

ORIGINAL ARTICLE

The Interrelationship Between Health Literacy and Primary Immunodeficiency Awareness in Pregnant and Early Postpartum Women

Gebe ve Erken Postpartum Dönemdeki Kadınların Sağlık Okuryazarlığı ve Primer İmmün Yetmezlik Farkındalığı İlişkisi

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ABSTRACT

Aim: This study aimed to investigate the relationship between health literacy levels and primary immunodeficiency awareness among pregnant and early postpartum women.**Methods:** This descriptive and correlational study included 206 women visiting the obstetrics and gynecology outpatient clinic and obstetrics ward of a university hospital between March and June 2024. Data were collected using the Participant Information Form, Health Literacy Scale, and Primary Immunodeficiency Awareness Form. Data analysis included the independent sample t-test, one-way analysis of variance, and Spearman's correlation test. A p-value of <0.05 was considered statistically significant.**Results:** The mean score on the health literacy scale was 110.72±13.92, while the mean score for primary immunodeficiency awareness was 15.03±2.88. Women aged 26-30 had higher understanding information scores on the health literacy scale than women aged 25 and below. Women with high school and university education had higher health literacy and primary immunodeficiency awareness scores than only literate women and those with primary education. A weak, positive correlation was found between access and information (a subdimension of the health literacy scale) and primary immunodeficiency awareness.**Conclusions:** Educational programs aimed at increasing health literacy in women may be an effective strategy for improving awareness of primary immunodeficiency. Education and awareness programs should be specifically developed for younger women and those at lower education levels.**Keywords:** Primary immunodeficiency, Health literacy, Pregnancy

Öz

Amaç: Gebe ve erken postpartum dönemdeki kadınların sağlık okuryazarlık düzeylerinin primer immün yetmezlik farkındalığı ile olan ilişkisinin incelenmesi amaçlanmıştır.**Gereç ve Yöntemler:** Tanımlayıcı ve ilişki arayıcı tipteki bu çalışma, Mart-Haziran 2024 tarihleri arasında bir üniversite hastanesi kadın hastalıkları ve doğum anabilim dalı gebe polikliniği ve obstetrik servisine başvuran 206 kadın ile yürütülmüştür. Verilerin toplanmasında Katılımcı Bilgi Formu, Sağlık Okuryazarlığı Ölçeği ve Primer İmmün Yetmezlik Bilgi Formu kullanılmıştır. Verilerin analizinde; bağımsız iki örneklem t testi, tek yönlü varyans analizi, spearman korelasyon testi kullanılmıştır. İstatistiksel anlamlılık düzeyi olarak p< 0.05 kabul edilmiştir.**Bulgular:** Kadınların sağlık okuryazarlığı ölçeği ortalama puanları 110,72±13,92, primer immün yetmezlik farkındalık puanları 15,03±2,88 olarak bulunmuştur. 26-30 yaş arasındaki kadınların sağlık okuryazarlığı bilgileri anlama puanları, 25 yaş ve altı kadınlara göre daha yüksek bulunmuştur. Lise ve üniversite eğitim düzeyine sahip kadınların sağlık okuryazarlığı ve primer immün yetmezlik farkındalık puanları, ilköğretim düzeyi ve okuryazar olan kadınlara göre daha yüksek bulunmuştur. Sağlık okuryazarlığı ölçeği alt boyutlarından bilgiye erişim ile primer immün yetmezlik farkındalığı arasında pozitif yönlü, düşük düzeyde bir ilişki tespit edilmiştir.**Sonuçlar:** Kadınların sağlık okuryazarlığı düzeylerini yükseltmeye yönelik eğitim programları, primer immün yetmezlik farkındalığını artırmada etkili bir strateji olabilir. Eğitim ve farkındalık çalışmalarının özellikle genç ve düşük eğitim düzeyine sahip kadınlara yönelik olarak geliştirilmesi gerekmektedir.**Anahtar Kelimeler:** Primer immün yetmezlik, Sağlık okuryazarlığı, Gebelik

