Original Article

DOI: 10.4274/anajog.galenos.2026.36349

Anat J Obstet Gynecol Res 2026;3(2):118-123

Internet-Related Health Anxiety in Women Diagnosed with Endometrial Intraepithelial Neoplasia: A Cross-Sectional Study

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ABSTRACT

Purpose: To evaluate the level of internet-related health anxiety and the factors associated with it in women diagnosed with endometrial intraepithelial neoplasia (EIN).

Methods: Women diagnosed with EIN were included in the study. Socio-demographic and clinical characteristics of the participants were recorded. Internet-related health anxiety was assessed using the cyberchondria severity scale-12 (CSS-12) with higher scores suggesting increased anxiety. The Mann-Whitney U test was used for between-group comparisons. Variables associated with the total CSS-12 score at $p<0.10$ in univariate analysis were included in the multivariable linear regression model.

Results: A total of 78 women participated with a median age of 44 (26-69) years, and median BMI of 32.1 kg/m^2 (21.8-47.6). The median total CSS-12 score was 31 (12-60), with higher scores indicating greater internet-related health anxiety. In univariate analysis, women younger than 40 years had significantly higher CSS-12 scores than women aged 40 years or older (37 vs. 31, $p=0.004$). CSS-12 scores were also significantly higher in nulliparous women than in multiparous women (45 vs. 32, $p=0.003$), and in women with fertility desire than in those without fertility desire (42 vs. 29, $p<0.001$). No significant association was found between educational level and CSS-12 score ($p=0.200$). In multivariable linear regression analysis, age younger than 40 years [B=5.41, 95% confidence interval (CI): 2.18-8.64, $p=0.001$], nulliparity (B=4.83, 95% CI: 1.56-8.10, $p=0.005$), and fertility desire (B=7.68, 95% CI: 3.94-11.42, $p<0.001$) were independently associated with the total CSS-12 score.

Conclusion: Among women diagnosed with EIN, greater levels of internet-related health anxiety was associated with age <40 years, nulliparity, and ongoing fertility desire. Accurate post-diagnosis information, guidance toward reliable online resources, and individualized counseling may help reduce internet-related health anxiety in this patient group.

Keywords: Cyberchondria, cyberchondria severity scale-12, endometrial intraepithelial neoplasia, internet-related health anxiety, online

INTRODUCTION

Endometrial intraepithelial neoplasia (EIN) is a premalignant lesion of the endometrium and is considered a direct precursor of endometrial adenocarcinoma.[1,2] Among patients diagnosed with EIN who undergo hysterectomy, endometrial cancer is detected in the hysterectomy specimen in approximately 30% to 50% of cases.[3-5] Although hysterectomy is the standard treatment approach for EIN, fertility-sparing treatment options may also be considered in women who have not yet given birth or who wish to preserve fertility. The uncertainty inherent in this premalignant condition and the complexity of treatment decisions may create substantial psychological burden and anxiety in women diagnosed with EIN.[2,6]

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Received: 09.06.2026 **Accepted:** 22.07.2026 **Publication Date:** 02.09.2026

Cite this article as: Öncü HN, Köksal OK, Baydemir ŞK, Hanedan C, Soysal Ç, Korkmaz V. Internet-related health anxiety in women diagnosed with endometrial intraepithelial neoplasia: a cross-sectional study. Anat J Obstet Gynecol Res. 2026;3(2):118-123

Today, the internet has become one of the most common and easily accessible sources of health information. As of 2023, the number of internet users worldwide has reached 5.3 billion, and with the widespread use of smartphones and digital platforms, the internet has become one of the most frequently used sources for health-related information. Individuals with an existing illness or a newly diagnosed condition tend to search online for their symptoms, diagnoses, and treatment options before or after consulting healthcare professionals. However, this search behavior does not always serve an informative function; on the contrary, it may sometimes turn into a cycle that reinforces and sustains anxiety. The increasing use of the internet to access health-related information is thought to contribute to anxiety and predispose individuals to cyberchondria, particularly due to the presence of conflicting and sometimes excessively detailed information.[7,8]

Cyberchondria is characterized by increased health anxiety and worry resulting from excessive or repetitive online searches for health-related information.[9] To assess this concept, McElroy and Shevlin[10] developed the 33-item cyberchondria severity scale (CSS) in 2014. Subsequently, the CSS-12, a shorter and more practical version for clinical and research settings, was introduced.[11] The Turkish validity and reliability study of the CSS-12 was conducted by Yorgancıoğlu Tarcan et al.[12] in 2023, and the internal consistency coefficient of the scale was reported as 0.80.

