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Research Article

Pregnant Women Registered at a Family Health Center: Tetanus Vaccination Status and Related Factors

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Abstract

Aim: This study examined the tetanus vaccination status of pregnant women and the factors influencing it. The role of the Family Health Center in vaccination was also evaluated.

Methods: Conducted between 01.01.2017 and 31.05.2019 at Istanbul Pendik Çamçeşme Family Health Center, the study included 609 pregnant women. Data were collected through a researcher-designed questionnaire.

Results: The participants' mean age was 29.9 ± 5.5 years. Nearly all (99.7%, n = 607) received prenatal care. While 22.2% (n = 135) were unaware of tetanus bacteria, 17.9% (n = 109) did not know about the vaccine. A total of 97.9% (n = 596) received at least one dose of tetanus vaccine during pregnancy. Among them, 14.1% (n = 86) were fully vaccinated, 52.9% (n = 322) followed the correct schedule, 26.1% (n = 159) followed an incorrect schedule, and 4.8% (n = 29) had not yet reached the appropriate vaccination time. None of the women informed solely by a family health worker were vaccinated; however, 54.7% (n = 47) of fully vaccinated women received information from a family physician, health worker, and obstetrician. Negligence was identified as the primary reason for not getting vaccinated (36.3%, n = 77).

Conclusion: Prenatal care and combined recommendations from healthcare professionals increased full-dose vaccination rates. Lack of detailed information from healthcare workers and patient negligence were major barriers to vaccination.

Keywords: Vaccination During Pregnancy; Tetanus Vaccine; Maternal Neonatal Tetanus

Introduction and Aim

Tetanus is a disease affecting the nervous system, caused by tetanospasmin, a neurotoxin produced by Clostridium tetani. It presents with uncontrolled muscle spasms and can be fatal if left untreated [1].

Despite being a vaccine-preventable disease, the global annual incidence remains around one million. Because exposure to this disease is possible from birth onward, vaccinating pregnant women, women aged 15–49, and infants beginning from two months of age through routine immunization programs is of great importance [2]. In Türkiye, the purpose of the Expanded Program on Immunization (EPI) is to minimize morbidity and mortality associated with vaccine-preventable diseases. The goal of the tetanus toxoid (TT) vaccine is to eliminate maternal and neonatal tetanus (MNT) [3]. In Türkiye's childhood vaccination program, the pentavalent vaccine (DaBT-İPA-Hib) is administered at 2, 4, 6, and 18 months of age. Following primary immunization, one dose of quadrivalent vaccine (DaBT-İPA) is administered in the first grade of primary school, and one dose of Td vaccine is administered in the eighth grade. As part of adult vaccination, tetanus vaccination is also administered to women aged 15–49, pregnant women, and soldiers [2].

According to the World Health Organization (WHO), 200,000 newborns died from neonatal tetanus (NT) in 2000, whereas this number decreased by 88%—to 25,000—in 2018 [4]. Türkiye launched its MNT elimination program in 1994 and achieved elimination in April 2009 [5]. According to the Türkiye Demographic and Health Survey (TDHS), in the last five years, 67.9% of women under age 20, 82.0% of women aged 20–34, and 79.3% of women aged 35–49 who had received prenatal care were vaccinated against tetanus [6].

The aim of this study is to determine the tetanus vaccination rate of pregnant women registered at Çamçeşme Family Health Center (FHC) between 01.01.2017–31.05.2019, in accordance with the vaccination schedule recommended in the Ministry of Health's EPI guidelines.

Materials and Methods

Study population and type

This cross-sectional study was conducted at Istanbul Pendik Çamçeşme Family Health Center. Women who were registered in the family health center units and experienced pregnancy between 2017 and 2019 were included.

Inclusion and exclusion criteria

Women who were officially registered at the FHC, had experienced pregnancy between 01.01.2017 and 31.05.2019, and provided written consent were included. Women not registered at the center or who did not provide consent were excluded.

