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Navigating the Infodemic: Cyberchondria and Its Associated Factors Among Dental Students – A Cross-Sectional Study.

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1. INTRODUCTION

The term cyberchondria is derived from the combination of two words: “cyber,” referring to the internet, and “hypochondria,” which denotes excessive worry about one’s health. With the increasing reliance on digital platforms, the internet has become one of the primary sources of health-related information1. A global survey involving over 12,000 participants, including individuals from India, reported that nearly 46% of respondents use the internet for self-diagnosis2. This phenomenon has contributed to a global “infodemic,” characterized by the rapid spread of both accurate and misleading health-related information online3.The overwhelming surge of information in today’s digital age has made it increasingly difficult for individuals to access clear, concise, and reliable guidance from trustworthy sources4. During periods of distress, individuals tend to modify their patterns of social media usage, often engaging in excessive information seeking until they experience cognitive overload and fatigue 5 6 7 . Furthermore, social media platforms facilitate the rapid dissemination of misinformation, as content is frequently shared without adequate verification. Such misinformation can increase confusion, heighten perceived risk8, and promote inappropriate or even harmful behaviors, with consequences ranging from misleading interpretations to life-threatening outcomes9. Cognitive biases influence how health information is interpreted, especially during the COVID-19 pandemic. Biases like confirmation and negativity distort judgment, leading to irrational decisions and contributing to cyberchondria.10 11.

Cyberchondria is characterized by excessive or repetitive online searching for health-related information driven by anxiety or distress, which paradoxically intensifies these concerns12. This behavior is often time-consuming and difficult to control, leading to neglect of personal, academic, or professional responsibilities. It may also negatively impact social interactions and interpersonal relationships13. Previous research has demonstrated a strong association between cyberchondria and functional impairment, heightened anxiety, and altered healthcare utilization patterns13 14. Factors such as health anxiety, intolerance of uncertainty, and information overload have been found to be positively correlated with cyberchondria15. Dental students represent a unique subgroup within the student population, as they are frequently exposed to health sciences and clinical knowledge. Their academic training may predispose them to extensively search for health-related information, both for academic purposes and personal reassurance. However, this tendency may evolve into maladaptive behavior, increasing the risk of anxiety, stress, and depression16. Additionally, they face dual pressures of academic workload and professional expectations, making them particularly vulnerable to psychological distress. The

Cyberchondria Severity Scale-12 (CSS-12) is a validated instrument used to assess the severity of cyberchondria, including domains such as compulsion, distress, and reassurance-seeking17. Similarly, the Depression Anxiety Stress Scale-21 (DASS-21) is widely used to evaluate psychological morbidity among students and young adults18. Together, these tools provide a comprehensive framework for assessing both excessive health-related internet use and its psychological correlates. Several studies have reported an increasing prevalence of cyberchondria among university students and have linked it to adverse mental health outcomes19 20. However, there is limited research focusing specifically on dental students, who may be particularly at risk due to their academic and clinical exposure.

Therefore, the present study aims to explore the prevalence of cyberchondria and its association with depression, anxiety, and stress among dental students using CSS-12 and DASS-21. The findings of this study may provide valuable insights into the mental health challenges faced by dental students in the digital era and highlight the need for interventions that promote digital literacy and psychological well-being

2. . MATERIALS AND METHODS

2.1 Study Design

This was a cross-sectional, questionnaire-based survey conducted among dental student and interns aimed at evaluating the prevalence of cyberchondria and its association with depression, anxiety, and stress among dental students.

2.2 Study Setting, Sample Size Determination and Sampling Technique

This study was conducted at Yogita Dental College and Hospital, which has a total of approximately 498 undergraduate dental students. Participation in the study was voluntary, and only those students who expressed willingness to participate were included in the sample. A total of 309 students volunteered to participate in the study. Digital consent was obtained from all participants prior to their involvement in the research, ensuring ethical compliance and informed participation. Stratified random sampling technique was used based on year of study (BDS II–IV year, interns) to ensure proportional representation. Within each stratum, participants were selected using simple random sampling.