Women diagnosed with EIN may experience intense worry due to the possibility of hysterectomy, the risk of fertility loss, and the potential presence of concurrent cancer. In this patient group, the clinical factors associated with online health information-seeking behavior and internet-related health anxiety have not yet been adequately investigated. Identifying high-risk patient groups in advance is important for healthcare professionals to provide accurate information and individualized counseling. In this study, we aimed to evaluate internet-related health anxiety using the CSS-12 and to determine the clinical and demographic factors associated with this anxiety in women diagnosed with EIN.

METHODS

This cross-sectional study was conducted between August 2025 and June 2026 after obtaining approval from the University of Health Sciences Turkey, Ankara Etlik City Hospital Scientific Research Ethics Committee (approval no: AEŞH-BADEK2-2025-019, date: 22.07.2025). The study included women diagnosed with EIN based on histopathological examination. Women aged 18 years or older with histopathologically confirmed EIN who reported using the internet for at least one hour per day and who self-reported seeking health-related information online were included in the study. The criterion of at least one hour of daily internet use was selected to ensure regular exposure to online information sources. Patients who did not use the internet daily, had a known psychiatric disorder or regular psychiatric medication use, had missing responses in the questionnaire form, or did not agree to participate were excluded. All participants were informed about the study, and written informed consent was obtained before administration of the questionnaire.

Internet-related health anxiety was assessed using the CSS-12. This scale, developed by McElroy et al.,[11] was adapted into Turkish and validated in 2023 by Yorgancıoğlu Tarcan et al.[12] The CSS-12 is a 5-point Likert-type scale consisting of 12 items, each scored from 1 to 5. The scale includes four subscales: compulsion, excessiveness, distress, and reassurance seeking. The compulsion subscale evaluates the extent to which online health searches interfere with daily functioning; the excessiveness subscale evaluates repetitive and difficult-to-control health information-seeking behavior; the distress subscale evaluates negative emotional responses after online health searches; and the Reassurance seeking subscale evaluates the tendency to repeatedly seek confirmation and reassurance from healthcare professionals or other sources. Each subscale score ranges from 3 to 15, while the total CSS-12 score ranges from 12 to 60. Higher scores indicate higher levels of internet-related health anxiety.[11]

Data about participants' age, body mass index (BMI), parity, menopausal status, fertility desire, and educational level were recorded. Age was evaluated in two groups: younger than 40 years and 40 years or older. Parity status was classified as nulliparous or multiparous. Educational level was categorized as primary-middle school and high school or above. The associations of these variables with the total CSS-12 score and subscale scores were analyzed.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Mac, version 22.0 (IBM Corp., Armonk, NY, USA). The distribution of continuous variables was assessed using the Kolmogorov-Smirnov test. Continuous variables that did not show normal distribution are presented as median (minimum-maximum), while categorical variables are presented as numbers and percentages.

The Mann-Whitney U test was used for pairwise group comparisons of the total CSS-12 score and subscale scores. Variables associated with the total CSS-12 score at $p<0.10$ in univariate analyses were included in the multivariable linear regression model using the enter method. Accordingly, age younger than 40 years, nulliparity, and fertility desire were entered into the multivariable linear regression model. The total CSS-12 score was considered a continuous outcome variable and was used as the dependent variable in the multivariable model.

Since the study was conducted over a predefined period, a post-hoc power analysis was performed using G*Power 3.1.9.7 to evaluate the adequacy of the final sample size. For multiple linear regression with three predictors, assuming a medium effect size ($f^2=0.15$), $\alpha=0.05$, and 80% power, the minimum required sample size was 77 participants. The final sample exceeded this value.

Before multivariable linear regression analysis, model assumptions were evaluated in terms of residual distribution and multicollinearity. Multicollinearity was assessed using variance inflation factor and tolerance values. Linear regression analysis was considered appropriate because the model residuals showed an acceptable distribution and no

significant multicollinearity was detected. Regression results were reported as B coefficients, 95% confidence intervals (CIs), and p values. A p value of <0.05 was considered statistically significant.

RESULTS

The median age of the 78 participants was 44 years (26-69), the median BMI was 32.1 kg/m^2 (21.8-47.6), and the median parity was 1 (0-6). Of the participants, 56 (71.8%) were premenopausal and 22 (28.2%) were postmenopausal. In terms of parity status, 19 (24.4%) were nulliparous and 59 (75.6%) were multiparous. Fertility desire was reported by 17 patients (21.8%) and absent in 61 patients (78.2%). Educational level was primary-middle school in 26 patients (33.3%) and high school or above in 52 patients (66.7%). The median total CSS-12 score was 31 (12-60) (Table 1).