Data collection

Data were collected using a questionnaire. The questionnaire was prepared by the researcher based on a literature review, piloted on 48 volunteers, reviewed with expert consultation, and finalized after ensuring clarity. It consisted of 31 main questions, including sociodemographic characteristics, obstetric history, and tetanus vaccination status during pregnancy. After obtaining permission from the Istanbul Health Directorate, the survey was administered to women registered at the FHC.

Statistical methods

Statistical analyses were conducted using SPSS version 22.0. Normality was evaluated via histograms and the Kolmogorov–Smirnov test. Descriptive statistics were presented as mean, standard deviation, and minimum–maximum values. For continuous variables, Student's t-test was used when normal distribution assumptions were met. The Mann–Whitney U test was used for non-normally distributed variables when comparing two groups, and the Kruskal–Wallis test for multiple groups. Spearman correlation analysis was used for associations between continuous variables. A p-value <0.05 was considered statistically significant.

Ethical considerations

The study protocol was approved on May 29, 2019 by the local ethics committee of the University of Health Sciences Kartal Dr. Lütfi Kırdar Training and Research Hospital.

Results

The mean age of participants was 29.9 ± 5.5 years. Of all participants, 44.7% (n = 272) had eight years of education or less, 81.1% (n = 494) were unemployed, and 67.3% (n = 410) had an income between 2000–4000 TL. Demographic characteristics of participants are presented in Table 1.

				%.(n)
Age (years ± SD)				29.9 ± 5.5
Education level	9 years or more	55.3(337)	8 years or less	44.7(272)
Employment status		Employed		18.9(115)
	Unemployed		81.1(494)	
Monthly Income level		Below 2000 TL (Low Income)		9.0(55)
	2001-4000 TL (Lower Middle Income)		67.3(410)	
	4001-6000 TL (Upper Middle Income)		18.1(110)	
	6000 TL or above (Upper Income)		5.6(34)	
Spouse's employment status		Employed		96.9(590
	Unemployed		3.1(19)	
Health insurance	Yes			93.1(567)
	No			6.9(42)

Table 1: Demographic characteristics of participants.

Obstetric characteristics showed that the median number of pregnancies was 2 (range 1–8), median number of births 2 (0–7), and median number of living children 2 (0–6). During the study, 28.9% (n = 176) of participants were pregnant.

Participants were asked about the healthcare centers they visited for prenatal follow-ups and the number of visits. The median number of prenatal visits was 11 (range 2–27). Overall, 99.7% (n = 607) received an adequate number of prenatal care visits according to the Ministry of Health Prenatal Care Guidelines. Additionally, 98.7% (n = 601) received at least one prenatal care visit at the family health center. In contrast, 36.1% (n = 220) received prenatal care at a state hospital at least once, 22.7% (n = 138) at a training and research hospital, 70.1% (n = 427) at a private hospital, and 1.8% (n = 11) at a private clinic or similar setting (Table 2).

Table 2: Prenatal care utilization of participants.

	Total Group %. (n)	Pregnant %. (n)	Non-pregnant %. (n)
Family Health Center*	98.7 (n = 601)	98.9 (n = 174)	98.6 (n = 427)
State Hospital*	36.1 (n = 220)	43.2 (n = 76)	33,3 (n = 144)
Training and Research Hospital *	22.7 (n = 138)	18.2 (n = 62)	24.5 (n = 76)
Private Hospital *	70.1 (n = 427)	63.6 (n = 112)	72.7 (n = 315)
Private Clinic *	1.8 (n = 11)	4.5 (n = 8)	0.7 (n = 3)

*Proportion of those who made at least one visit

Education on pregnancy and childbirth was received by 36.5% (n = 222); 10.5% (n = 64) received partial education, and 52.9% (n = 322) received no education at all.

The use of recommended supplements during pregnancy is presented in Table 3. The most frequently used supplement was folic acid (87.2%, n = 531), while multivitamins were the least commonly used (78.0%, n = 475).