2.3 Ethical Considerations

Ethical approval for the study was obtained from the Institutional Ethics Committee prior to data collection (Ref. No.: YDCH/IEC/2107/135/2026). The study adhered to standard ethical principles, including voluntary participation, informed consent, confidentiality, and anonymity.

2.4 Study Population

The study population comprised of 4 groups II, III, IV BDS and Interns uundergraduate dental students enrolled in the Yogita Dental College and Hospital in Maharashtra during the study period.

2.5 Eligibility Criteria

Inclusion Criteria

1. Enrolled Dental Students (undergraduate BDS years II–IV, interns) at the study institution during the data-collection period. 2. Dental Students Aged ≥ 18 years.

2. Access to internet and an electronic device (smartphone/computer) to complete the online questionnaire.

3. Provided informed consent (electronically or written) before participation.

Exclusion Criteria

1. Dental students who declined to provide informed consent or withdrawn consent at any time.

2. Incomplete or invalid questionnaire responses (e.g.,>10% missing items on CSS-12 or DASS-21, or identical response patterns suggesting non-engagement).

2.6 Data Collection Instrument

Data were collected using a self-structured and validated questionnaire specifically developed for this study. The instrument was designed following an extensive review of existing literature and expert input to ensure content adequacy and relevance. The questionnaire was structured, self-administered, and comprised four sections. The first section included demographic details such as age, gender, level of study, and occupation. The second section assessed internet usage, including access to the internet at home or via mobile devices. The third section incorporated the Cyberchondria Severity Scale – Short Form (CSS-12), a validated 12-item instrument used to measure the severity of cyberchondria across domains

such as compulsion, distress, excessiveness, and reassurance-seeking. Each item was rated on a 5-point Likert scale ranging from 1 (never) to 5 (always), with total scores ranging from 12 to 60, where higher scores indicate greater severity. The CSS-12 has demonstrated good internal consistency and validity in previous studies[17]. The fourth section included the Depression Anxiety Stress Scale – Short Form (DASS-21), a validated 21-item tool assessing depression, anxiety, and stress. Each item was rated on a 4-point Likert scale (0 = did not apply to me at all to 3 = applied to me most of the time). Subscale scores were summed and multiplied by two to obtain final scores, which were then categorized into normal, mild, moderate, severe, or extremely severe levels[18]. The questionnaire was administered electronically using Google Forms to ensure anonymity and facilitate ease of data collection.

Validation of the Instrument

Content validity was established through expert evaluation by faculty members in the field of dental education and behavioural sciences. The questionnaire was reviewed for clarity, relevance, and comprehensiveness. A pilot study was conducted on a small group of students (not included in the final sample) to assess feasibility, clarity, and understanding of the questions. Necessary modifications were made based on feedback. Internal consistency of the questionnaire was assessed using Cronbach's alpha (0.87), ensuring acceptable reliability of the instrument.

2.7 Statistical Analysis

The collected data were entered and analyzed using appropriate statistical software. Descriptive statistics were used to summarize demographic variables such as gender, frequency of dental visits, and internet access, and were expressed as frequencies and percentages. Inferential statistics were applied to determine associations and differences between groups. The Chi-square (χ^2) test was used to compare categorical variables across different levels of study (2nd year, 3rd year, 4th year, and interns). The level of significance was set at $p < 0.05$. Pearson's correlation test was used to assess the relationship between Cyberchondria Severity Scale (CSS) scores and Depression, Anxiety, and Stress Scale (DASS-21) scores. One-way Analysis of Variance (ANOVA) was applied to compare mean scores of CSS, depression, anxiety, and stress across different academic years. A p-value < 0.05 was considered statistically significant.