In the univariate analysis, the total CSS-12 score was 37 (15-58) in women younger than 40 years and 31 (12-50) in women aged 40 years or older ($p=0.004$). Women younger than 40 years also had significantly higher scores in the excessiveness, distress, and compulsion subscales, whereas the difference in the reassurance subscale did not reach statistical significance. The total CSS-12 score was 45 (19-60) in nulliparous women and 32 (12-49) in multiparous women ($p=0.003$), with significantly higher scores in all CSS-12 subscales among nulliparous women. No significant difference was observed in total CSS-12 score based on menopausal status with premenopausal women scoring 32 (12-60) vs. postmenopausal 29 (13-56), ($p=0.176$), and none of the CSS-12 subscale scores differed significantly according to menopausal status. The total CSS-12 score was 42 (18-60) in women with fertility desire and 29 (12-49) in who did not express a desire for fertility ($p<0.001$), with significantly higher scores in all CSS-12 subscales among women with fertility desire. The total CSS-12 score was 32 (12-50) in women with primary-middle school education and 33 (13-57) in those with high school or above education ($p=0.200$), and no significant differences were found in CSS-12 subscale scores according to educational level (Table 2).

Table 1. Demographic and clinical characteristics of the study population (n=78)

Variable	Value
Age (years), median (min-max)	44 (26-69)
BMI (kg/m^2), median (min-max)	32.1 (21.8-47.6)
Parity, median (min-max)	1 (0-6)
Total CSS-12 score, median (min-max)	31 (12-60)
Age group, n (%)	
<40 years	27 (34.6)
≥40 years	51 (65.4)
Menopausal status, n (%)	
Premenopausal	56 (71.8)
Postmenopausal	22 (28.2)
Parity status, n (%)	
Nulliparous	19 (24.4)
Multiparous	59 (75.6)
Fertility desire, n (%)	
Present	17 (21.8)
Absent	61 (78.2)
Educational level, n (%)	
Primary-middle school	26 (33.3)
High school or above	52 (66.7)

BMI: Body mass index, CSS-12: Cyberchondria severity scale-12

In the multivariable linear regression analysis, age younger than 40 years (B=5.41, 95% CI: 2.18-8.64, $p=0.001$), nulliparity (B=4.83, 95% CI: 1.56-8.10, $p=0.005$), and fertility desire (B=7.68, 95% CI: 3.94-11.42, $p<0.001$) were independently associated with the total CSS-12 score. The model explained 42% of the variance in the total CSS-12 score ($R^2=0.42$; adjusted $R^2=0.39$) (Table 3). No significant multicollinearity was detected among the variables included in the multivariable model (VIF range: 1.18-1.74; tolerance range: 0.57-0.85).

DISCUSSION

This study evaluated internet-related health anxiety using the CSS-12 scale in women diagnosed with EIN, a population for which evidence on cyberchondria remains limited. In our study, the median total CSS-12 score was 31 (12-60). As no established cut-off values exist for the CSS-12, this score cannot be categorized as low, moderate, or high. In the multivariable analysis, age younger than 40 years, nulliparity, and fertility desire were identified as three factors independently associated with the total CSS-12 score. Our findings highlight the importance of clinicians developing awareness of internet-related health anxiety in the management of women diagnosed with EIN.

Age younger than 40 years was independently associated with the total CSS-12 score ($p=0.001$), and CSS-12 scores were also higher in women younger than 40 years in the univariate analysis ($p=0.004$). This finding is consistent with the existing literature.[13-15] In a general population study by Aleyeidi et al.,[14] younger women were shown to have higher cyberchondria scores compared with older women. In the study conducted by Güleşen and Beydağ[16] among women with heart disease, cyberchondria levels were also found to be higher in women younger than 50 years compared with those aged 50 years or older. In our study, receiving a premalignant diagnosis, such as EIN, at a young age may add an additional perceived threat to reproductive health and may further increase online information-seeking behavior.

