

ORIGINAL ARTICLE

Health Related Internet Search and Its Influence on the Behaviors of Those Seeking Professional Health Care: A Cross-Sectional Study at a Tertiary Care Hospital, Abbottabad, Pakistan

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ABSTRACT

Objective: To investigate health-related internet search and its influence on the behaviors of those seeking Professional Health care.

Study Design: A cross-sectional study.

Place and Duration of Study: The study was conducted at the Department of Psychiatry, Combined Military Hospital (CMH), Abbottabad, Pakistan, over a period of six months, from January 2024 to July 2024.

Methods: A total of 356 participants were recruited through convenience non-probability sampling. Inpatients aged 18–50 years were included, while those with psychiatric or chronic medical/surgical illnesses were excluded. Data were collected using a structured, pre-adapted questionnaire. Descriptive statistics were calculated, and associations were examined using Chi-Square tests with odds ratios (95% CI). A *P*-value <0.05 was considered statistically significant.

Results: Among 356 participants, 46.1% reported performing health-related internet searches. Psychological reactions varied, with 34.6% experiencing, reassurance, or support and 37.6% reporting fear or anxiety. Anxiety (OR = 3.14) and reassurance (OR = 15.78) were substantially more common among internet searchers, suggesting a dual psychological influence. Searchers frequently had positive behavioral objectives, such as changing their smoking or substance usage (50.6%), increasing their physical activity (81.1%), and improving their nutrition (77.4%). They showed more involvement with healthcare services by asking doctors more questions (OR = 1.76) and requesting referrals or extra investigations (OR = 8.11) than non-searchers. Self-medication (51.1%) and stopping scheduled tests or drugs (57.3%) were two potentially dangerous practices that were also noted. In general, both positive and negative behavioral reactions were linked to online searches.

Conclusion: Online health information searching can have a twofold effect: promoting positive lifestyle intentions and augmenting concern and unsafe self-management. Increased digital health literacy can help maximize the benefits and mitigate risks.

Keywords: Anxiety, Health Behavior, Health Information Seeking Behavior, Internet, Self-Medication.

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Introduction

The ever-increasing use of digital tools and applications has supported a number of health information needs.¹ The Internet is now the most popular source of online health information, and it is so due to its accessibility, interactive nature, and immediacy.² Digital health literacy can be defined as the ability to acquire, understand, evaluate, and use digital health information to make informed decisions and has become increasingly important to

both the general population and health professionals.³

The social media environment is changing and has transformed how health professionals and the general population seek, use, and share health information.⁴ The accessibility of reliable and credible health-related information over the web can substantially impact health-related behavior as well as outcomes.⁵

At the same time, health information search results on the internet can be misleading, especially for vulnerable populations. Advice that does not match the established medical guidelines or is misunderstood by patients may result in misinterpretation, confusion, and other consequences.⁶ Some patients cannot understand the results of diagnosis and treatment recommendations due to a lack of disease knowledge and communication barriers between patients and doctors.⁷

Numerous factors affecting the patient's attitudes and their involvement in healthcare have been explored in the literature.⁸ A cross-sectional survey of 993 adults in Vietnam found that the popularity of mass media sources, such as the internet, for receiving health information, compared with other sources, was associated with increased use of healthcare.⁹

However, one of the studies also found a negative impact of seeking health information online on the utilization of medical services. The use of mobile internet had a significant negative impact on an individual's inclination to use primary healthcare services.¹⁰

On the negative side, there is cyberchondria, which experts describe as excessive, anxiety-producing health research, which is directly connected to heightened health anxiety and other psychopathology, as per meta-analysis results.¹¹ Nonetheless, there are certain qualitative and empirical studies that suggest searching for health information on the internet can be reassuring.¹²

Further, age-specific case reports have shown that anxiety in older individuals may be provoked by the use of Google to search for health symptoms and can be incorporated into cognitive-behavioral therapy practices.¹³ In a cross-sectional study, web-based searches of acute symptoms were correlated with

both feelings of empowerment and undesired self-treatment or avoidance of formal care.¹⁴

Previous research indicates that digital health literacy boosts well-being, lowers anxiety, and improves health behaviors in both rural and general populations. Additionally, it is associated with increased participation in digital health initiatives. Online medical data may directly impact clinical decision-making, although most evidence comes from non-clinical or general populations rather than from patients actively seeking medical attention. Furthermore, the majority of current research does not look at both positive (such as empowerment and lifestyle modification) and negative (like anxiety or self-medication) outcomes in the same cohort.