3. Result

1. Demographic Characteristics

A total of 309 participants were included in the study. The majority of participants across all academic years were female, with percentages ranging from approximately 72% to 91%. Most participants reported regular internet access, with over 84% in all groups having access to the internet via home or phone. Regarding dental visits, a considerable proportion of students reported visiting the dentist only when in pain, especially among 2nd-year students (45.3%), whereas 3rd-year, 4th-year students, and interns more commonly reported annual visits [Table 1].

2. Cyberchondria Severity Scale (CSS) Responses

The distribution of responses to CSS items showed varying levels of agreement across academic years [Table 2] [Figure 1]. Statistically significant differences between groups were observed across several items. Participants differed notably in the extent to which online symptom searching distracted them from other activities ($\chi^2 = 29.745$, $p = 0.003$). Significant differences were also identified in behaviors such as reading multiple web pages ($p = 0.012$), experiencing panic related to serious conditions ($p = 0.003$), consulting a general practitioner ($p = 0.006$), and interruption of work ($p = 0.046$). However, certain items, including repeated searching of symptoms and perceived well-being after reading online information, did not demonstrate statistically significant differences. With respect to overall Cyberchondria Severity Scale (CSS) scores, a significant association was found between academic level and CSS severity ($\chi^2 = 26.160$, $p = 0.002$). The majority of participants were categorized as having mild cyberchondria, followed by moderate and low levels, while severe cyberchondria was relatively uncommon across all groups.

3. Depression, Anxiety, and Stress (DASS-21)

Depression

A statistically significant association was found between academic level and depression levels ($\chi^2 = 30.828$, $p = 0.002$). Most participants reported moderate levels of depression, with a small proportion experiencing severe to extremely severe depression.

Anxiety

Although variations were observed across groups, the association between academic level and anxiety was not statistically significant ($p > 0.05$). However, a notable number of participants reported moderate to extremely severe anxiety levels.

Stress

A highly significant association was observed between academic level and stress ($\chi^2 = 62.919$, $p < 0.001$). Most participants were in the normal stress category, though interns showed relatively higher severe and extremely severe stress levels[Table 3].

4. Correlation Between CSS and DASS-21

Pearson's correlation analysis [Table 4] revealed a moderate positive correlation between Cyberchondria Severity Scale (CSS) scores and psychological variables, including depression ($r = 0.328$, $p < 0.001$), anxiety ($r = 0.290$, $p < 0.001$), and stress ($r = 0.295$, $p < 0.001$). Additionally, depression demonstrated a strong positive correlation with anxiety ($r = 0.776$) and stress ($r = 0.732$). These findings suggest that higher levels of cyberchondria are significantly associated with increased psychological distress.

5. Comparison of Mean Scores (ANOVA)

One-way ANOVA demonstrated statistically significant differences across academic levels for all measured variables. A significant difference was observed in Cyberchondria Severity Scale (CSS) scores ($F = 4.856$, $p = 0.003$), with interns exhibiting the highest mean scores. Similarly, depression levels showed a significant difference ($F = 4.421$, $p = 0.005$), with the highest scores reported among interns. Anxiety also differed significantly across groups ($F = 5.556$, $p = 0.001$), again with interns demonstrating the highest levels. In addition, stress levels showed a significant difference ($F = 5.564$, $p = 0.001$), with interns reporting the greatest levels of stress. These findings indicate that interns consistently exhibited higher levels of cyberchondria and psychological distress compared to other academic groups.

Overall, interns consistently demonstrated higher levels of cyberchondria and psychological distress compared to other groups [Table 5]. The study demonstrates a significant association between cyberchondria and psychological factors such as depression, anxiety, and stress. Academic level appears to play a crucial role in influencing levels of distress and cyberchondria, with interns demonstrating comparatively higher levels than other groups. This can be explained by the unique transitional phase interns experience as they move from theoretical learning to real-world clinical practice. During this period, interns are exposed to a wide range of clinical cases and are often required to apply their knowledge in high-pressure environments, which can increase uncertainty and self-doubt. This heightened sense of responsibility, combined with limited clinical experience, may make them more prone to anxiety about health-related issues. Increased reliance on online health information appears to be linked with greater psychological burden among dental students.

