who use social media and the internet as information sources, tend to have higher vaccine hesitancy [26, 27]. Misinformation and disinformation about vaccines are among the most significant reasons for vaccine hesitancy and refusal among parents and adults [17, 28]. Moreover, false information disseminated through social media and the internet can quickly reach large audiences, posing a greater risk for vaccine hesitancy and refusal [29]. In this context, conducting education and awareness campaigns to ensure that the community receives information about vaccines, supporting the ability to access accurate and reliable information, and providing guidance on how to access reliable information are crucial.

The study revealed that some participants have children with incomplete vaccinations. Several studies in Turkey have identified under-vaccination concerning childhood immunizations [9, 15]. National-level investigations also indicate prevalent cases of under-vaccination in children [14]. To ensure the success of vaccination programs and control infectious diseases, achieving high immunization coverage within the community is paramount. A decrease in immunization coverage jeopardizes community immunity, escalating the risk of infectious diseases. Hence, maintaining adequate immunization coverage is vital for preventing infectious diseases and safeguarding public health [6]. In this context, it is recommended to explore the reasons behind rejected or delayed vaccine applications, assess the factors contributing to vaccine hesitancy, and provide information about the diseases these vaccines protect against, along with potential consequences when vaccines are not administered.

The most significant finding of the study is that the belief in the necessity of vaccines plays a pivotal role in vaccine hesitancy. The findings underscore that the perception that vaccines are both beneficial and indispensable serves as a safeguarding element against vaccine hesitancy within society. Vaccination is one of the most effective public health interventions, and since the discovery of vaccines, the incidence of infectious diseases and related deaths has sharply declined. However, these successful outcomes have led to the paradox of vaccines becoming victims of their own success. In communities that have not experienced infectious diseases and related disabilities and deaths, the perception has emerged that vaccines are unnecessary and not beneficial [21, 30].

Furthermore, misinformation about vaccines shared on social media, along with vaccine opposition narratives disseminated by non-experts and public figures, has contributed to the belief that vaccines are not beneficial or even harmful [27, 28, 31]. The literature suggests that individuals who believe in the benefits of vaccines and exhibit positive attitudes towards vaccinations are less likely to experience vaccine hesitancy [32, 33]. Considering the association between vaccine hesitancy, increasing vaccine refusals, and decreasing immunization rates, providing information about the severity of infectious diseases and the benefits of vaccines and organizing educational programs can be crucial in supporting the belief in the benefits of vaccines. Additionally, highlighting the successes achieved in diseases like smallpox, polio, and rabies through the discovery of vaccines can contribute to reinforcing the belief in the necessity and benefits of vaccines.

Limitations

While this research contributes to the existing literature, it comes with certain limitations. Primarily, the study was confined to a single city center, and data collection was limited to a specific healthcare institution. Another constraint is that the data collection period coincided with the summer, potentially resulting in the absence of residents due to reasons such as holidays. Additionally, the city's tourism resources may attract individuals from different cities and regions, including those who do not reside in the central city. This poses a limitation as the research group may not fully represent the entire population of the city. Consequently, the research findings may not be entirely generalizable to the broader population. Despite these limitations, the results of the research are crucial in shedding light on vaccine hesitancy within the community, the perception that vaccines are harmful and unnecessary despite vaccination achievements, and the necessity for vaccine-related information and education.

Conclusions

In this study conducted in a city center in Turkey to determine the vaccine hesitancy within the community and the influencing factors, it was concluded that the community has a moderate level of vaccine hesitancy. A significant portion of the community was found to believe that vaccines are not beneficial and are harmful. A substantial part of the community, around one-third, has not received any education about vaccines, and a portion of their children is incompletely vaccinated. The study identified that individual vaccine acceptance and the belief that vaccines are beneficial and necessary serve as protective factors against vaccine hesitancy.
The research findings align with existing literature and contribute to the literature. Considering that the belief in the usefulness and necessity of vaccines serves as a protective factor against vaccine hesitancy, it is recommended to increase awareness about the seriousness of infectious diseases and the benefits of vaccines through informative campaigns. Emphasis should be placed on obtaining information about vaccines from healthcare professionals such as doctors and nurses, as well as official organizations like the World Health Organization and the Ministry of Health, instead of relying on information from social media, neighbors, or relatives. Future research could focus on evaluating the impact of vaccine education programs on vaccine hesitancy within the community.

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Ethical approval

Artvin Çoruh University (Number: E-18457941-050.99-68822, Date: 01.11.2022).

Data availability statement

Research data are available upon reasonable request from the corresponding author.

Institutional approval

Artvin Provincial Health Directorate (Date: 29.05.2023, Number: E-17720518-514.01.02-216530312).

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Conflicts of interest statement

None.

Authors' contributions

This study is entirely the author's own work and no other author's contribution has been received.

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