Considering such mixed and contradictory results, there is an urgent need to investigate the effects of health-related internet searches on the behaviors of individuals seeking professional healthcare. We can learn more about how online searching actually impacts real-life health decisions and patient pathways by analyzing their psychological responses, lifestyle changes, self-medication routines, and healthcare utilization in a diverse group of people. Our research was framed in a question that individuals who engage in health-related internet searching are more likely to experience both positive and negative psychological responses and demonstrate distinct behavioral and healthcare-seeking patterns compared to non-searchers.

Methods

The cross-sectional study was conducted at the Department of Psychiatry, Combined Military Hospital (CMH), Abbottabad, Pakistan, over a period of six months, from January 2024 to July 2024. After taking approval from the Ethical Review Committee of the Hospital, vide certificate serial no: IERC/PSY/2024/05, dated 2nd December 2023. We recruited 356 participants, and the sample size was estimated based on the reported percentage (expected proportion) in the literature of online health-seeking information, 63.66 %.¹⁵ The WHO calculator was used to calculate the sample size, taking a 95% confidence level and a 5% margin of error.

Data were collected using a non-probability consecutive sampling technique. Patients aged between 18 and 50 years who reported to the

general medical reception were included. Exclusions were made of patients who had a past or current history of psychiatric or chronic medical/surgical conditions. Demographic variables such as age, gender, level of education, as well as frequency of internet use and frequency of searches on the internet for health-related information were recorded after informed consent; a proforma was signed.

A structured questionnaire was used to collect the data, a version of which was provided by the authors of published tools and was adapted to the research's purpose and subject.¹⁶ The instrument also obtained sociodemographic data, trends in internet use in regard to health, feelings on receiving online health information, and behaviors that follow. The operational definition of health-related internet search was defined as the search for symptoms or diseases, treatments, drugs, lifestyle recommendations, or other diagnostic details online in the last 12 months.

Anxiety or fear refers to feelings of worry, stress, or perceived threat triggered by online information. Support or relief indicated feelings of reassurance or comfort gained from such searches. Diet change, habit change, and increased physical activity were defined as self-reported intentions or actions to modify lifestyle, influenced by online health content. Asking doctors questions or referrals was defined as raising additional concerns, seeking clarifications, or requesting screening tests based on information found online. Self-medication refers to taking or modifying medicines without professional consultation, while resignation from planned tests or medicines indicates cancellation, postponement, or discontinuation of recommended care.

All complete questionnaires were checked for completeness and entered into IBM SPSS Statistics (Version 26) for analysis. Descriptive statistics, including means, standard deviations, ranges, and frequencies, were calculated to summarize participant characteristics and response patterns. Associations between health-related internet searching and behavioral or emotional outcomes were examined using Chi-Square tests. For each 2×2 comparison, odds ratios (ORs) with 95% confidence intervals (CIs) were computed to assess the effect size and direction. Multivariate binary logistic

regression was used to identify predictors of health-related internet searching, and results were reported as odds ratios (ORs), adjusted odds ratios (AORs), 95% confidence intervals, and *P*-values. A *P*-value ≤0.05 was considered statistically significant. A *P*-value <0.05 was considered statistically significant.