TABLES

Table 1: Distribution of the participants as per gender, frequency of dental visits and access to internet at Home/Phone

Parameters	Options	2nd year	3rd year	4th year	Interns
Gender	Male	20(23.81%)	11(9.3%)	22(24.7%)	5(27.8%)
	Female	64(76.19%)	107(90.7%)	67(75.3%)	13(72.2%)
Frequency of dental visits	Once a year	23(26.7%)	61(51.7%)	44(49.4%)	10(55.6%)
	Every 2 to 3 years	7(8.1%)	14(11.9%)	15(16.9%)	1(5.6%)
	Only when in pain	39(45.3%)	28(23.7%)	20(22.5%)	5(27.8%)
	Never	17(19.8%)	15(12.7%)	10(11.2%)	2(11.1%)
Access to internet at Home/Phone	Yes	73(84.9%)	107(90.7%)	80(89.9%)	17(94.4%)
	No	9(10.5%)	8(6.8%)	4(4.5%)	1(5.6%)
	Maybe	4(4.7%)	3(2.5%)	5(5.6%)	0(0.0%)

Table No. 2: Comparison between II, III and IV BDS using Chi square test for CSS Scale							
	Responses	**2nd year (n=84)**	**3rd year (n=118)**	**4th year (n=89)**	**Interns (n=18)**	**χ^2**	**P value**
1. If I notice an unexplained bodily sensation I will search for it on the internet	Never	8	14	11	0	17.630	0.127#
	Rarely	29	24	19	2		
	Sometimes	33	46	37	8		
	Often	7	22	17	4		
	Always	9	12	5	4		
2. Researching symptoms or perceived medical conditions online distract me from reading news/ sports/ entertainment articles online	Never	18	21	9	0	29.745	0.003**
	Rarely	33	40	24	6		
	Sometimes	32	41	40	7		
	Often	3	14	11	2		
	Always	0	2	5	3		
3. I read different web pages about the same perceived condition	Never	14	16	6	0	25.660	0.012*
	Rarely	21	38	23	3		
	Sometimes	35	46	49	7		
	Often	12	14	7	4		
	Always	4	4	4	4		
4. I start to panic when I read online that a symptom I have is found in a rare or serious condition	Never	13	21	15	1	29.991	0.003**
	Rarely	28	49	19	3		
	Sometimes	33	32	44	9		
	Often	12	10	8	2		
	Always	0	6	3	3		
5. Researching symptoms or perceived medical conditions online leads me to consult with my GP	Never	18	14	12	0	27.569	0.006**
	Rarely	23	41	13	7		
	Sometimes	36	46	48	5		
	Often	9	14	12	4		
	Always	0	3	4	2		
6. I enter the same symptoms in to a web search on more than one occasion	Never	13	19	11	2	16.944	0.152#
	Rarely	32	43	23	7		
	Sometimes	33	43	46	4		
	Often	5	10	6	2		
	Always	3	3	3	3		
7. Researching symptoms or perceive medical conditions online	Never	26	29	15	2	21.319	0.046*
	Rarely	30	43	26	4		

