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CYBERCHONDRIA IN STUDENTS: AN EHEALTH RELATED PROBLEM. A REVIEW

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A – study design, **B** – data collection, **C** – statistical analysis, **D** – interpretation of data, **E** – manuscript preparation, **F** – literature review, **G** – sourcing of funding

ABSTRACT

Background: Cyberchondria is a phenomenon described as an excessive search on the Internet for health-related information driven by anxiety or distress, which only amplifies such. Due to their increased usage of and exposure to the Internet, young adults are especially vulnerable to such phenomena.

Aim of the study: The purpose of the following review was to gather existing knowledge in the area of cyberchondria in students, systemize the current state of knowledge, and identify possible new research areas.

Material and methods: The literature search was conducted using Pubmed, Web of Science, Scopus, and EBSCO databases to retrieve publications up to October 7, 2023. An additional search was performed on May 25, 2024, to identify new relevant works. The selection conditions were met by 35 articles analyzed for demographics and their relationship with mental aspects.

Results: Most of the studies indicated a moderate level of cyberchondria in participants. The cyberchondria phenomenon was correlated with somatic and psychological problems. Those who experienced cyberchondria presented with higher health anxiety and stress levels.

Conclusions: Cyberchondria seemed to be related to health anxiety, stress, and the need for reassurance. The evolution of the problem is unknown due to the lack of longitudinal studies. Such research may provide a better understanding of phenomena and support for individuals.

KEYWORDS: cyberchondria, anxiety, hypochondriasis, problematic internet use

Background

The Internet caused a revolution in searches for health-related information. Due to the availability of health-related information, social media and forums – especially those related to rare or chronic diseases, gained popularity [1,2]. The Internet provides information on symptoms and management of illness [3]. Nevertheless, the growing amount of medical misinformation is a significant public health issue [4]. In 2014, in the European Union, over 75% of respondents declared that the Internet is a good way of finding out more about health [5]. Although potential benefits exist, such as easy access, anonymity, and low cost, excessive health research may lead to increased medical anxiety [6]. The penetration of the Internet in populations ranges from 97.3% in Northern Europe to 23.9% in Eastern Africa and 65.7% globally [7]. Thus, searching for the predictors of Internet-related health issues is an important field of research.

Cyberchondria (CYB) is the term derived from the words "cyber" and "hypochondriasis." It is defined as "an excessive or repeated search for health-related information on the internet, driven by distress or anxiety about health, which only amplifies such distress or anxiety" [8].

To evaluate anxiety as a result of online searches, McElroy et al. developed the Cyberchondria Severity Scale (CSS). The final version of the long CSS includes 33 items divided into five factors:

1. Compulsion – reflecting the ways that online health research (OHR) interrupts online and offline activities;

2. Distress – items of subjective emotional states associated with OHR;

3. Excessiveness – items involved with searching for information across numerous sources, often repeatedly;

4. Reassurance Seeking – items reflecting anxiety, manifesting in reassurance from a more qualified person; and

5. Mistrust of Medical Professional – items reflecting trust in the expertise of medical professionals over their own research [6].

The scale presents a moderate positive correlation between the first four factors and a small positive correlation between "Compulsion," "Distress," "Excessiveness," and "Mistrust of Medical Professionals." Between the fourth and fifth factors, a small negative correlation was found. It makes sense that a person with a higher need for reassurance will have lower mistrust in professional expertise [6].

Aim of the study

This review aims to summarize findings obtained to date and understand the phenomena of CYB in the student population. They are more prone to excessive Internet usage due to the culture, which needs the Internet as a tool for communication, information sharing, and community formation [9].

Material and methods

Search strategy

The search strategy was to review papers from the earliest published until October 7, 2023, to identify all relevant studies among the following databases: PubMed, Web of Science, Scopus, and EBSCO. For the search purpose, the following keywords were defined: ("cyberchondria") AND ("students" OR "college students" OR "university students") (Boolean operator).

On May 25, 2024, we performed a second search between the years 2023 and 2024 to identify new relevant studies published after October 7, 2023.