Results

A total of 356 participants were included in the analysis. The mean age of respondents was 31.87 ± 14.18 years, ranging from 18 to 75 years, indicating participation from both young and older adults. Most respondents were female (60.7%), and nearly one-third had undergraduate education (36.8%), followed by middle (27.2%), primary (17.1%), and graduate-level qualifications (18.8%). Almost half of the participants (46.1%) reported performing health-related internet searches, showing substantial engagement with online health information, Table 1.

Psychological responses showed that 37.6% of participants felt anxious or fearful after searching for health information, while 34.6% reported a sense of support or relief. Behavioral changes were also common: 60.4% expressed a desire to change their diet, 40.2% wanted to modify other habits (smoking/subs use reduction), and 73% reported an increase in physical activity. Regarding interactions with the health system, 35.1% asked their doctor more questions, while 11.2% requested referrals or additional screening tests. Concerning medication behavior, 51.1% reported taking or changing medication without doctor consultation, and 57.3% resigned from planned tests or medicines. About 59.3% made a doctor's appointment, and 44.4% reported canceling one.

Chi-Square analyses demonstrated several significant associations between health-related internet searching and subsequent psychological and behavioral outcomes. Participants who searched the internet for health information were significantly more likely to experience anxiety or fear (51.8% vs. 25.5%, *P* < 0.001; OR = 3.14), indicating that searching can intensify worry. Conversely, searchers were also substantially more likely to feel supported or relieved (63.4% vs. 9.9%, *P* < 0.001; OR = 15.78), showing that online information can simultaneously provide reassurance, Table 2.

Health-related searching strongly predicted

behavioral intentions. Searchers had markedly higher odds of wanting to change their diet (77.4% vs. 45.8%, $P < 0.001$; OR = 4.06) and modestly higher intentions to change other habits (50.6% vs. 31.2%, $P < 0.001$; OR = 2.25). They were also more likely to report increasing physical activity (81.1% vs. 66.1%, $P = 0.002$; OR = 2.20).

Searchers demonstrated significantly higher engagement with professional healthcare: they were more likely to ask doctors more questions (42.1% vs. 29.2%, $P = 0.011$; OR = 1.76) and far more likely to request referrals or additional screening tests (20.7% vs. 3.1%, $P < 0.001$; OR = 8.11). This suggests that online information may increase the perceived need for further diagnostic evaluation.

Health-related searchers also showed greater odds of taking or changing medication without consulting a doctor (62.2% vs. 41.7%, $P < 0.001$; OR = 2.30), as well as resigning from planned tests or medications (70.7% vs. 45.8%, $P < 0.001$; OR = 2.86), indicating

potential risky decision-making driven by online information. However, internet searching did not significantly influence making an appointment ($P = 0.141$), although canceling an appointment showed a modest but significant association (51.8% vs. 38.0%, $P = 0.009$; OR = 1.75), Table 3. Binary logistic regression analysis demonstrated that several behavioral and psychological factors were significantly associated with health-related internet searching. In the final adjusted model, feeling of support or relief (AOR=50.50, 95% CI: 20.36–125.23), asking for referral/additional screening tests (AOR=11.37, 95% CI: 3.56–36.32), desire to change other habits (AOR=7.31, 95% CI: 3.48–15.35), feeling anxious or fear (AOR=6.05, 95% CI: 2.86–12.79), desire to change diet (AOR=3.92, 95% CI: 1.87–8.21), and taking/changing medication without consultation (AOR=2.67, 95% CI: 1.41–5.06) remained statistically significant predictors, (Table 4).