interrupts my work	Sometimes	24	34	38	7		
	Often	4	8	8	2		
	Always	2	4	2	3		
8. I think I am fine until I read about a serious condition online	Never	16	19	17	1	15.899	0.196#
	Rarely	22	43	24	3		
	Sometimes	36	38	34	7		
	Often	8	10	10	3		
	Always	4	8	4	4		
9. I feel more anxious or distressed after researching symptoms or perceived medical conditions online	Never	15	21	15	1	23.236	0.002**
	Rarely	26	41	27	2		
	Sometimes	34	42	35	9		
	Often	6	10	7	4		
	Always	5	4	5	2		
10. Researching symptoms or perceived medical conditions online interrupts my offline social activities (e.g. reduces time spent with friends/family)	Never	17	25	18	3	19.871	0.07#
	Rarely	27	49	27	6		
	Sometimes	30	38	36	5		
	Often	11	2	7	2		
	Always	1	4	1	2		
11. I suggest to my GP/medical professional that I may need a diagnostic procedure that I read about online (e.g. a biopsy/ a specific blood test)	Never	19	33	17	4	6.521	0.888#
	Rarely	23	35	27	4		
	Sometimes	34	39	34	7		
	Often	7	7	9	3		
	Always	3	4	2	0		
12. Researching symptoms or perceived medical conditions online leads me to consult with other medical specialists (e.g. consultants)	Never	18	20	10	2	17.101	0.146
	Rarely	27	40	20	3		
	Sometimes	33	40	48	8		
	Often	5	13	9	3		
	Always	3	5	2	2		
CSS	Low	22	35	13	2	26.160	0.002**
	Mild	43	59	60	8		
	Moderate	18	22	14	5		
	Severe	1	2	2	3		

** - significant*

*** - highly significant*

 # - not significant

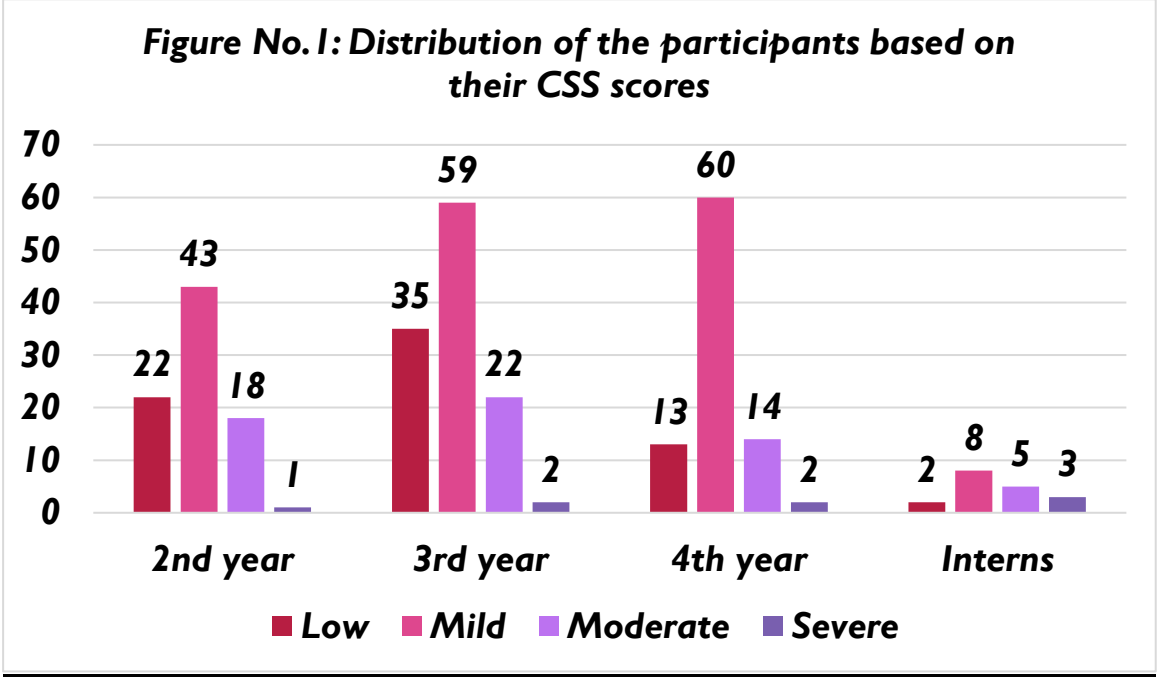
Table 3: Distribution and comparison of responses as per Depression Anxiety and Stress Scale – Construct wise							
Constructs		**Level of Study**				χ^2	**P value**
		2nd year (n=84)	**3rd year (n=118)**	**4th year (n=89)**	**Interns (n=18)**		
Depression	**Normal**	13	37	21	3	30.828	0.002**
	Mild	25	26	17	3		
	Moderate	39	41	40	5		
	Severe	5	7	8	2		
	Extremely Severe	2	7	3	5		
Anxiety	**Normal**	12	31	15	2	26.203	0.010*
	Mild	7	4	4	2		
	Moderate	43	50	41	4		
	Severe	10	15	16	1		
	Extremely Severe	12	18	13	9		
Stress	**Normal**	59	95	68	10	62.919	0.000**
	Mild	17	6	9	0		
	Moderate	6	7	4	0		
	Severe	2	8	6	3		
	Extremely Severe	0	2	2	5		
* - *significant*							
** - *highly significant*							
# - *not significant*							