Introduction

Health literacy is defined as "the degree to which individuals can obtain, process, understand, and communicate health-related information to make informed health decisions" (1,2). Although health literacy is important for everyone, it holds particular significance for women because a woman's health behaviors affect both her own and her child's health (3,4). Low health literacy among pregnant women has been associated with insufficient folic acid intake, a higher rate of unintended pregnancies (5), reduced participation in prenatal care (6), and early cessation of exclusive breastfeeding (7). Health literacy skills determine a mother's ability to assess her health

status, make informed health decisions, and seek timely medical care (8). Therefore, enhancing maternal health literacy is increasingly important for improving the health outcomes of newborns (9). Although health literacy is recognized as a critical determinant of maternal and child health, there is a lack of research and awareness regarding the importance of addressing the health literacy needs of pregnant women and mothers on a global scale (10).

Primary immunodeficiency disorders (PIDs) are disorders caused by genetic defects that affect the immune system, leading to chronic, severe, and often

life-threatening infections if left undiagnosed and untreated (11). This is a growing group of disorders, with over 400 PIDs currently known, owing to advancements in diagnostic and treatment options (12). The clinical spectrum of PIDs ranges from life-threatening conditions that appear in infancy to less severe disorders diagnosed in adulthood. Most patients present with recurrent infections that frequently respond poorly to antibiotic treatment. A large proportion of these disorders affect children (13). Due to the lack of newborn screening programs, national registries, and formal health records, the prevalence of PIDs is uncertain in many countries. It is estimated to range from one in a thousand to one in ten thousand in Australia, North America, and Europe, with a higher prevalence in regions with higher rates of consanguineous marriages (14). In Turkey, the incidence of PIDs is not precisely known; however, given the high rate of consanguinity, it is believed to be higher than the global incidence rate (15). Early and accurate diagnosis of PIDs is crucial for patient survival and quality of life. Delays in diagnosis can lead to recurrent infections and cause organ damage, complications, morbidity, and mortality due to mismanaged disorders (16).

Late and inadequate diagnosis of PIDs remains a significant issue in many countries, including Turkey. This can be attributed to the insufficient recognition of PIDs and a lack of awareness of these disorders. Early diagnosis of PID requires the symptoms indicating frequent or severe infections to be recognized not only by physicians and other healthcare providers but also by well-informed patients and parents or other family members (17). Globally, the average time from symptom onset to diagnosis is approximately four years (18). The Jeffrey Modell Foundation (JMF) was established to raise awareness of PIDs and improve diagnosis and treatment processes. It provides educational materials, diagnostic guidelines, and research reports to inform both healthcare professionals and the general public (19). The JMF has identified 10 warning signs to enhance public awareness of PIDs and recommends consulting a specialist if at least two of these signs are present (20).

Early diagnosis plays a vital role in the management of PIDs. It reduces healthcare costs, enhances patients' quality of life, and facilitates timely treatment (21, 22, 23). Increasing awareness among mothers can positively impact early diagnosis of PIDs. Enhanced maternal awareness can help recognize the early

signs of these disorders, thereby enabling patients to receive early-stage care and treatment (22). Health literacy influences the ability of individuals to utilize available healthcare services and make informed health decisions. Given that pregnancy is a transformative journey that requires expectant mothers to be well-informed and proactive in healthcare, understanding the health literacy levels of pregnant women is essential. Mothers should exercise initiative and develop critical thinking, analysis, and decision-making abilities regarding maternal and child health. This study aimed to examine the relationship between health literacy levels and primary immunodeficiency awareness in women during pregnancy and the early postpartum period. Increasing health literacy may enable women to be more informed about PIDs and recognize their symptoms at an early stage. This will facilitate early diagnosis and timely access to appropriate treatment, positively affecting maternal and infant health. Research Questions

1. What is the health literacy level of pregnant and early postpartum women?
2. What is the primary immunodeficiency awareness level in pregnant and early postpartum women?
3. Is there a relationship between health literacy and primary immunodeficiency awareness in women during pregnancy and the early postpartum period?

Materials and Methods

The type of Research: This is a descriptive and correlational study.