Eligibility criteria

The inclusion criteria were all original quantitative papers published in peer-reviewed journals that measured the prevalence of CYB, assessed predictors or connected them with other disorders, and used standardized tools such as the CSS scale or its shorter forms. All studies that did not fulfill the inclusion criteria, as well as reviews, book chapters, and letters to the editor, were excluded. Only articles written in the English language were included in the review analyses.

Data collection process

The articles from each database were retrieved, and duplicated records were identified and removed. Two authors independently analyzed the titles and

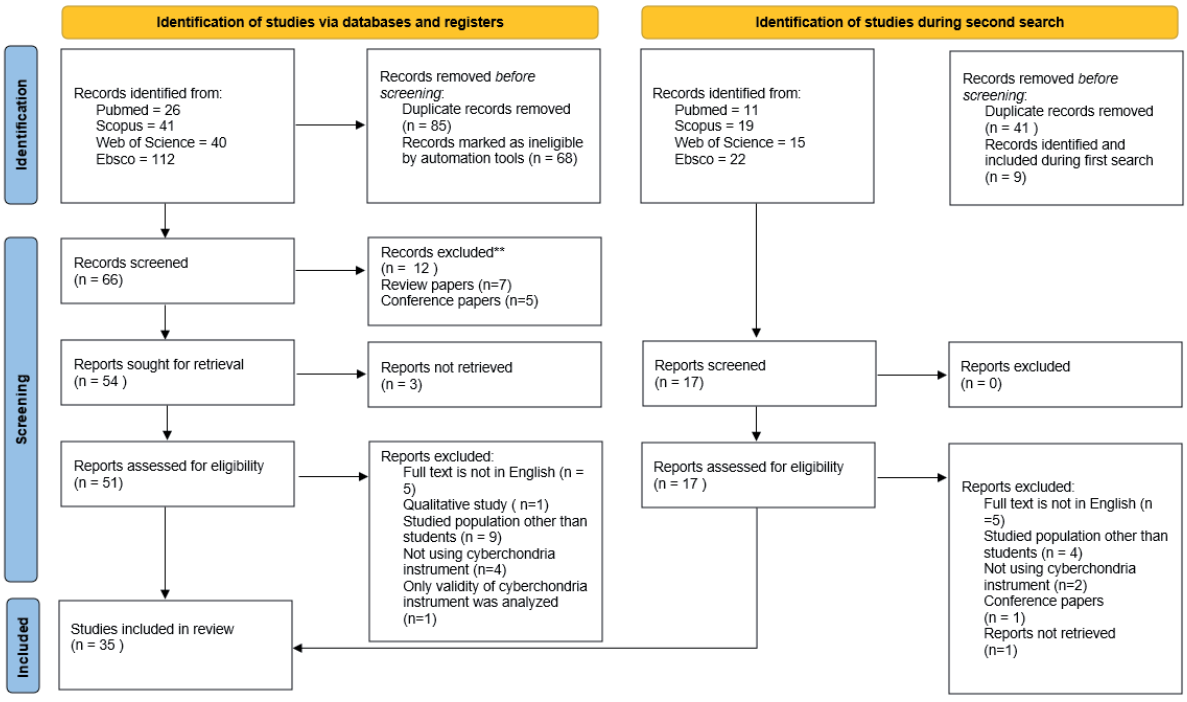

Figure 1. PRISMA flow diagram

abstracts of the remaining works. All retrieved full papers were independently assessed for relevance. One author completed data extraction, and relevant information was summarized for this report.

Study selection

The selection process is presented using the PRISMA flow diagram (Fig.1) [10]. In the final analysis, 35 articles were included [6,11–44]. Given that all of the studies were conducted on non-generic populations, extrapolating our results to the general population may be risky and biased. Unfortunately, all of the studies were cross-sectional. Thus, there is no data regarding prolonged observation.

Most of the studies were related to the recent COVID-19 pandemic, as isolation and remote learning had an impact on health anxiety and OHR.

Discussion

Epidemiology

Table 1 summarizes the findings regarding demographic data and scores obtained from participants. It is worth noticing that in all of the studies, students presented moderate levels of CYB. Additionally, it is surprising that scores obtained from students of health-related sciences did not differ from those obtained from other faculties.

