

The Relationship of E-health Literacy with Cyberchondria: A Cross-Sectional Study on Pregnant Women

ABSTRACT

Background and Objectives: Health literacy and cyberchondria are effective for pregnant women to make the right health decisions for themselves and their babies. The purpose of this study is to investigate the correlation between e-health literacy, cyberchondria, and the factors influencing them in pregnant women.

Materials and Methods: The cross-sectional study was conducted on a population of pregnant women who were admitted to two public hospitals located in Samsun. A questionnaire form consisting of 3 sections was used as a data collection tool in the study. Pregnancy information form, e-health literacy scale and cyberchondria scale. The study involved analysing 400 questionnaire forms. Data were analyzed by the frequency test, One Way ANOVA, correlation analysis and multiple regression.

Results: The study participants had a mean age of 28.53 ± 6.53 . Among them, 60.3% were aged 19-29, 37.3% had an associate degree, 45.3% were pregnant for the first time, and 38.3% were in their second trimester. The mean pregnancy was 1.81 ± 10.63 . In the study group, the mean e-health literacy was 3.27 ± 0.99 , and the mean cyberchondria was 30.29 ± 9.78 . The study found a statistically significant difference in e-health literacy and cyberchondria based on age, educational status, gestational week, and number of pregnancies. Additionally, there was a statistically significant positive relationship between health literacy and cyberchondria severity.

Conclusion: The results of the study showed that the level of e-health literacy and cyberchondria of pregnant women was moderate, and that e-health literacy, age and education level would affect cyberchondria. Therefore, this problem can be prevented by providing digital health practices, e-health literacy and safe internet use training to pregnant women in health institutions and the media.

Paper Type: Research Article

Keywords: Cyberchondria, E-Health Literacy, Pregnancy, Public Hospital.

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Introduction

Health literacy, as defined by the World Health Organization, refers to the ability of individuals to access, comprehend, and apply health-related information. These skills are essential for making informed decisions, adopting healthy behaviours, and effectively utilizing health services. Health literacy empowers individuals to take control of their health and contributes to improving the health of communities as a whole (1). Health literacy is a crucial tool that enables individuals to access, comprehend, and apply information that promotes and sustains good health. It is intertwined with health systems, health policies, and community health efforts, all working together to enhance health outcomes (2). Health literacy improves individuals' ability to understand and use healthcare services and enhances communication with providers. This contributes to better health outcomes for both patients and health professionals. Many people with low health literacy may not use preventive health services, which can have a negative impact on their health outcomes. To address this issue, it is important to increase health education and improve health literacy. This will help promote the use of preventive health services and ultimately reduce health disparities (3).

Health literacy levels of individuals are an important variable that positively contributes to their health level (4). In the European health literacy study, the rate of inadequate health literacy is 12.4%. In the USA Adult Literacy Study, the rate of health literacy below the basic level is 14%. In Turkey, in the health literacy study conducted by the Ministry of Health in 2018, the rate of

inadequate health literacy was 30.9%. According to this study, the regions with the lowest rates of insufficient health literacy are Eastern Marmara (19.7%), Central Anatolia (20.4%) and Western Black Sea (23.6%). The regions with the highest rates of inadequate health literacy are Southeastern Anatolia (33.3%), Eastern Anatolia (54.2%) and the Mediterranean Region (35%). According to the results of the same study, health literacy shows statistically significant differences according to gender, age and educational status. One of the most important results of the study is that the rate of inadequate health literacy in Turkey is 35.4% among women and this rate is highest among women between the ages of 18-24 (14%) (5). Low health literacy has a negative impact on people's health status. It leads to less use of preventive health services and more resort to medical services. It also increases hospitalization rates and health expenditures, and increases the likelihood of medication errors. It also leads to problems with self-care and adherence to treatment (4).