Location and Characteristics of the Research: The study was conducted in the obstetrics and gynecology outpatient clinic and obstetrics ward of a university hospital between March 2024 and June 2024. The study population consisted of pregnant women in their last trimester who applied to the relevant hospital to seek healthcare services and women who gave birth in the obstetrics ward during the study period. Sample size calculations were performed using G*Power 3.1.9.2 software. Based on the study by Kul Uçtu and Kaplan (2023), with a 95% confidence level ($1-\alpha$), 80% power ($1-\beta$), an effect size of $d = 0.20$, and the t-test, the required sample size was determined to be 206 participants (24). Convenience sampling, one of the non-probability sampling methods, was used for sample selection.

Women with multiple pregnancies, high-risk pregnancies (such as preeclampsia, gestational

diabetes mellitus, preterm labor, etc.), those who conceived via assisted reproductive technologies, and those whose babies were in the neonatal intensive care unit were excluded from the study.

Data Collection Technique and Tools

Data were collected using the Participant Information Form, Primary Immunodeficiency Awareness Form, and Health Literacy Scale.

Participant Information Form

Developed by the researcher based on the relevant literature, this questionnaire includes questions on the sociodemographic and obstetric characteristics of the participants (25, 26, 27, 28, 29).

Health Literacy Scale

The scale was developed by Sørensen et al. with 47 items (30) and later shortened to 25 items by Toçi et al. (31). "Aras and Bayık (2017) conducted the Turkish validity and reliability studies on the short form." (32). The scale uses a five-point Likert scale and consists of 25 items. There are four sub-dimensions: "Access (items 1-5)", "Understanding (items 6-12)", "Appraising (items 13-20)" and "Applying (items 21-25)". Each item was scored as follows: "1: No difficulty at all, 2: Slight difficulty, 3: Moderate difficulty, 4: Significant difficulty, 5: Unable to do/unskilled/impossible." All items in the scale are positively worded. No items are reverse-coded. The subdimensions of the scale allow for scores of 5-25 for Access, 7-35 for Understanding, 8-40 for Appraising, and 5-25 for Applying. The total scale score ranged from 25 to 125. The scale does not have a cut-off point. Higher scores indicate higher health literacy. In both the Turkish validation study and the present study, Cronbach's alpha coefficient of the scale was 0.92.

Primary Immunodeficiency Awareness Form

A 25-item questionnaire containing the primary immunodeficiency warning signs set forth by the Jeffrey Model Foundation was created by the researchers (20, 33, 34, 35). As a result of the literature review, in addition to the 10 warning signs developed by the Jeffrey Model Foundation, the questions of "presence of chronic diarrhea", "delayed healing of wounds" and "mother and father having a consanguineous marriage" were added to the correct answers in the questionnaire form (36). To evaluate the content validity of the Primary Immunodeficiency Awareness Form, it was submitted to the opinion of 4 experts

(faculty members in the fields of Pediatric Immunology and Allergy, Pediatric Health and Diseases Nursing, Obstetrics and Gynecology Nursing, and Public Health Nursing). The experts were asked to examine each item using the Davis technique as (a) very appropriate, (b) appropriate, (c) little change required, and (d) much change required (37). As a result of the data obtained from the experts, the Content Validity Index of the information form was calculated as 0.98.

Correct answers regarding primary immunodeficiency were scored as 1 and incorrect answers were scored as 0. The total score was calculated by summing the correct responses out of 25 questions, and comparisons with sociodemographic variables and the health literacy scale were made based on this score.

Data Collection

The questionnaires were administered through face-to-face interviews conducted by the researchers.

Ethical Considerations

Before the study, Necmettin Erbakan University Health Sciences Scientific Research ethics committee approval (Decision No: 42-696-2024) and institutional permission from the hospital were obtained. Permission for use was also received via e-mail from the authors responsible for the Turkish adaptation of the scales used in this study. Before data collection, the purpose of the study was explained to the participants, and both verbal and written informed consent were obtained. The study was conducted under the principles of the Declaration of Helsinki.