Table 1. Studied population and scores obtained in the CSS questionnaire

Author, country, Year of publication	Number of participants	Sex (n=females)	Scores obtained by participants (SD)	Faculty
McElroy et al., UK 2013 [6]	208	73 (133)	n/a	Psychology and Business students
Bati et al., Turkey 2018 [11]	874	312 (560)	36.98 (7.69)	Health science students
Fergus et al., USA 2018 [12]	330	110 (220)	52.34 (8.58)	Undergraduate students
Selvi et al., Turkey 2018 [13]	337	149 (188)	75.47 (19.41)	Undergraduate students
Aulia et al., Indonesia 2019 [14]	162	54 (108)	70.83 (16.289)	Medical science students
Dagar et al., India 2019 [15]	171	94 (77)	n/a	Engineering students
Gibler et al., USA 2019 [16]	221	65 (156)	55.17 (20.19)	Undergraduate students
Apay et al., Turkey 2020 [17]	411	307 (104)	74.31 (17.57)	Undergraduate students
Dost et al., Turkey 2021 [18]	404	63 (341)	69.76 (23.13)	Health science students
Gandla et al., India 2021 [19]	400	217 (183)	30.86 (9.44)	Medical students
Mrayyan et al., Jordan 2021 [20]	143	39 (104)	20.46 (4.80)	Undergraduate students
Kurcer et al., Turkey 2021 [21]	794	196 (598)	n/a	Medical science students
Shailaja et al., India 2021 [22]	300	54 (246)	26**	Dental science students
Bodrožić Selak et al., Croatia 2022 [23]	196*	n/a	7.92 (4.12)	Undergraduate students
Rashid et al., Pakistan 2022 [24]	300	141 (159)	79.9 (21.3)	Undergraduate students
Abu Khait et al., Jordan 2022 [25]	143	42 (101)	21.8 (4.08)	Undergraduate students
Padagas et al., Philippines 2022 [26]	179	131 (48)	36.18 (8.34)	Teacher education students
Sravani et al., India 2022 [27]	280	149 (131)	n/a	Medical students
Mrayyan et al., Jordan 2022 [28]	143	39 (104)	2.55 (0.6)	Undergraduate students

Table 1 contd.

Author, country, Year of publication	Number of participants	Sex (n=females)	Scores obtained by participants (SD)	Faculty
Zhou et al., China 2022 [29]	1117	581 (536)	72.50 (21.47)	Undergraduate students
Rasouli et al., Iran 2022 [30]	204	105 (99)	33.52 (5.92)	Nursing students
Sohail et al., Pakistan 2022 [31]	205	83 (122)	n/a	Undergraduate students
Patanapu et al., India 2022 [32]	302	56 (246)	n/a	Dental science students
Molu et al., Turkey 2023 [33]	178	22 (156)	83.30 (12.31)	Nursing students
Sabir et al., Pakistan 2023 [34]	500	248 (252)	n/a	Undergraduate students
Maryam et al., Pakistan 2023 [35]	169	89 (80)	n/a	Medical science students
Akpinar et al., Turkey 2023 [36]	843	327 (516)	28.67 (8.58)	Nursing students
Mrayyan et al., Jordan 2023 [37]	333	104 (229)	3 (0.82)	Nursing students
Zhu et al., China 2023 [38]	2744	845 (1899)	24***	Undergraduate and graduate students
Kartal et al., Turkey 2023 [39]	534	(534)	77.37 (22.49)	Health science students
Robles-Mariños et al., Peru 2023 [40]	657	261 (396)	25.1 (9.1)	Undergraduate students
Agrawal et al., India 2024 [41]	1033	549 (479)	28.8 (10.3)	Undergraduate medical and non-medical students
El-Zoghby et al., Egypt 2024 [42]	1435	698 (737)	32.2 (9)	Medical students
Bahadir et al., Turkey 2024 [43]	420	194 (226)	81.5 (21.5)	Undergraduate students
Lathabhavan et al., India 2024 [44] ***	651 742	338 (313) 398 (344)	4.31 (1.25) 4.21 (1.04)	Undergraduate students

*At cyberchondria measurement;
** Median;
*** Comparison of two cross-sectional studies performed in two-time waves.