The strongest independent predictor was the presence of fertility desire (B=7.68, 95% CI: 3.94-11.42, $p<0.001$), with a markedly higher median CSS-12 score in women with fertility desire compared with those without (42 vs. 29, $p<0.001$). Nulliparity was also identified as an independent predictor (B=4.83, 95% CI: 1.56-8.10, $p=0.005$), with higher median CSS-12 scores in nulliparous women compared with multiparous women (45 vs. 32, $p=0.003$). The substantial overlap between these two variables, and the fact that both were identified as independent predictors, suggest

Table 2. Univariate analysis of total CSS-12 and subscale scores

Variable	Total CSS-12	*p* value	Excessiveness	*p* value	Distress	*p* value	Reassurance	*p* value	Compulsion	*p* value
Age group										
<40 years, n=27	37 (15-58)	0.004	11 (5-15)	0.006	10 (4-15)	0.008	9 (3-14)	0.068	8 (3-14)	0.038
≥40 years, n=51	31 (12-50)		8 (3-15)		7 (3-12)		7 (3-12)		6 (3-12)	
Parity status										
Nulliparous, n=19	45 (19-60)	0.003	12 (6-15)	0.006	11 (5-15)	0.007	9 (4-15)	0.048	8 (3-15)	0.046
Multiparous, n=59	32 (12-49)		8 (3-13)		7 (3-12)		7 (3-12)		6 (3-12)	
Menopausal status										
Premenopausal, n=56	32 (12-60)	0.176	9 (3-15)	0.232	8 (3-15)	0.189	7 (3-15)	0.448	7 (3-15)	0.275
Postmenopausal, n=22	29 (13-56)		8 (3-14)		7 (3-14)		7 (3-13)		6 (3-15)	
Fertility desire										
Present, n=17	42 (18-60)	<0.001	12 (6-15)	0.003	11 (5-15)	0.001	10 (4-15)	0.003	9 (3-15)	0.008
Absent, n=61	29 (12-49)		8 (3-13)		7 (3-12)		7 (3-12)		6 (3-12)	
Educational level										
Primary-middle school, n=26	32 (12-50)	0.200	8 (3-13)	0.168	7 (3-12)	0.224	7 (3-12)	0.328	6 (3-13)	0.128
High school or above, n=52	33 (13-57)		9 (4-15)		8 (3-14)		8 (3-14)		8 (3-14)	

Values are presented as median (minimum-maximum). Mann-Whitney U test was used for group comparisons
CSS-12: Cyberchondria severity scale-12

Table 3. Multivariable linear regression analysis for factors associated with total CSS-12 score

Variable	B	95% CI	*p* value
Age <40 years	5.41	2.18 to 8.64	0.001
Nulliparity	4.83	1.56 to 8.10	0.005
Fertility desire	7.68	3.94 to 11.42	<0.001

Dependent variable: total CSS-12 score. R^2=0.42; adjusted R^2=0.39. Reference categories were age ≥40 years, multiparity, and absence of fertility desire
CSS-12: Cyberchondria severity scale-12, B: Unstandardized regression coefficient, CI: Confidence interval

a common psychological background. Stroeken et al.[17] described common experiences among young women with gynecologic cancer as feeling trapped between achieving the best oncological outcome and preserving fertility, as well as experiencing time pressure. They also showed that young age at diagnosis, time pressure, and inadequate counseling may increase reproductive concerns and lead to long-term psychological distress.[17] Similarly, Deng et al.[18] demonstrated that fertility-related concerns may outweigh disease-related concerns and that worries about fertility loss may negatively affect treatment adherence and quality of life. In a study conducted among patients with cervical cancer, fertility concerns were reported to be more pronounced in nulliparous women and to mediate the relationship between depressive symptoms and fear of recurrence.[19] The psychological burden caused by social pressure associated with motherhood in childless women has also been emphasized in the literature.[20]

In our society, where the notion of children and family are highly valued, having a premalignant diagnosis like EIN may trigger a similar psychological burden mechanism in women with fertility desire. These women have to face the possibility of hysterectomy or cancer and the uncertainties of fertility-sparing treatment at the same time; this may create an ongoing cycle of anxiety and fuel repeated online information-seeking behavior.

Although nulliparity and fertility desire are conceptually related, they do not completely represent the same clinical construct. Nulliparity reflects reproductive history, whereas fertility desire reflects ongoing reproductive intention and future-oriented concern. Therefore, the independent association of both variables with the total CSS-12 score may suggest that internet-related health anxiety in women with EIN is influenced both by not having children and by the uncertainty surrounding future fertility plans.