Table 4: Pearson's Correlation Test between CSS & constructs of Depression Anxiety and Stress Scale					
		Depression score	**Anxiety score**	**Stress score**	**CSS**
Depression score	Pearson Correlation	1	.776**	.732**	.328**
	Sig. (2-tailed)		.000	.000	.000
	N	309	309	309	309
Anxiety score	Pearson Correlation	.776**	1	.828**	.290**
	Sig. (2-tailed)	.000		.000	.000
	N	309	309	309	309
Stress score	Pearson Correlation	.732**	.828**	1	.295**

	Sig. (2-tailed)	.000	.000		.000
	N	309	309	309	309
CSS	Pearson Correlation	.328**	.290**	.295**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	309	309	309	327
** - Correlation is significant at the 0.01 level (2-tailed).					

Table 5: Comparison between the groups based on level of study using One way ANOVA test

		N	Mean	Std. Deviation	F	P value
CSS TOTAL	II BDS	84	29.56	7.548	4.856	.003**
	III BDS	118	29.75	8.881		
	IV BDS	89	31.58	7.376		
	Interns	18	36.94	10.844		
Depression score	II BDS	84	6.7500	2.85756	4.421	.005**
	III BDS	118	6.1441	4.04732		
	IV BDS	89	6.8090	3.31620		
	Interns	18	9.5000	5.69055		
Anxiety score	II BDS	84	6.6667	3.30510	5.556	.001**
	III BDS	118	6.2881	4.20440		
	IV BDS	89	6.8202	3.92996		
	Interns	18	10.5000	6.72353		
Stress score	II BDS	84	6.3214	2.97848	5.564	.001**
	III BDS	118	5.5593	4.32157		
	IV BDS	89	6.2809	3.90509		
	Interns	18	9.7222	6.56914		
* - *significant* ** - *highly significant* # - *not significant*						



4. Discussion

The present study aimed to assess the prevalence of cyberchondria and its association with depression, anxiety, and stress among dental students. The findings indicate that cyberchondria is a prevalent behavioral concern in this population and is significantly associated with psychological distress. Cyberchondria, defined as excessive or repeated online searching for health-related information leading to increased anxiety, has gained prominence in the digital era. This is consistent with the conceptual framework proposed by Starcevic and Berle, who described cyberchondria as a maladaptive coping mechanism driven by health anxiety and uncertainty[21]. Dental students, due to their academic exposure to medical knowledge and easy access to online information, may be particularly vulnerable to such behaviors. In the present study, higher levels of cyberchondria were associated with increased levels of depression, anxiety, and stress. Similar findings were reported by Durak and Yalçınkaya-Alkar, who demonstrated a strong relationship between cyberchondria, anxiety sensitivity, and problematic internet use[19]. This suggests that excessive online health searching may exacerbate underlying psychological vulnerabilities rather than provide reassurance. Depression, stress and anxiety showed significant variation across academic levels.[Table 3]. These findings are consistent with previous studies reporting high psychological distress among dental students due to academic and clinical demands[22 23].