Gender

In nine papers, there were no differences in the CSS scores of males and females [11, 14, 18, 19, 24, 25, 33, 36, 42]. Contrarily, only two works found statistically significant differences between genders, with higher scores obtained by the males [27, 29], and in six of the studies, females obtained higher CCS scores with statistical significance [21, 22, 30, 32, 34, 35]. In a subscales comparison, Shailaja et al. found that females had higher scores in the subscales of Compulsion and Distress than males [22]. Such findings were supported by Sabir et al., who found that females had higher scores in the mentioned subscales than males [34]. Similar findings were presented by Patanapu et al., where females had higher scores in all subscales except for Excessiveness [32]. In contrast, Bati et al. reported higher Compulsion and Mistrust scores in male students [11]. Similar results regarding the Mistrust scale were found by Sohail et al. [31]. In Aulia et al.'s work from 2019, women tended to have higher scores in the "Need of reassurance" subscale compared to male students. At the same time, male students were more likely to have problems with relaxation after finding troublesome information [14].

Age and academy

Considering age as one of the variables in some of the reviewed papers, Padagas et al. showed that it had a weak correlation with CSS total score [26]. However, three studies found a negative correlation [19, 37,43]. Opposingly, the relationship with age was not supported by other studies [21,29, 42].

In five of the examined studies, there was no association found between the year of the study and CSS scores [28, 29, 36, 39, 42]. However, one inves-

tigation revealed a positive correlation between the year of the study and the CSS score [19]. Disparities in subscales related to academic performance were observed where students with lower grade point averages demonstrated higher scores in Item 8, "I am overwhelmed by the amount of information I found online," of the CSS [28] or exhibited higher scores on the Mistrust and Compulsion subscale [32]. Moreover, students who obtained less than 65% in their final year university examination displayed overall higher CSS mean scores, with only a higher mean score for the Excessiveness subscale compared to all other CSS subscales [32]. Correlation with academic performance, however, was not compared in the Chinese and Turkey studies [29,42]. Furthermore, first-year students displayed elevated scores in the Distress subscale [33], which is consistent with findings from Sohail et al. indicating a positive correlation between Compulsion and Distress with academic stress [31].

The study by Bati et al. revealed that medical faculty had lower CSS scores than students from other health-related faculties [11]. Rashid et al. showed that the frequency of CYB was higher in the non-medical than in the medical field [24], which was partially confirmed by an Indian study in which medical and non-medical students were compared. The severity of CYB was significantly higher in the non-medical student population [41].

Health-related behavior and socioeconomic factors

Increased alcohol consumption has been identified as a potential indicator of CYB [27], although this association was not observed in studies by Dost et al. and Kurcer et al. [18, 21]. Similar disparities were found in relation to tobacco use. A 2021 study did not find any statistical significance between smoking and CYB levels [21]; however, Kartal et al. discovered that tobacco users exhibited higher CSS scores [39]. Four studies examined the influence of residential location on CYB factors, yielding conflicting results. Bati et al. and Zhou et al. found no differences in CSS scores based on place of residence [11, 29], whereas Kurcer et al. reported that urban area residents had higher scores for such symptoms [21]. Interestingly, an Egyptian study did not find any such correlations [42]. Notably, students living alone presented higher scores compared to those living with family or friends [21]. Surprisingly, the study by Bahadir et al. found an inverse relationship, where those who lived alone presented lower CYB severity than those living with friends or family [43]. However, the P value was 0.055, which means that although slight differences were found, they were not statistically significant [43]. A possible explanation for such outcomes was presented by Zoghby et al.; the students who worried more about family members' health showed higher levels of CYB [42]. Living with family may alleviate the anxiety related to separation, as students often have to move out.

Conflicting outcomes also emerged concerning income effects: Students with neutral income (expenses = income) displayed higher CSS scores than those with negative income (expenses > income) [33], yet Kartal et al.'s findings did not substantiate these claims [39]. Only one study assessed the sleep quality of CYB-affected students. It revealed a significant link between sleep disturbance and CYB, suggesting a bidirectional relationship where an increased prevalence of poor sleep quality was associated with CYB [38].