Pregnancy is one of the most critical periods of adult women's lives. During pregnancy, many sociological, psychological and physiological changes occur in women's lives (6). At the same time, women face a number of threats that are very difficult to predict in this period. Pregnant women apply to primary health care institutions and gynaecology and obstetrics specialists to cope with these problems and overcome the pregnancy process harmlessly. With the development of technology and the Internet, women now often turn to online resources to gather information about pregnancy (7–9). Pregnant women mostly search for

information on the Internet about physiological changes occurring during pregnancy, the birth process, fetal development, newborn care, breastfeeding and mode of delivery (10, 11). In a study examining internet sites that provide information about pregnancy and pregnancy process, and it was determined that 87% of these sites were managed by individuals without medical training. In addition, it was determined that 80% of these sources provided at least one piece of information about the pregnancy process incomplete or inaccurate (12).

The internet has become a crucial source of information on health, just like in almost every other subject today. As a result, e-health literacy has gained importance as a separate form of health literacy, and cyberchondria has emerged as an important concept. E-health literacy refers to the ability of individuals to access, search, find, understand and evaluate health-related information from the internet and digital sources. Cyberchondria is considered as the digital equivalent of hypochondria, and it is characterized by fear and anxiety arising from misinterpretations of bodily sensations found on the internet. Cyberchondria is defined as excessive or repeated searches on the internet, made due to anxiety and concerns about health, that further increase the anxiety and concerns experienced (13–15).

Health literacy and cyberchondria are thought to be effective in enabling pregnant women to make the right health decisions about themselves and their babies to be born. In the relevant literature, studies evaluate health perception or health literacy during pregnancy (4, 16–22). However, studies

evaluating cyberchondria, a new concept in pregnant women, and health literacy are limited. This study aims to investigate the relationship between e-health literacy and cyberchondria in pregnant women, as well as the factors affecting them. The study will contribute to the relevant literature, and help improve the level of cyberchondria among pregnant women.

Materials and Methods

Population and Sample

The study was cross-sectional. The study was conducted in the gynecology and obstetrics outpatient clinics of public hospitals of two districts with a total population of 18.928 and 19.017 in Samsun province Metin girmek için buraya tıklayın veya dokunun. The total number of pregnant women who applied to these outpatient clinics between January and June 2023 was 4540 Metin girmek için buraya tıklayın veya dokunun. The sample of the study was calculated as 354 with 95% confidence interval and 5% margin of error Metin girmek için buraya tıklayın veya dokunun. For the study, a total of 600 questionnaire forms were left at the pregnancy information classes of these hospitals. 400 completed and complete questionnaire forms were analyzed. The questionnaires were only administered to pregnant women who agreed to participate in the study. The study data were collected between 20.07.2023 and 15.09.2023. The principles of the Declaration of Helsinki were followed in the study.

Data Collection Tools

Data collection for the study was conducted utilizing a trio of instruments: the “Socio-Demographic Characteristics Form,” the “e-Health Literacy Scale,” and the

“Cyberchondria Severity Scale.” These tools were employed to ascertain the individual attributes of the study participants.

Socio-demographic characteristics form

It consists of 22 items the researchers created about the teachers’ socio-demographic characteristics.

E-Health Literacy Scale

The “e-Health Literacy Scale,” initially developed by Norman and Skinner in 2006 (23), was utilized in its Turkish version, adapted by Tamer Gencer in 2017 (24), with established validity and reliability. This scale is composed of eight items, each rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). An increase in the average score on the scale, approaching 5, indicates a higher level of e-health literacy. The scale’s Cronbach’s Alpha coefficient, a measure of its internal consistency, was originally reported as 0.90 (25, 26). In the present study, the Cronbach’s Alpha value for the scale was determined to be 0.92.