Statistical Analysis

Data analysis was performed using IBM SPSS V22 (Chicago, USA). Descriptive statistics were presented as numbers, percentages, mean, standard deviation, median, minimum, and maximum values. The normality of the distribution of continuous variables was assessed using skewness and kurtosis values within the range of +1 to 1 (38). Accordingly, continuous variables analyzed in this study have a normal distribution. To compare mean values between two independent groups, an independent samples t-test was used, and a one-way analysis of variance (One-Way ANOVA) was applied for comparisons among three or more groups. Posthoc Tukey tests were conducted to identify the group(s) responsible for any significant differences. The Spearman correlation test was used to examine the relationships between continuous variables. The internal consistency coefficient (Cronbach's

Alpha) was calculated to test the reliability of the measurements obtained from the scales. A p-value of <0.05 was considered statistically significant.

Results

A total of 230 pregnant and postpartum women participated in the study. Of the women, 71.4% were aged 26 years or older and 40.4% were pregnant. Additionally, 61.8% of the women had at least a high school education (Table 1). The women's mean score for primary immunodeficiency awareness was found to be 15.03 ± 2.88 , while the mean score for the health literacy scale was 110.72 ± 13.92 (Table 2).

Table 1. Descriptive Characteristics of Women (n=230)

Variables		n (%)
Age	25 years and below	66 (28.6)
	26-30 years	82 (35.7)
	31 years and older	82 (35.7)
Highest Level of Education	Literate	16 (7.0)
	Primary Education	77 (33.5)
	High School	87 (37.8)
Employment Status	University And Above	50 (21.7)
	Employed	50 (21.7)
	Unemployed	180 (78.3)
Highest Educational Level of Partner	Literate	12 (5.2)
	Primary Education	76 (33.0)
	High School	85 (37.0)
Employment Status of Partner	University And Above	57 (24.8)
	Employed	220 (95.7)
	Unemployed	10 (4.3)
Income Status	Income Less than Expenditure	25 (10.9)
	Income Match Expenditure	166 (72.2)
	Income more than expenses	39 (17.0)
Pregnant/Postpartum	Pregnant	93 (40.4)
	Postpartum	137 (59.6)
Chronic health conditions	Yes	33 (14.3)
	No	197 (85.7)
Continuous Drug Use	Yes	31 (13.5)
	No	199 (86.5)
Time of Marriage (years)		6.16 ± 4.94 (5.00, Min:1.00, Mak:23.00)

Table 2. Distributions of Women's Health Literacy Scale and PID Awareness Scores

Scale	$\bar{X}$	SD	Med.	Min.	Max.
Health Literacy Scale (Total)	110.72	13.92	114.00	50.00	125.00
Access to Information	22.64	3.13	24.00	9.00	25.00
Understanding Information	30.45	4.50	31.00	14.00	35.00
Appraisal/Evaluation	35.17	5.19	36.00	9.00	40.00
Application/Use	22.46	3.32	24.00	9.00	25.00
PID Awareness*	15.03	2.88	15.00	6.00	22.00

*PID: Primary Immunodeficiency, SD: Standard deviation

The correct responses of women to questions related to primary immunodeficiency awareness are presented in Table 3. Accordingly, the questions with the highest rate of correct answers were "use of antibiotics for two months or longer" and "experiencing pneumonia more than twice a year," whereas the questions with the lowest rate of correct answers were "frequent urinary tract infections" and "presence of mouth sores (aphthae)."