Table 1: Descriptive characteristics of participants (N = 356)

Variable	Category/Summary	N (%)
Age (years)	Mean $\pm$ SD (Range)	31.87 $\pm$ 14.18 (18–75)
Gender	Male	140 (39.3%)
	Female	216 (60.7%)
Education	Primary	61 (17.1%)
	Middle	97 (27.2%)
	Undergraduate	131 (36.8%)
	Graduate	67 (18.8%)
Health-related internet search	Yes	164 (46.1%)
	No	192 (53.9%)
Feeling anxious or fearful	Yes	134 (37.6%)
	No	222 (62.4%)
Feeling of support/relief	Yes	123 (34.6%)
	No	233 (65.4%)
Desire to change diet	Yes	215 (60.4%)
	No	141 (39.6%)
Desire to change other habits	Yes	143 (40.2%)
	No	213 (59.8%)
Increasing healthy physical activity	Yes	260 (73.0%)
	No	96 (27.0%)
Asking the doctor for suggestions/questions	Yes	125 (35.1%)
	No	231 (64.9%)
Asking the doctor for a referral/additional tests	Yes	40 (11.2%)
	No	316 (88.8%)
Taking/changing drugs without consulting	Yes	182 (51.1%)
	No	174 (48.9%)
Resignation from planned tests/meds	Yes	204 (57.3%)
	No	152 (42.7%)
Making a doctor appointment	Yes	211 (59.3%)
	No	145 (40.7%)
Cancellation of appointment	Yes	158 (44.4%)
	No	198 (55.6%)

Table 2: Association of health-related internet search with behaviors and feelings (2×2)

	Internet Searching		Odds Ratio (95% CI)	Chi-Square (χ^2)	P-value
	Yes (N=164)	No (N=192)			
Feeling anxious or fearful	85 (51.8%)	49 (25.5%)	3.140 (2.010–4.906)	26.08	<0.001
Feeling of support/relief	104 (63.4%)	19 (9.9%)	15.782 (8.922–27.919)	112.03	<0.001
Desire to change diet	127 (77.4%)	88 (45.8%)	4.057 (2.552–6.447)	36.94	<0.001
Desire to change other habits	83 (50.6%)	60 (31.2%)	2.254 (1.463–3.473)	13.80	<0.001
Increasing healthy physical activity	133 (81.1%)	127 (66.1%)	2.196 (1.342–3.592)	10.40	0.002
Asking the doctor for suggestions/questions	69 (42.1%)	56 (29.2%)	1.764 (1.137–2.737)	6.47	0.011
Taking/changing drugs without consulting	102 (62.2%)	80 (41.7%)	2.303 (1.503–3.528)	14.91	<0.001
Resignation from planned tests/meds	116 (70.7%)	88 (45.8%)	2.856 (1.839–4.435)	22.41	<0.001
Making a doctor appointment	104 (63.4%)	107 (55.7%)	1.377 (0.899–2.110)	1.38	0.141

Chi-Square test was used to compare proportions between participants who searched the internet for health-related information and those who did not. Odds ratio (OR) with 95% confidence interval (CI) are presented. Statistical significance was considered at $P < 0.05$

Table 3: Unadjusted and Adjusted Logistic Regression Analysis for Factors Associated with Health-Related Internet Search

Variable	Full model with Enter Method		Model with Stepwise Logistic Regression	
	Odds Ratio (95% CI)	P-value	Odds Ratio(95% CI)*	P-value
Age (years)	1.015 (0.986–1.044)	0.320	-	-
Gender of participants	0.633 (0.318–1.259)	0.193	-	-
Educational status of participants	0.884 (0.619–1.262)	0.496	-	-
Feeling anxious or fear	6.252 (2.866–13.636)	<0.001	6.047 (2.859–12.788)	<0.001
Feeling of support or relief	47.925 (18.502–124.137)	<0.001	50.496 (20.362–125.228)	<0.001
Desire to change diet	4.059 (1.804–9.132)	0.001	3.919 (1.870–8.213)	<0.001
Desire to change other habits (quitting smoking/alcohol)	7.291 (3.371–15.766)	<0.001	7.312 (3.483–15.351)	<0.001
Increasing healthy physical activity	1.105 (0.512–2.383)	0.799	-	-
Asking doctor for suggestions/questions	1.528 (0.768–3.040)	0.227	-	-
Asking for referral/additional screening tests	11.652 (3.338–40.673)	<0.001	11.366 (3.556–36.324)	<0.001
Taking/changing medication without consultation	2.492 (1.275–4.872)	0.008	2.669 (1.407–5.063)	0.003
Resignation from planned tests/medicines	1.782 (0.918–3.461)	0.088	-	-
Making appointment with doctor	1.491 (0.779–2.855)	0.228	-	-
Cancellation of doctor appointment	1.630 (0.855–3.107)	0.138	-	-