In three studies, a positive correlation between Internet addiction and CSS scores was found [13, 20, 25]. Those findings were supported by others – students who spent more time reading health-related information had more severe CYB [27, 42]. Additionally, those who believed information found on the Internet and considered it the main source of health-related information also had higher CSS scores [36]. Confirmation of such results was presented by Bati et al. [11]. Similarly, Khait et al. regression analysis showed that CYB can be a predictor of Internet addiction. [11, 25].

An interesting relationship was shown between smartphone addiction and CYB. Comparing medical and non-medical students, both cohorts showed positive correlations between CSS scores and scores obtained on the Smartphone Addiction Scale (SAS). It showed that in both groups, those with higher levels of CYB tended to exhibit greater smartphone addiction [41]. In addition to the findings in the non-medical cohort, there was a positive correlation between CYB levels and the WHO-5 Well-being Index. The fact that such a correlation was not found in medical students may imply that with health literacy comes a different perception of well-being [41]. Similar findings were presented in an Egyptian study; those who were considered smartphone addicts, as defined by SAS scores, had higher CSS scores in comparison to those who were not considered addicted [43].

Medical and psychological aspects

Analysis of students' health records showed that individuals with chronic illnesses or a history of medical issues, including self-diagnosed conditions, exhibited elevated CSS scores compared to those who perceived themselves as healthy [11, 19, 21, 29, 33, 34, 39]. Additionally, in one of the studies, the Health Anxiety Index (HAI) scores and CSS scores were significantly higher in students with health problems. It is also worth mentioning that the scores of those who

do not believe in the accuracy of the online information they obtain were comparatively lower [11]. This was particularly evident in the case of participants with prior medical history recording notably higher scores for Excessiveness and Reassurance subscales when contrasted with their counterparts [19]. However, these findings were not replicated by some authors' findings [36,42].

In an Indian paper related to COVID-19, it was proven that health anxiety related to the disease, measured by the Coronavirus Anxiety Scale (CAS), was a predictor of CYB severity [27]. Similar results were also obtained in a Turkish study in which the mediating roles between COVID-19 anxiety and Internet Addiction measured by the Young Internet Addiction Test-Short Form (YIAT-SF) were analyzed [36]. A positive correlation between the mentioned scales and the CSS scale was found. The anxiety measured by CAS had a direct effect on CYB severity; similarly, internet addiction had a mediating role both by direct effect and indirect effect on COVID-19 anxiety leading to CYB [36]. A correlation was additionally found between CSS scores and Internet Addiction Test (IAT) scores [13]. Regarding the impact of COVID-19 on CYB, there is an especially interesting study that was performed cross-sectionally at two points in time [44]. The first measurement took place in June 2021, during the second wave in India, and the second was conducted in September 2022 with the situation under control after the pandemic. In addition to the CSS, the students' anxiety was measured with the Fear of COVID-19 Scale and Perceived Stress Scale. At the time of the first measurement, CYB moderated the fear of COVID-19, leading to increased stress, and at the same time, perceived stress through fear of COVID-19 had an impact on CYB. Surprisingly, the results of the second part of the study found only an indirect effect of perceived stress on CYB moderated by fear of COVID-19. The CYB did not have an indirect effect on the perceived stress at the time of the second measurement [44]. Such findings are particularly important. In a time of increased anxiety and uncertainty, CYB can indirectly increase levels of stress; however, after the alleviation of the problem, the effect disappears. Further studies of such bidirectional indirect effects, which can be alleviated, may provide promising results in terms of the management of the problem.