Table 3. Distribution of women's responses to questions about PID awareness

Scale	Correct Answer n (%)
1 More than four ear infections per year	147 (63.9)
2 More than two sinusitis cases per year	118 (51.3)
3 Two months of antibiotic use	177 (77.0)
4 More than two pneumonia cases per year	173 (75.2)
5 Developmental delay	162 (70.4)
6 Recurrent skin wounds	143 (62.2)
7 Fungal infection in the mouth (thrush)/skin	145 (63.0)
8 Need for intravenous therapy	148 (64.3)
9 Blood infection, meningitis,	164 (71.3)
10 Frequent urinary tract infection	63 (27.4)
11 Mouth sores (canker sores)	71 (30.9)
12 Premature loss of milk teeth	124 (53.9)
13 Belly falling on the tenth day	178 (77.4)
14 Delayed wound healing	143 (62.2)
15 Frequent diarrhea	151 (65.7)
16 Snoring while sleeping	169 (73.5)
17 Tonsil enlargement	114 (49.6)
18 Family history of primary immunodeficiency	139 (60.4)
19 Parents having consanguineous marriages	102 (44.3)
20 Family member with a congenital anomaly	138 (60.0)
21 Having a family member with allergic asthma	99 (43.0)
22 Increased fever after vaccination	153 (66.5)
23 Redness at the vaccination site	161 (70.0)
24 Pain at the vaccination site	156 (67.8)
25 2nd Inflammatory discharge at the time of vaccination after tuberculosis vaccination in the 2nd month	118 (51.3)

The health literacy scale "understanding" sub-dimension scores showed significant differences according to age ($p < 0.05$). Women aged 26-30 had higher scores for understanding information than women aged 25 and under. Significant differences were also found in total health literacy scale scores and understanding information subdimension scores according to education level ($p < 0.05$). Women with high school education had higher total health literacy and understanding subdimension scores than literate women and those with primary education (Table 4).

There were significant differences in the primary

Table 4. PID awareness and health literacy scale scores according to sociodemographic variables

Variable	Health Literacy Scale					PiD X̄±S
	Access X̄±S	Understanding X̄±S	Appraisal X̄±S	Application X̄±S	Overall score X̄±S	
Age ¹						
25 years and below	22.09±3.52	29.50±5.00*	34.30±6.45	22.45±3.59	108.35±16.64	14.52±2.80
26-30 years	23.07±2.42	31.41±3.89*	36.05±4.27	22.43±3.13	112.96±11.22	15.24±2.78
31 years and above	22.65±3.39	30.26±4.50	35.00±4.82	22.49±3.30	110.39±13.77	15.22±3.02
Test Value	1.809	3.512	2.158	0.007	2.066	1.467
p	0.166	0.031	0.118	0.993	0.129	0.233
Highest Level of Education ¹						
Literate	21.94±3.19	28.00±6.42*	34.44±7.19	21.75±4.02	106.13±18.73*	13.88±2.92*
Primary Education	21.96±3.33	29.53±4.17*	34.31±5.31	22.10±3.54	107.91±13.79*	14.40±3.15*
High School	23.02±3.18	31.30±4.53*	36.01±5.07	23.09±3.04	113.43±14.15*	15.22±2.61
University And Above	23.24±2.51	31.18±3.71	35.28±4.34	22.12±3.08	111.82±10.85	16.02±2.58 *
Test Value	2.568	4.304	1.587	1.788	2.900	4.361
p	0.055	0.006	0.193	0.150	0.036	0.005
Employment Status ²						
Employed	22.92±3.86	31.58±5.24	36.22±5.55	22.64±3.23	113.36±16.52	15.10±2.83
Unemployed	22.56±2.91	30.14±4.23	34.88±5.07	22.41±3.35	109.99±13.06	15.01±2.90
Test Value	0.716	2.018	1.615	0.442	1.520	0.205
p	0.475	0.045	0.108	0.659	0.130	0.838
Income Status ¹						
Income Less than Expenditure	22.60±2.63	30.40±4.83	35.40±5.01	22.20±3.15	110.60±13.38	14.00±2.43
Income Match Expenditure	22.55±3.25	30.34±4.46	35.04±5.42	22.44±3.47	110.36±14.41	15.24±2.85
Income more than expenses	23.05±2.96	30.97±4.53	35.62±4.32	22.69±2.77	112.33±12.21	14.77±3.13
Test Value	0.407	0.317	0.221	0.174	0.316	2.232
p	0.666	0.729	0.802	0.840	0.729	0.110
Pregnant/Postpartum ²						
Pregnant	23.13±2.58	30.86±4.59	35.62±5.52	22.49±3.12	112.11±13.57	15.03±3.03
Postpartum	22.31±3.43	30.18±4.43	34.87±4.96	22.43±3.46	109.78±14.12	15.02±2.78
Test Value	1.965	1.135	1.082	0.143	1.246	0.027
p	0.051	0.258	0.280	0.886	0.214	0.979
Chronic Health Condition ²						
Yes	22.66±3.21	30.53±4.48	35.25±5.26	22.59±3.33	111.04±14.06	14.76±3.03
No	22.48±2.71	30.00±4.65	34.73±4.87	21.64±3.13	108.85±13.06	15.07±2.86
Test Value	0.305	0.623	0.533	1.540	0.835	0.578
p	0.761	0.534	0.595	0.125	0.405	0.564
Continuous Drug Use ²						
Yes	22.62±3.23	30.49±4.46	35.18±5.30	22.52±3.41	110.80±14.16	14.65±3.46
No	22.77±2.50	30.23±4.81	35.16±4.55	22.06±2.63	110.23±12.41	15.09±2.78
Test Value	-0.257	0.301	0.015	0.707	0.213	0.675
p	0.797	0.764	0.988	0.480	0.832	0.504