Participants were asked whether they were aware of the importance of the procedures performed during World Health Organization (WHO) monitoring and the requested laboratory tests for maternal and infant health; the first four procedures recognized as important for maternal and infant health were blood pressure measurement, blood group determination, tetanus vaccination, and complete blood count (CBC) (Table 4).

Table 3: Supplement use during pregnancy.

	Used % (n)	Partially Used % (n)	Not Used % (n)
Folic Asid	87.2 (531)	4.4 (27)	8.4 (51)
Iron	86.9 (529)	6.9 (42)	6.2 (38)
Vitamin D	81.3 (495)	8.7 (53)	10.0 (61)
Multivitamin	78.0 (475)	8.4 (51)	13.6 (83)

Table 4: Participants' awareness of the importance of the procedures performed during WHO monitoring for maternal and infant health.

	Aware % (n)	Partially Aware % (n)	Not Aware % (n)
Complete Blood Count (CBC)	78.5 (478)	14.0 (85)	7.5 (46)
Blood Group Determination	79.8 (486)	13.0 (79)	7.2 (44)
TSH	76.2 (464)	14.9 (91)	8.9 (54)
Glucose	76.0 (463)	14.8 (90)	9.2 (56)
OGTT	66.8 (407)	16.1 (98)	17.1 (104)
Urine Analysis (TİT)	77.3 (471)	13.8 (84)	8.9 (54)
HbsAg	74.4 (471)	15.1 (92)	10.5 (64)
Folic Acid Supplementation	77.4 (471)	13.6 (83)	9.0 (55)
Iron Supplementation	78.3(477)	13.7(83)	8.0 (49)
Tetanus Vaccination	78.5 (478)	14.1 (86)	7.4 (45)
Blood Pressure Measurement	80.3 (489)	13.0 (79)	6.7 (41)

A total of 71.9% (n = 438) of pregnant women reported not having any chronic disease during pregnancy. Among those diagnosed, the most common chronic conditions were hypothyroidism (42.7%; n = 73), hypertension (20.4%;n = 35), and diabetes (11.7%; n = 20).

Participants were asked whether they had knowledge about the disease caused by the tetanus bacterium and its mode of transmission. A total of 37.4% (n = 228) stated they had knowledge, 40.4% (n = 246) had partial knowledge, and 22.2% (n = 135) stated they had no knowledge at all. Similarly, regarding tetanus vaccination, 48.9% (n = 298) reported having knowledge, 33.2% (n = 202) had partial knowledge, and 17.9% (n = 109) reported having no knowledge.

A total of 97.9% (n = 596) of participants received at least one dose of tetanus vaccine during pregnancy. Of all participants, 14.1% (n = 86) were fully vaccinated with five doses. Among first-time pregnant women, 2.7% (n = 5) were unvaccinated and 2.7% (n = 5) were fully vaccinated (Table 5). Additionally, 6.1% (n = 37) received more than five doses.

Table 5: Vaccination status of participants.

	% (n)
Unvaccinated	2.1 (13)
Fully Vaccinated	14.1 (86)
Vaccinated with Incorrect Schedule *	26.1 (159)
Vaccinated with Correct Schedule **	52.9 (322)
Not Due Yet ***	4.8 (29)

*Vaccinated with incorrect Td schedule (either under- or over-vaccinated according to the Td schedule).

**Vaccinated according to the Td schedule but have not completed all 5 doses.

***Currently pregnant and not yet due for vaccination.

When total vaccination status was examined by pregnancy order, unvaccinated rates were 38.5% in first pregnancies, decreased in second and third pregnancies, and increased again to 30.8% in fourth or subsequent pregnancies. Correct vaccination rates increased as the number of pregnancies decreased, whereas incorrect schedule rates increased as the number of pregnancies increased (Table 6).

Table 6: Relationship between number of pregnancies and vaccination status.