The Cyberchondria Severity Scale Short Form (CCS-12)

The scale developed by McElroy et al. in 2019 has been subjected to numerous validity and reliability studies in various languages. The Turkish version was evaluated by Yorgancıoğlu Tarcan et al. The scale consists of a total of 12 statements and four sub-dimensions, namely excessiveness, distress, confidence seeking, and coercion. The statements are rated on a 5-point Likert scale, ranging from “1=never” to “5=always”. The scale’s total score ranges from 5 to 60, and the sub-dimensions are scored independently. The scale is assessed based on the overall score, and it has a Cronbach Alpha

value of 0.80 (25, 26). In this study, the scale's Cronbach Alpha value was 0.90.

Data Analysis

Data analysis was conducted using the SPSS 26.0 software package. Demographic characteristics were defined by analysing the data using number, frequency, and percentage analyses. As the Skewness and Kurtosis values of the scale were found to be between -1.5 and +1.5, a T-test and ANOVA test were performed. The relationship between the scales was determined using correlation, and the effect was determined using multiple regression analysis. The statistical significance level was set at ($p < 0.001$).

Results

Among the participants, 60.3% were between the ages of 19-29 years, with a mean age of (28.53 ± 6.53), 37.3% were associate degree graduates, 45.3% had their first pregnancy, 38.3% were in the 2nd trimester and mean pregnancy (1-6) was 1.81 ± 10.63 (Table 1).

In Table 2, it was determined that all participants used smartphones and social media, did research on the Internet about the pregnancy process, and 67.5% spent an average of 2-3 hours on the Internet daily.

In Table 3, scales and sub-dimension averages are given. The mean score for e-Health Literacy was 3.27 ± 0.99 , and the mean score for cyberchondria was 30.29 ± 9.78 . In the sub-dimensions of cyberchondria, extremism was determined to be the highest sub-dimension with a mean of 8.30 ± 2.77 . According to these findings, it can be said that the e-health literacy scale and cyberchondria scale scores of pregnant women are at a moderate level.

Table 1. Socio-demographic Characteristics of Pregnant Women (N=400)

Variables		N	%
Age	19-29	241	60.3
	30-39	121	30.3
	+ 40	38	9.5
Education	Primary education	36	9.0
	High School	81	20.3
	Associate Degree	149	37.3
	Undergraduate education	134	33.5
Number of pregnancies	First	181	45.3
	Second	121	30.3
	3 and above	98	24.5
Pregnancy week	1. Trimester	144	36.0
	2. Trimester	153	38.3
	3. Trimester	103	25.8
Smoke	Yes	15	3.8
	No	385	96.3
Smoking at home	Yes	117	29.3
	No	283	70.8
Parents' Smoking Status	Yes	146	36.5
	No	254	63.5
Alcohol	Yes	106	26.5
	No	294	73.5
Family Structure	Nuclear family	345	86.3
	Patriarchal family	55	13.8
Who do you live with?	My wife and children	345	86.3
	With my wife and family	55	13.8
Employment status	Yes	317	79.3
	No	83	20.8
Do you have an income?	Yes	317	79.3
	No	83	20.8
Income status	Income covers expenses	56	14.0
	Income equal to expenditure	31	7.8
	Income does not cover expenses	313	78.3
Social security	SSI	259	64.8
	Pension Fund	108	27.0
	Bağ-Kur	33	8.3
	Mean age (19-29)	28.53 ± 6.53	
	Pregnancy average (1-6)	1.81 ± 10.63	
	Pregnancy Week (1-40)	18.98 ± 10.61	

Table 2. Internet use of pregnant women

Variables		N	%
Using a smartphone	Yes	400	100.0
Using social media	Yes	400	100.0
Gebelik süreci ile internette ilgili arama yaptınız mı?	Yes	400	100.0
How many hours a day do you spend online on average?	0-1 hour	108	27.0
	2-3 hours	270	67.5
	4 + hours	22	5.5
Do you do research about your doctor on the internet?	Yes	400	100.0

Table 3. Mean of Scales and Subscales

Scales	Min	Max	\bar{x}	SS	Cronbach's Alpha
Cyberchondria	12	60	30.29	9.78	0.906
Excessiveness	3	15	8.30	2.77	
Distress	3	15	7.28	2.87	
Mistrust	3	15	7.53	2.94	
Compulsion	3	15	7.19	2.94	
e-Health Literacy	1	5	3.27	0.99	0.926

Table 4 presents a comparative analysis of e-health literacy and cyberchondria in relation to various socio-demographic factors. The findings revealed statistically significant differences between e-health literacy and cyberchondria when considered alongside educational status, gestational week, and the number of pregnancies. These differences were observed to be significant at a p-value of less than 0.05 ($p < 0.001$).