The findings of this study are consistent with the limited but growing literature on cyberchondria in the field of gynecologic oncology.[15,21-23]. In studies evaluating the relationship between human papillomavirus (HPV) positivity, which may be associated with fear of malignant transformation, and cyberchondria, HPV 16/18 positivity was also found to have a significant effect on cyberchondria levels.[21,22] Corrales et al.[15] found that the use of the internet for health information was more common among younger and more highly educated patients attending a gynecologic oncology clinic. In a study conducted among patients undergoing oncologic surgery, a significant positive relationship was found between cyberchondria and surgical fear, and a high level of cyberchondria was reported to be the most

important independent variable determining fear of surgery.[23] This finding indicates that cyberchondria may not be merely a passive accompanying condition in oncologic processes, but rather an active factor that may influence clinical outcomes.

In the present study no significant association was found between educational level and the total CSS-12 score ($p=0.200$). The relationship between educational level and cyberchondria is not consistent in the literature. Some studies have reported that higher educational level is associated with lower cyberchondria scores, and this has been explained by better health literacy, greater ability to evaluate information sources, and a more critical interpretation of digital content.[24,25] In contrast, other studies have reported that individuals with higher educational levels may demonstrate more frequent health information-seeking behavior because they use the internet more often and have greater access to health-related information.[15,26] These differing results suggest that cyberchondria cannot be explained solely by formal educational level.

From a clinical perspective, these findings highlight the importance of structured counseling from the time of diagnosis in patients diagnosed with EIN, particularly in young, nulliparous women and those with ongoing fertility desire. The risk of concurrent malignancy, treatment options, and fertility-sparing approaches in eligible patients should be clearly explained on an individual basis. In addition, guiding patients toward reliable online resources and providing individualized patient education may help reduce repetitive and anxiety-provoking online searches.

One of the strengths of this study is that it evaluated internet-related health anxiety in a specific patient group with a premalignant condition that is clinically important in terms of fertility. To our knowledge, no previously published study has specifically evaluated cyberchondria or internet-related health anxiety in women diagnosed with EIN. Available evidence in gynecologic populations has mainly focused on HPV-positive women and gynecologic oncology patients.[15,21,22] In addition, the use of the validated and reliable CSS-12 scale enabled internet-related health anxiety to be assessed using a standardized method. Demonstrating clinically meaningful variables such as age, nulliparity, and fertility desire as independent predictors in multivariable analysis is also one of the important strengths of the study.

Study Limitations

Nevertheless, this study has some limitations. First, the study has a single-center and cross-sectional design and therefore, causal relationships between variables cannot be established. The limited sample size requires caution when interpreting subgroup analyses. Additional psychometric scales evaluating general health anxiety, depression, or anxiety levels were not used in the study. In addition, participants' internet use and online health information-seeking behaviors were based on self-report. Another limitation is that only women who regularly used the internet and reported online health information-seeking behavior were included. This may have introduced selection bias, as women without routine internet use, limited digital access, or lower digital health literacy were not represented in the study population. Therefore, the findings may not be generalizable to all women diagnosed with EIN. The type, quality, and reliability of the online sources accessed by participants were not objectively evaluated. Finally, the absence of a control group prevents comparison of EIN-specific internet-related health anxiety with benign gynecologic conditions or the general population.

CONCLUSION

Internet-related health anxiety was associated with age younger than 40 years, nulliparity, and expressed fertility desire among women diagnosed with EIN. These findings indicate that, in the management of EIN, not only oncologic treatment decisions but also patients' post-diagnosis information-seeking behaviors and psychological needs should be taken into consideration. Accurate information, guidance toward reliable sources, and individualized counseling may help reduce internet-related health anxiety, particularly in young, nulliparous patients with fertility desire. Prospective, multicenter studies including control groups and more comprehensive psychosocial assessments are needed to address this issue more broadly.

Ethics

Ethics Committee Approval: Approval from the University of Health Sciences Turkey, Ankara Etlik City Hospital Scientific Research Ethics Committee (approval no: AEŞH-BADEK2-2025-019, date: 22.07.2025).

Informed Consent: All participants were informed about the purpose and procedures of the study, and written informed consent was obtained prior to completion of the questionnaire. Participant confidentiality and privacy were strictly maintained.

Footnotes

Authorship Contributions

Surgical and Medical Practices: O.K.K., Ş.K.B., C.H., Concept: H.N.Ö., V.K., Design: H.N.Ö., V.K., Data Collection or Processing: H.N.Ö., O.K.K., Ş.K.B., C.H., Ç.S., Analysis or Interpretation: H.N.Ö., Ç.S., V.K., Literature Search: H.N.Ö., Writing: H.N.Ö.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process: During the preparation of this work, the author(s) used ChatGPT to improve "readability" and "language". After using this tool/service, the author(s) reviewed and edited the content as needed and took full responsibility for the content of the publication.

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