**Adjusted odds ratio (OR) obtained from the final Forward Stepwise Logistic Regression Model (Step 6)*

Table 4: Crude and Adjusted Logistic Regression Analysis of Factors Associated with Health-Related Internet Searching

Variable	Crude Odds Ratio (95% CI)	P-value	Adjusted Odds Ratio (95% CI)*	P-value
Age (years)	0.996 (0.981–1.011)	0.603	—	—
Gender	0.976 (0.637–1.496)	0.912	—	—
Educational status		0.448	—	—
^L Primary vs Graduate	0.945 (0.472–1.891)	0.873	—	—
^L Middle vs Graduate	0.642 (0.343–1.201)	0.165	—	—
^L Undergraduate vs Graduate	0.726 (0.402–1.311)	0.289	—	—
Graduate	Reference category			
Feeling anxious or fearful	3.140 (2.010–4.906)	<0.001	6.047 (2.859–12.788)	<0.001
Feeling of support or relief	15.782 (8.922–27.919)	<0.001	50.496 (20.362–125.228)	<0.001
Desire to change diet	4.057 (2.552–6.447)	<0.001	3.919 (1.870–8.213)	<0.001
Desire to change other habits	2.254 (1.463–3.473)	<0.001	7.312 (3.483–15.351)	<0.001
Increasing healthy physical activity	2.196 (1.342–3.592)	0.002	—	—
Asking doctor for suggestions/questions	1.764 (1.137–2.737)	0.011	—	—
Asking doctor for referral/additional screening tests	8.108 (3.308–19.869)	<0.001	11.366 (3.556–36.324)	<0.001
Taking/changing medication without consulting a doctor	2.303 (1.503–3.528)	<0.001	2.669 (1.407–5.063)	0.003
Resignation from planned tests/medicines	2.856 (1.839–4.435)	<0.001	—	—
Making an appointment with a doctor	1.377 (0.899–2.110)	0.141	—	—
Cancellation of doctor's appointment	1.754 (1.149–2.677)	0.009	—	—

*Adjusted Odds Ratio (AOR) obtained from the final Forward Stepwise Logistic Regression Model

Discussion

Repetitive internet searches that lead to escalation of health concern are termed cyberchondria.¹⁷ Such an activity has been associated with inaccurate self-diagnosis and incorrect self-care or medication use, which may pose a risk to patient health. Wrong self-diagnosis, lack of medical professional help where necessary, uncommon and serious side effects, unsafe drug interactions, improper administration routes, wrong dosage, inappropriate treatment choice, and the risk of addiction and abuse of a drug are all risks.¹⁸

Our study showed that 46.1% of the survey respondents were searching the internet to find health-related information, which is in line with

previous studies, indicating a significant percentage of the population searched with the aim of finding information regarding symptoms and health advice.¹⁹ Compared to non-searchers, however, searchers were far more likely to be supported (63.4% vs. 9.9%; OR = 15.78; $P < 0.001$), but also far more likely to report anxiety or fear (51.8% vs. 25.5%; OR = 3.14; $P < 0.001$). The concept reflects this dual effect, in which the pursuit of health-related information is associated with increased health-related worry, as in cyberchondria.¹¹

Recent studies conducted by Peng RX et al. show that individuals who engage in online searches tend to develop more health concerns and pursue additional medical consultations in a bid to have the impression

that they are better protected.²⁰ In a systematic review, 16 studies (4,920 people) were reviewed that indicated online searching of health information is correlated with anxiety.²¹ Nevertheless, qualitative and mixed-methods studies suggest that online self-diagnosis may give patients a sense of control or reassurance.¹²