While a statistically significant difference was found between age and cyberchondria severity ($p < 0.001$), no significant difference was found between e-health literacy ($p > 0.05$). The analysis identified a statistically significant association between age and the severity of cyberchondria ($p < 0.001$), but no significant correlation was found between age and e-health literacy ($p > 0.05$).

The mean e-health literacy scores were as follows: 3.34 ± 0.97 for those aged 30-39 years, 3.46 ± 1.03 for associate degree holders, 3.45 ± 0.71 for individuals in their second trimester, and 3.45 ± 0.91 for those experiencing their first pregnancy. Regarding cyberchondria severity, the mean scores

were 31.90 ± 9.74 for the 19-29 year age group, 31.55 ± 9.24 for associate degree graduates, 31.65 ± 9.72 for second-trimester pregnancies, and 32.02 ± 10.08 for second-time pregnancies.

The correlation analysis revealed a statistically significant positive relationship between eHealth Literacy and the severity of Cyberchondria. This finding indicates that higher levels of eHealth Literacy are associated with increased severity of Cyberchondria ($p < 0.001$), ($r = 0.240$) (Table 5).

In Table 6, the severity of cyberchondria and the factors affecting it were analysed with a multiple regression model. The analysis yielded a statistically significant regression model. This implies that the model effectively predicts the dependent variable based on the independent variables included in the analysis ($F(5,395) = 5.692$, $p < 0.05$), and the independent variables explained 9% of the change in cyberchondria severity ($R^2 = 0.090$). According to the results of this analysis, cyberchondria severity is affected by e-health literacy, age and educational status (Table 6).

Table 4. Comparison of E-health Literacy and Cyberchondria Severity with Socio-demographic Characteristics

Variables		e-Health Literacy		Cyberchondria	
		\bar{x}	SS	\bar{x}	SS
Age	1.19-29	3.28	1.00	31.90	9.74
	2.30-39	3.34	0.97	28.27	9.19
	3.40 + above	2.99	0.91	26.53	9.85
	p	0.169		0.000*	
	F	1.786		8.988	
	Tukey			2>3	
Education	1.Primary education	2.76	0.92	24.56	8.19
	2.High School	3.14	0.99	31.46	11.18
	3.Associate Degree	3.46	1.03	31.55	9.24
	4.Undergraduate education	3.26	0.91	29.72	9.33
	p	0.001*		0.001*	
	F	5.707		5.680	
	Tukey	3>2		3>2>4>1	
Pregnancy week	1. Trimester	3.03	1.05	28.40	8.97
	2. Trimester	3.45	0.71	31.65	9.72
	3. Trimester	3.33	1.18	30.90	10.59
	p	0.001*		0.012*	
	F	7.010		4.448	
	Tukey	3>1		2>1	
Number of pregnancies	1.First	3.45	0.91	31.00	9.94
	2.Second	3.18	1.01	32.02	10.08
	3.3 and above	3.04	1.04	26.84	8.21
	p	0.002*		0.000*	
	F	6.100		8.826	
	Tukey	1>3		1>3	

*One way-ANOVA

Table 5. Correlation Analysis

Scales		Cyberchondria	Excessiveness	Distress	Mistrust	Compulsion	e-Health Literacy
Cyberchondria	r	1	0.781	0.886	0.897	0.827	0.240
	p		0.000	0.000	0.000	0.000	0.000 *
Excessiveness	r		1	0.615	0.608	0.444	0.072
	p			0.000	0.000	0.000	0.000 *
Distress	r			1	0.736	0.654	-0.050
	p				0.000	0.000	0.000 *
Mistrust	r				1	0.691	-0.015
	p					0.000	0.000 *
Compulsion	r					1	0.13
	p						0.009 *
e-Health Literacy	r						1
	p						