¹ One-way ANOVA, ²Independent simple t-test, PID: Primary immunodeficiency**Table 5.** Relationship between health literacy and PID awareness

Variables	1	2	3	4	5	6
1. PID	-					
2. Health Literacy Overall Score	.090	-				
3. Access	.143*	.772**	-			
4. Understanding	.027	.856**	.596**	-		
5. Appraisal	.069	.886**	.637**	.646**	-	
6. Application	.097	.738**	.471**	.496**	.602**	-

Spearman's correlation coefficient, *p<0,05, **p<0,01, PID: Primary immunodeficiency

immunodeficiency awareness scores according to education level ($p<0.05$). Women with university education had higher awareness scores for primary immunodeficiency than literate women or those with primary education (Table 4).

The relationship between health literacy scale total and subscale scores and primary immunodeficiency awareness is presented in Table 5. A weak, positive correlation was identified between the health literacy scale "access to information" sub-dimension and primary immunodeficiency awareness scores ($r=.143$, $p<0.05$).

Discussion

Health literacy is of great importance during pregnancy and the early postpartum period because the health behaviors of a woman during these stages affect both herself and her baby (39). The literature indicates variability in women's health literacy levels. Some studies have reported that women have above-average health literacy levels (40, 41), while others have emphasized insufficient health literacy levels (42). The health literacy of women during pregnancy is similar to that of the general population (43, 44, 3, 45). In the present study, the health literacy level of the women was moderate. Several factors can explain this. First, considering the participants' education levels, it is evident that a higher education level positively influences health literacy (44, 46). More than half of the women who participated in the study had a high school education or higher, supporting the notion that as education level increases, individuals' capacity to understand and use health-related information also improves. Second, the participants' better socioeconomic status may be another explanatory factor for higher health literacy. Better socioeconomic conditions not only facilitate easier access to health information but also enable more effective utilization of health care services. Third, studies conducted in regions with better access to healthcare services have shown higher health literacy levels. The ease of access to healthcare services and the quality of these services in the region where our study was conducted may have contributed to the participants' improved understanding and use of health information.

In the present study, women aged 26-30 had higher understanding scores on the health literacy scale than women aged 25 and below. This finding is consistent with other studies in the literature (46). This result that the experience and knowledge acquired with age

enhance the ability of respondents to interpret and understand health information. Therefore, when planning health education programs, the age factor of the individuals being educated should also be considered.