In our study, a striking proportion stated their intentions to change behavior: 60.4% reported that they wanted to change their diet, 40.2% indicated that they wanted to change their drinking and smoking habits, and 73% indicated that they wanted to change their physical activity. Online searching was significantly linked with the intentions to change diet (77.4% vs. 45.8%; OR = 4.06; $P < 0.001$), change other habits (50.6% vs. 31.2%; OR = 2.25; $P = 0.002$), and engage in more physical activity (81.1% vs. 66.1%; OR = 2.20; $P = 0.002$). Previous studies agree with this trend. A recent review of 29 studies found that online health websites are associated with substantial improvement in physical exercise, self-efficacy, and quality of life.²² Similarly, in another study, 47% of 847 diabetics reported that they had altered their lifestyles due to searching for health information online. The probability of making the adjustments was increased over two times when this information was communicated to a physician.²³ A Taiwanese study found that middle-aged and older patients who were using the Internet tended to have increased physical activity and a healthier diet.²⁴

Also, we found that interaction with the healthcare system was associated with internet searching: the probability of both searchers asking more questions (OR = 1.76; $P = 0.011$) and asking their doctor more questions (OR = 8.11; $P < 0.001$) increased. This is in agreement with the data of a systematic review, which demonstrates that online searches of health information often lead to more engaged, curious patients, which can alter the dynamic of consultation.⁶

Moreover, the findings by Van Riel N et al. have shown that users of Dr. Google tended to argue about the symptoms and possible testing during the consultation.¹⁹ A US study shows that online searches can promote hospital visits and reduce perceived quality of treatment due to the lack of personal contact required with the patient.²⁵ Another Chinese study found that online searchers had significantly

more outpatient visits than non-seekers.²⁶

Along with these positive practices, there are some alarming trends as per our research, which found that 57.3% had stopped taking planned medication or tests and over half (51.1%) had taken or changed medication without first consulting a professional; searchers (OR = 2.30; $P < 0.001$) were more likely to do so than other groups (OR = 2.86; $P < 0.001$). Similar findings are reported by studies by Aoun L et al., who found that individuals seeking information about acute symptoms online sometimes prefer self-management or delay seeking care.¹⁴ The same qualitative research has consequences that show internet searches have the propensity to decrease patient confidence in the physician and lead to independent treatment decisions without oversight.¹² The findings of another Chinese study revealed that people's use of primary care facilities was adversely affected by mobile Internet use, and that mobile Internet use also heavily promoted self-medication.¹⁰

Finally, common mental health trends might be indicated through collective psychological and behavioral effects of online health seeking. A wide range of anxiety, sadness, and obsessive-compulsive symptoms has been implicated in cyberchondria, and the beliefs of reassurance vs concern may vary with the individual circumstances and the antecedent beliefs of the patient.^{17,27}

There are some limitations with our study. It is cross-sectional, so we cannot tell whether online searches are actually causing anxiety, behavior change, and healthcare choices, or whether those who are predisposed to the said behaviors are simply more likely to have searched. None of the data was self-reported, and thus, memory or personal bias could have played a role in the responses. The sample cannot be representative of all the people, particularly those lacking access to the internet or varying linguistic skills, or those with underlying medical issues that can influence behavior.

Conclusion

Health-related Internet search is significantly associated with the development of emotional responses and health-seeking behavior. Searchers were more anxious and more reassured, and had more intentions of changing diet, habits, and physical activity. Online search was associated with

increased patient interactions, including questions asked and requests for referrals; however, it was also associated with risk-prone behaviors, such as self-medication and discontinuation of scheduled tests. Altogether, the impact of internet searching on the decision-making process is significant and multifaceted, which is why it is necessary to enhance digital health literacy and refer to reliable sources of information online.

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AAB: Conception, design of the work, revising, editing, supervising for intellectual content, and approval for final submission

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AAB is the nominated guarantor and takes full responsibility for the overall content and integrity of the work