	An vaccinated % (n)	Correct Schedule % (n)	Incorrect Schedule % (n)	Fully Vaccinated % (n)	Not Due Yet % (n)	P value
1 pregnancy	38.5 (5)	47.5 (153)	6.9 (11)	5.8 (5)	31.0 (9)	0.000
2 pregnancies	15.4 (2)	35.4 (114)	20.8 (33)	26.7 (23)	27.6 (8)	
3 pregnancies	15.4 (2)	13.4 (43)	31.4 (50)	38.4 (33)	37.9 (11)	
4 or more pregnancies	30.8 (4)	3.7 (12)	40.9 (65)	29.1 (25)	3.4 (1)	

X = 212.676; Cramér's V = 0.341; p = 0.000.

The relationships between participants' demographic characteristics and overall vaccination status are summarized in Table 7. Furthermore, the proportion of fully vaccinated participants was higher among those with 9 years or more of education, the unemployed, those whose spouse is employed, those with health insurance, and those with an income level between 2000–6000 TL.

Table 7: Demographic Characteristics of Participants and Overall Vaccination Status.

		Unvaccinated % (n)	Correct schedule % (n)	Incorrect Schedule % (n)	Fully Vaccinated % (n)	Not Due Yet % (n)	P Value
Ages (years ± SD)		31.7 ± 5.7	27.9 ± 4.8	33.3 ± 5.4	31.5 ± 4,6	27.2 ± 4.3	0.000
Education Level	≤ 8 years	30.8 (4)	37.9 (122)	62.9 (100)	43.0 (37)	31.0 (9)	0.000
	≥ 9 years	69.2(9)	62.1 (200)	37.1 (59)	57.0 (49)	69.0 (20)	
Employment Status	Employed	38.5 (5)	20.2 (65)	16.4 (26)	14.0 (12)	24.1 (7)	0.187
	Unemployed	61.5 (8)	79.8(257)	83.6(133)	86.0 (74)	75.9 (22)	
Income Level	<2000TL	7.7 (1)	7.5 (24)	12.6 (20)	5.8 (5)	17.2 (5)	0.083
	2001-4000TL	46.2 (6)	67.4(217)	67.9 (108)	74.4 (64)	51.7 (15)	
	4001-6000 TL	23.1 (3)	19.9 (64)	14.5(23)	15.1(13)	24.1(7)	
	≥ 6001 TL	23.1(3)	5.3(17)	5.0(8)	4.7(4)	6.9(2)	
Spouse's Employment Status	Employed	100.0(13)	98.1(316)	94.3(150)	95.3(82)	100.0(29)	0.131
	Unemployed	0.0(0)	1.9(6)	5.7(9)	4.7(4)	6.9(2)	
Health Insurance	Yes	100.0(13)	92.9(299)	93.1(148)	94.2(81)	89.7(26)	0.793
	No	0.0(0)	7.1(23)	6.9(11)	5.8(5)	10.3(3)	

Participants' vaccination status was also examined in relation to whether they had received any education about pregnancy or childbirth. Among unvaccinated women, 46.2% (n = 6) had received education, 7.7% (n = 1) had received partial education, and 46.2% (n = 6) had received no education. More than half of fully vaccinated women (57.0%, n = 49) had received no education.

During pregnancy, 11.8% (n = 72) of participants were not informed about the tetanus vaccine. Almost half (46.1%, n = 281) were informed by family health workers.

Among unvaccinated women, 61.5% (n = 8) had not been informed about vaccination, while 30.8% (n = 4) had been informed by a family physician. Notably, none of the women informed solely by a family health worker were unvaccinated.

Among fully vaccinated participants, 25.6% (n = 22) were informed by a family physician, and 12.8% (n = 11) were informed by a family health worker. However, 54.7% (n = 47) of fully vaccinated women had been informed by a combination of family physicians, obstetricians, and family health workers.

When asked why they did not receive the tetanus (Td) vaccine during pregnancy, 36.3% (n = 77) cited negligence. Other reasons included lack of information (17.9%, n = 38), not being advised by healthcare staff (3.33%, n = 7), fear of harm to the baby (0.9%, n = 2), and religious reasons (0.9%, n = 2).