**. Correlation is significant at the 0.01 level (2-tailed)

Table 6. Factors affecting cyberchondria, Multiple Regression Analysis

Variables	B	SE	β	t	p
(Constant)	16.838	6.678		2.521	0.012
Age (19-29)	2.386	0.862	0.162	2.768	0.005*
Education (Associate egree)	0.201	0.518	0.020	0.389	0.000*
Number of pregnancies(First)	-1.016	0.688	-0.084	-1.478	0.140
Pregnancy week (1.trimester)	0.371	0.656	0.030	0.566	0.572
e-Health Literacy	0.085	0.488	0.009	0.175	0.004*
Adjusted R2 = 0.090	F=5.692		df=(5,395)		*p= 0.000
Dependent Variable: Cyberchondria Severity					

Discussion

The current literature provides limited insights regarding the cyberchondria levels and e-health literacy among pregnant women. This research identified notable differences in e-health literacy and cyberchondria levels among pregnant women based on various socio-demographic factors. Furthermore, it was established that e-health literacy significantly influences the level of cyberchondria. By exploring these aspects, this study seeks to enrich the existing body of knowledge and bridge the identified gap in the literature.

The number of pregnancies of the participants was 1.81 ± 10.63 . Comparatively, according to the Turkish Statistical Institute (TÜİK) 2022 data, the national average age at birth in Turkey is 29.2, with an average of 1.62 pregnancies. In the specific province where this research was conducted, the average birth rate for pregnant women stood at 1.32 (TÜİK, 2023). Additionally, relevant studies in this domain, such as the one by Şirin Gök et al. (2022), reported a mean age of 28.0 ± 6.0 for pregnant women, while the research by Baltacı et. al (2023) found a mean age of 28.60 ± 6.33 . These findings are consistent with the results of the present study, demonstrating a similar trend in the mean

age and number of pregnancies among pregnant (27, 28).

In this study, it was observed that all participating pregnant women engaged with the Internet and social media for information regarding pregnancy and related processes. This universal utilization contrasts with the findings of Güneş Öztürk et al. (2020), where it was reported that 70.6% of pregnant women used the Internet and 55.1% relied on social media for information-seeking purposes (19). Additionally, research indicates a high prevalence of Internet use for health information among pregnant women in Iran, with up to 95% engaging in online searches for health-related data (6). This comparison highlights the varying levels of Internet and social media usage among pregnant women in different regions and contexts. Other studies in the literature have found that the percentage of pregnant women using the Internet for information ranges broadly from 70% to 97% to obtain information about the pregnancy process and to verify the information they received from health professionals (8, 29, 30). Based on these results, it can be said that pregnant women receive information about pregnancy on the Internet other than physicians or midwives. Although the information received by pregnant women from health

professionals has an important effect, pregnant women continue to search for information online (31). Although online information seeking by pregnant women is considered appropriate for their mental health when the level of e-health literacy is insufficient, this situation may have negative consequences for both the pregnant woman and the foetus (14). For this reason, it can be stated that both the health of the pregnant woman and the baby can be protected by providing awareness training to pregnant women about searching for health information on the internet in the pregnancy class and pregnancy school in all hospitals in Turkey.