Correlation analysis revealed a moderate positive relationship between cyberchondria and depression, anxiety, and stress [Table 4]. McElroy, E.,&Shevlin, M. suggesting that excessive online health searching can amplify health anxiety and emotional distress[17] . The strong interrelationship among depression, anxiety, and stress further reflects their overlapping nature. Additionally, interns demonstrated significantly higher mean scores for CSS and psychological parameters [Table 5], indicating increased vulnerability at advanced stages of training. Elani HW, et al. suggesting that clinical responsibilities and workload contribute to heightened stress and maladaptive coping strategies[24]. Overall, the study emphasizes the need for improving digital health literacy and implementing stress management interventions among students to reduce cyberchondria and its psychological impact. The observed association between cyberchondria and psychological distress aligns with the findings of Jungmann and Witthöft, who reported increased cyberchondria levels during the COVID-19 pandemic, driven by the “infodemic” and uncertainty surrounding health information[20]. This highlights how external factors, such as widespread misinformation and easy internet accessibility, can intensify health-related anxiety.

Furthermore, Fergus and Dolan emphasized that individuals with higher health anxiety are more likely to engage in repetitive online health searches, reinforcing a cycle of reassurance-seeking and distress[25]. This cycle may be particularly relevant for dental students, who may interpret benign symptoms in a clinical context, thereby increasing anxiety levels. A systematic review by Vismara et al. confirmed that cyberchondria is consistently associated with anxiety, depression, and stress across various populations, supporting the findings of the present study[26]. This reinforces the notion that cyberchondria is not an isolated behavior but part of a broader spectrum of psychological morbidity. Although limited research exists specifically among dental students, parallels can be drawn from studies on medical students. Azuri et al. reported that medical students frequently exhibit health anxiety and reassurance-seeking behavior, which may predispose

them to cyberchondria[27]. Given the similarities in academic stress and clinical exposure, dental students may face comparable risks. Additionally, excessive internet use has been widely linked to mental health issues. Kuss and Griffiths highlighted that problematic internet use is associated with increased levels of anxiety, depression, and stress, which may further contribute to cyberchondria[28]. This suggests that cyberchondria may be part of a larger pattern of maladaptive digital behavior.

Overall, the findings of this study emphasize that while the internet serves as a valuable source of health information, uncontrolled and excessive use may have detrimental psychological effects. The significant association between cyberchondria and psychological distress underscores the need for targeted interventions, improved digital health literacy, and mental health support among dental students.

5. Conclusion

The present study highlights that cyberchondria is a significant and emerging concern among dental students in the era of easy internet accessibility and widespread health-related information. A considerable proportion of students demonstrated varying levels of cyberchondria, reflecting excessive and repetitive online health information-seeking behavior. The findings suggest a positive association between cyberchondria severity and psychological morbidity, particularly depression, anxiety, and stress. Students with higher cyberchondria scores were more likely to experience elevated levels of emotional distress, indicating that excessive reliance on online health information may aggravate rather than alleviate health-related concerns. Academic pressure, clinical exposure, and increased digital engagement may further predispose dental students to such maladaptive behaviors. The study underscores the importance of promoting digital health literacy, encouraging responsible internet use, and addressing mental health concerns within this population. Early identification and targeted interventions, including counseling and awareness programs, are essential to reduce the impact of cyberchondria and improve overall psychological well-being among dental students.

6. Recommendations

Future research should adopt longitudinal designs to establish causal relationships between cyberchondria and psychological factors such as depression, anxiety, and stress. Studies involving multiple dental institutions and diverse geographic populations are recommended to improve generalizability of findings. There is a need to design and evaluate interventions such as digital literacy programs, stress management workshops, and cognitive-behavioral strategies to reduce cyberchondria and Incorporating awareness about cyberchondria into the dental curriculum. Regular screening of dental students using tools like CSS-12 and DASS-21 can aid in early identification of at-risk individuals. Institutions should strengthen access to psychological counseling and support systems to address anxiety, stress, and maladaptive behaviors. Educating students on evaluating credible online health information can reduce misinformation-related anxiety. ,Faculty members can play a key role in guiding students, recognizing early signs of distress, and encouraging help-seeking behavior

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