Discussion

In this study, conducted among pregnant women monitored at a Family Health Center in Istanbul between 2017–2019, 14.1% were fully vaccinated, 52.9% were vaccinated according to the correct schedule, 26.1% were vaccinated using an incorrect schedule, 4.8% had not yet reached their vaccination time, and 2.1% were unvaccinated. When asked why they did not receive the Td vaccine, 36.3% cited negligence.

A total of 609 participants completed the survey developed for this study. The mean age was 29.9 ± 5.5 years. Of these women, 44.7% had eight years of education or less (14 were illiterate (2.3%) and 8 had not completed primary school (1.3%). Additionally, 81.1% were unemployed, 67.3% had an income between

2000–4000 TL, 93.1% had health insurance, and 96.9% of spouses were employed. These findings closely align with the results of the 2018 Türkiye Demographic and Health Survey (TDHS) [6].

According to the Ministry of Health Prenatal Care Guidelines, every pregnant woman should receive at least four qualified prenatal care visits [7]. In our study, 99.7% of pregnant women met this criterion. A total of 98.7% had at least one prenatal follow-up at the Family Health Center. Prior to the implementation of the family medicine system, studies indicated significantly lower rates of adequate prenatal care. After implementation, rates progressively increased in various studies [8-10].

In our study, only 36.5% of participants had received formal education about pregnancy or childbirth. Partial education was received by 10.5%, while 52.9% had never received any education. Other studies have clearly demonstrated that prenatal education significantly increases knowledge, awareness, and appropriate health-seeking behavior [11,12]. The low rates found here emphasize the need for improved educational programs within family medicine practices.

According to the WHO, routine supplementation with multivitamins, zinc, and iodine is not recommended for pregnant women with adequate and balanced nutrition; however, supplementation with calcium, iodine, iron, folic acid, and zinc is recommended for those with insufficient nutritional intake. The Turkish Ministry of Health recommends providing pregnant women with vitamin D, iron, and folic acid supplementation. While vitamin and mineral supplementation is not advised in cases of adequate nutrition during pregnancy, it is essential for fetal development in cases of nutritional insufficiency [13]. During our study, 87.2% of participants reported taking folic acid, 86.9% iron, 81.3% vitamin D, and 78.0% multivitamins during pregnancy. Similarly, in the study by Tel Adıgüzel., *et al.* 100% of pregnant women reported using at least one vitamin or mineral supplement, with 59.1% taking folic acid, 75.4% iron, and 78.3% multivitamins [14]. Literature indicates that most recommended tests, vaccines, and measurements during pregnancy are performed, and supplements are generally used, which aligns with our findings based on current Turkish data.

In our study, 71.9% of pregnant women did not have any chronic disease diagnosis during pregnancy. The most commonly diagnosed chronic conditions were hypothyroidism (42.7%), hypertension (20.4%), and diabetes (11.7%). In a Danish study by Jolving., *et al*. 91.4% of pregnant women had no chronic diseases, with the most common being respiratory diseases, asthma (1.73%), thyroid disorders (1.50%), and anxiety/personality disorders (1.33%). Hypertension and diabetes rates were 0.43% and 0.48%, respectively [15]. The higher rates of chronic diseases in our study may be related to Türkiye being a developing country, emphasizing the need for close monitoring and treatment of pregnancy-related health issues.