In the present study, the e-health literacy score was determined to be 3.27 ± 0.99 . Statistically significant differences were identified between e-health literacy and factors such as educational status, gestational week, and the number of pregnancies. The mean scores of those with associate degrees, those in the second trimester and those with first pregnancy were higher than the other groups. According to these results, it can be said that pregnant women have an e-health literacy level above the average. In the relevant literature, the e-health literacy of individuals was determined as low (32), medium (33–35), and high (18). In the studies conducted in Korea and Lebanon, in line with the results of the present study, e-health literacy was at a medium level in community-based studies (18, 36). Şahin et al. (2023) found that the level of e-health literacy was high in their study on pregnant women (37). Considering that pregnant women with higher education levels may also have higher e-health literacy, education may increase

health awareness and healthy lifestyle behaviors. This may help to increase the level of health literacy and reduce unnecessary anxiety as a result of online health research.

As a result of the study, the mean cyberchondria level was 30.29 ± 9.78 . The study revealed a statistically significant difference between cyberchondria and variables such as age, educational status, number of pregnancies, and gestational week. This finding is in line with the existing literature on the subject matter (33–35,38). Cyberchondria is becoming a public health concern due to the widespread use of the Internet and people's increased tendency to search for health information online (39). High levels of cyberchondria may also cause anxiety, depression and obsessive-compulsive disorders (15, 39, 40). Furthermore, individuals with high levels of cyberchondria may cause unnecessary intensity by applying to health institutions even if they do not have any health problems; thus increasing health service costs (27). Based on these results, considering the prevalence of internet use, providing training on beneficial internet use, especially through educational institutions, will lead to a decrease in the level of cyberchondria in the society.

Another study result showed that cyberchondria was affected by e-health literacy, age and educational status in the multiple regression model. In studies conducted in the literature, cyberchondria was found to be affected by e-health literacy, health anxiety, problematic internet use and health anxiety (34, 35, 39, 41). According to these results, it is of great importance to provide periodic training to pregnant women about the pregnancy process with specific training programs and training tools from the first moment they apply to health institutions. Because the stress and anxiety that may occur on pregnant women who do

not receive proper education will cause them to visit health institutions unnecessarily and cause the pregnant woman to face different health problems.

Study Limitations and Strengths: The study relied on pregnant individuals self-reporting their data. Since the study was cross-sectional, it was not possible to establish a causal relationship between e-health literacy and cyberchondria. Additionally, the fact that the study was conducted only in public hospitals in Samsun province limits the generalizability of the results.

Conclusion

The study shows that expectant mothers possess moderate levels of competence in cyberchondria and e-health literacy. In addition, expectant mothers' e-health literacy and cyberchondria levels varied based on their socio-demographic characteristics. In particular, the participants' e-health literacy, age and educational background emerged as significant predictors of cyberchondria prevalence.

Pregnant women's health literacy affects their ability to understand and use basic health-related information and their ability to make appropriate health decisions for themselves and their baby. At the same time, health literacy of pregnant women also affects their cyberchondria levels. Therefore, health literacy and cyberchondria levels of pregnant women who use the health system due to pregnancy will affect how they can use the health system. Improving cyberchondria and health literacy levels of pregnant women will have a direct impact on family and community health. Improving pregnant women's health literacy and cyberchondria

levels should be the primary goal in building a healthier future.

According to this result, health institutions and health workers should determine pregnant women's health literacy levels, health information search levels on the internet and cyberchondria levels and then decide which educational tools and methods are appropriate for them. According to the results, appropriate trainings should be provided in pregnancy classes and pregnancy schools to prevent negative effects on the health of both pregnant women and their babies.

When pregnant women face a health problem and try to solve it by simply searching the Internet and applying what they find, they risk putting themselves and their unborn child at risk. In such cases, seeking advice from a health institution is a safer and more appropriate course of action. As e-health literacy levels increase in Turkey, both public and private healthcare institutions can proactively address this issue. These potential risks can be mitigated by offering courses such as "pregnancy schools" and "pregnancy classes" that educate expectant mothers on digital health practices, e-health literacy, and the use of trusted online resources. It is essential to remember that raising the level of health literacy is vital for a healthier society.

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Author contributions: YD, SÖ and ED designed the study, YD, SÖ and ED collected the data, YD and SÖ analysed the data and wrote the manuscript, all authors contributed to manuscript revisions.

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