Primary immunodeficiency disorders (PIDs) are genetic disorders that increase susceptibility to infection. Awareness of PIDs among pregnant women and mothers is crucial for their health and the health of their children. Early diagnosis of PIDs can prevent disease progression and facilitate early treatment initiation. Mothers must be aware of this issue to protect their children from infections and effectively manage the necessary treatment processes. Delay in diagnosis is a major concern in terms of the consequences of recurrent and serious infections and complications caused by live-attenuated vaccinations such as BCG and oral poliomyelitis vaccine (OPV) (47). Awareness studies related to PIDs are predominantly directed at healthcare workers. Awareness studies conducted with the general population are limited to whether they have heard of PIDs and where they obtained the information. In one study, the question "Have you ever read or heard about PIDs?" was asked, and 41% of respondents answered 'yes', with those respondents primarily obtaining this information from media sources such as the internet and TV (17). No previous study has been applied to the general population to determine awareness of the 10 warning signs. Studies targeting physicians also indicated low awareness of the 10 warning signs (20, 35, 48). In a study by Kılınc et al. (2024) assessing physicians' awareness of PIDs, physicians were asked about the 10 warning signs developed by the Jeffrey Model Foundation, and only 6.9% of the physicians were found to be familiar with all 10 signs (34). The authors scored correct responses to warning signs as 1, and the median score was determined as 7. In the present study, mothers' awareness of PIDs was assessed on a 25-point scale, with an average score of 15.03 ± 2.88 (approximately 60%). In a study conducted with medical students, the percentage of correct answers regarding PID warning signs was 64.4%, while another study reported an awareness level of 54.8% among medical students (25, 49). Despite expectations that physicians' PID awareness would be higher than that of mothers due to professional training and clinical experience, it is noteworthy that even among physicians, the rate of familiarity with all 10 warning signs was as low as 6.9% (34). This finding indicates that efforts to raise awareness among mothers about

health-related issues are effective.

The questions with the highest correct response rates regarding women's awareness of primary immunodeficiency disorders were "Use of antibiotics for 2 months or longer" and "Having pneumonia more than twice a year". This is consistent with the literature (34, 50). In addition, a study conducted with physicians following up with PID patients reported that one of the most common findings observed was 'having pneumonia more than twice a year'. Physicians most frequently observe this symptom in clinical practice, and they consider it a significant sign of increasing suspicion of PIDs in children. Recognition of mothers with this symptom as the most correctly identified sign demonstrates high awareness in the community about this symptom and that parents carefully monitor their children's health.

For PID diagnosis, the most predictive factor is a confirmed or suspected family history of immunodeficiency (51). Family history is crucial for the early diagnosis and management of PIDs, as well as for reducing morbidity and mortality (52). A detailed family history can help prevent serious complications from vaccination, such as BCG, in children with immunodeficiency by delaying vaccination until a suitable diagnosis is made (53). In the present study, 60% of the women considered family history as a PID indicator. This finding a certain level of awareness in the community but also indicates that such awareness requires further improvement. This rate highlights the need for broader recognition of family history in PID diagnosis by both the general population and healthcare professionals. In this context, the critical role of family history in PID diagnosis should be further emphasized through both public education programs and clinical practice.

A weak, positive correlation was found between access to information on the health literacy scale and PID awareness. This indicates that as health literacy increases, so too does PID awareness. However, the weak correlation may be due to difficulty in accessing information on rare diseases like PIDs. Additionally, PID awareness might be high only among individuals motivated to seek information on this topic, which may contribute to the weak correlation.

Limitations of the Study

In this study, no information was collected on women who refused to participate in the study or did not complete the data collection tools. Therefore, we did

not assess the characteristics of individuals who did not participate in the study or the possible effects on health literacy and awareness of primary immunodeficiency.

Conclusion

In the present study, the mean health literacy scale score of the participating women was found to be 110.72 ± 13.92 , while the mean PID awareness score was 15.03 ± 2.88 . These findings indicate that health literacy and PID awareness are moderate. Women aged 26-30 had higher understanding information scores on the health literacy scale than women aged 25 and below. Women with high school and university education levels had significantly higher health literacy and PID awareness scores than literate women and those with primary education. The significant differences in health literacy and PID awareness based on age and education level indicate that there is a greater need for support in these areas for younger women and those with lower education levels.

A weak, positive correlation was found between access to information on the health literacy scale and PID awareness. The findings that increasing health literacy may also enhance PID awareness. In this context, it can be concluded that educational programs aimed at improving women's health literacy levels could be an effective strategy for increasing PID awareness.

Furthermore, more scientific research is needed to better understand the relationship between health literacy and PID awareness. Such studies could provide insights into how health literacy interventions can be more effectively employed to increase PID awareness.

Conflict of interest

The author declares that there is no conflict of interest

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