Although 97.9% of participants received at least one dose of the tetanus vaccine during pregnancy, 22.2% had no knowledge about the tetanus bacterium and its transmission, and 17.9% were unaware of the tetanus vaccine, resulting in a 2.1% unvaccinated rate. Among unvaccinated participants, 46.2% had received education related to pregnancy or childbirth, yet 61.5% of these had not been informed about vaccination. Only about half of fully vaccinated participants had received educational guidance. During pregnancy, 11.8% of participants were uninformed about the tetanus vaccine, while 46.1% received information from family health staff. Notably, no unvaccinated participants had received guidance from family health staff. Among fully vaccinated women, the majority (54.7%) were educated collaboratively by family physicians, obstetricians, and family health staff. Strassberg., *et al*. reported that age, race, and education level did not affect vaccine acceptance, whereas the strongest factor influencing acceptance was healthcare providers' education, both verbal and with visual materials [16]. Therefore, healthcare workers must be informed to prioritize patient education despite high workloads. Studies by Altıparmak., *et al*. and Karakaya and Coşkun showed that vaccination knowledge and uptake increased significantly after education [11,17]. In contrast, Önde., *et al*. reported that 64.1% of participants lacked knowledge about the tetanus vaccine [18]; in our study, this rate was 17.9%, likely due to the structured family health system in Türkiye, personalized care, and vaccine education provided by family health staff. Similar findings were observed in studies by İsaoğlu., *et al*. and Turan and Kul, showing that most pregnant women received tetanus vaccine information from obstetricians and family health staff [19,20]. U.S.-based studies also emphasize the crucial role of nurses in educating pregnant and breastfeeding women about vaccines to prevent infectious diseases [21]. Sönmez and Aksakoğlu reported that nearly all tetanus-vaccinated pregnant women were vaccinated at primary care facilities by nurses/midwives [22].

In our study, 14.1% of participants were fully vaccinated (five doses), 52.9% vaccinated according to the correct schedule, 4.8% were not vaccinated due to timing, 26.1% were vaccinated incorre-

ctly (either excess or insufficient doses), and 2.1% were unvaccinated. Comparable studies report similar variations, highlighting that vaccination rates depend on healthcare providers' knowledge, patient education, and guidance [8,10,12,17,22]. For instance, Gesser., *et al*. found that only 65.3% of healthcare workers recommended the Tdap vaccine to their daughters or spouses during pregnancy, indicating lack of consensus among professionals [23]. In our study, 67% of participants were either fully vaccinated or vaccinated according to the correct schedule.

Analysis by parity revealed that as the number of pregnancies increased, the proportion of correctly vaccinated women decreased, while incorrect vaccination schedules became more frequent. Demographically, full vaccination rates were higher among women with ≥9 years of education, unemployed women with employed spouses, those with health insurance, and those with a household income of 2000–6000 TL. Nevertheless, unvaccinated participants were more prevalent among women with higher education, while employment was associated with lower unvaccinated rates. These findings align with Sönmez and Aksakoğlu, who reported that higher education, employment, and health insurance were associated with proper vaccination schedules, whereas age, occupation, and income did not significantly affect vaccination [22].

Among unvaccinated participants, reasons included neglect (36.3%), lack of information (17.9%), recommendation against vaccination (3.33%), concerns about fetal harm (0.9%), and religious reasons (0.9%). Similar studies report neglect and lack of knowledge as the main reasons, with fetal harm concerns also commonly cited [9]. Studies indicate that obstetricians generally recommend tetanus vaccination but often refer patients to family health centers. Overall, the greatest barrier to tetanus vaccination in primary care appears to be patient neglect.

Conclusion and Recommendations

With the strengthening of the family medicine system and population-based care, prenatal care rates have increased, and tetanus vaccination coverage has become widespread. However, gaps remain in education, counseling, and schedule adherence.

- Increasing awareness among family physicians and family health workers regarding the importance of tetanus vaccination counseling.
- Ensuring that both family physicians and family health workers—not only one group—provide vaccination education.
- Integrating tetanus vaccination status into the Family Medicine Information System (AHBS) to ensure accurate tracking and reduce missed doses.
- Maintaining postpartum continuation of the tetanus vaccination schedule.
- Preventing duplicate or incorrect dosing by implementing structured adult vaccination calendars linked to electronic medical records.
- Enhancing prenatal education programs to reduce negligence and misinformation.
- These measures are expected to increase vaccination coverage and reduce incorrect or unnecessary dosing.

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