Similarly, Shailaja et al., in an analysis of the relationship between CYB and the General Health Questionnaire-12 (GHQ-12), the Depression Anxiety and Stress Scale 21 (DASS-21), and a quality of life 8-item survey (QOL-8), found that CYB shared a direct correlation with depression, anxiety, and stress, however, without an association between CYB and quality of life [22]. Those claims were also supported by Khait et al., who found positive associations between CYB and Internet addiction, anxiety sensitivity (AS), and whether the participant was infected with the coronavirus [25]. Similarly, a Croatian report also found a positive correlation between anxiety measured by the DASS-21 and CYB [23]. Those who experienced higher levels of anxiety also experienced higher levels of CYB [23]. The perceived severity of the situation and perceived vulnerability relationship during COVID-19 had a positive correlation with CYB. Those who consider themselves more vulnerable and in more severe situations were more likely to experience CYB symptoms. The perceived threat had an indirect effect on CYB by causing anxiety [23]. It is also worth mentioning that Kurcer et al. found that HAI scores and CSS scores were lower in students who believed they had COVID-19 compared to those who believed they had not, possibly by reducing anxiety caused by uncertainty [21]. Also, in a Chinese study, the DASS-21 stress subscale was found to be positively correlated with the overall CSS score; what is more, stress was found in a regression analysis to be a predictor of CYB [29]. They also found that alexithymia – an impaired ability to identify, describe, and differentiate emotions, played a role in symptoms of CYB. For the Toronto alexithymia scale (TAS-20), linear regression showed that the difficulty identifying feelings subscale could positively and externally orient thinking and negatively predict CYB. What is more, alexithymia moderated the relationship between stress and CYB. As a result, with an increase in alexithymia level, the predictive effect of stress on CYB became larger [29]. The positive correlation between DASS-21 and CSS scales found in the mentioned papers confirms the validity of CSS. Such correlations were presented for the first time by McElroy et al. at the initial validation of the CSS questionnaire, where the total CSS score and all of the subscales positively correlated with the DASS-21 total score and its subscales [6].

Contrary to the relationship that Shailaja et al. found between CSS and QOL in an analysis of CSS and the Short Form-36 (SF-36), which is also used to evaluate individuals' quality of life, negative correlations were found between CSS total scores and SF-36 and between CSS and scores of physical health and mental health SF-36 subscales [39].

Other studies in which the correlation between CYB and health anxiety was researched used the HAI and determined a moderate correlation between both scales [11]. Similar results were also obtained by Selvi et al., where HAI scores had a significant association with CSS [13]. In a study from the USA, the HAI scores were also found to be significant predictors of overall CYB, as well as all of the CSS subscales scores [16]. A Peruvian study also found a moderate positive correlation between CSS and the Short Health Anxiety Index (SHAI) and a weak to moderate positive correlation between CSS subscales and SHAI scores

[40]. Similar findings were presented in a study analyzing the relationship of CYB with intolerance of uncertainty (IU) and AS, in which a positive correlation between CYB and IU, as well as AS, was found [24].

In searching for a relationship between CYB and irrational beliefs, a Turkish study compared CSS scores with the Irrational Beliefs Scale (IBS). Total CSS scores were positively correlated with subscales of IBS, such as the need for approval and blame tendency, and negatively correlated with the emotional irresponsibility subscale. Additionally, there were positive correlations between the anxiety subscale of CYB and the need for approval subscale of IBS and a weak negative correlation with emotional irresponsibility. The compulsion subscale was positively correlated with the need for approval, high expectations, and blame tendency in the IBS and negatively correlated with emotional irresponsibility [18].

In a study from the USA, which tried to conceptualize CYB phenomena, CSS scores were compared with various scales, such as the Metacognitions Questionnaire-Health Anxiety (MCQ-HA), the Beliefs about Rituals Inventory (BARI), the Stop Signals Questionnaire (SSQ), Positive and Negative Affect Schedule (PANAS), the Whitney Index-6 (WI-6), the Anxiety Sensitivity Index-3 (ASI-3), and the Intolerance of Uncertainty Scale 12 (IUS-12). In a zero-to-one correlation, all of the mentioned questionnaire scores were positively correlated with the CSS score. Further regression analyses revealed that positive and negative metacognitive beliefs shared an association with CYB in block 2 with beliefs, about rituals in block 3, and with stop signals in block 4. Overall, in block 4, health anxiety, positive metacognitive beliefs, beliefs about rituals, and stop signals were associated with CYB. The second part of the study, with the use of the Big Five Inventory 2-Extra Short Neuroticism Scale (BFI-2-XS) and Dimensional Obsessive Compulsive Scale (DOCS), showed a positive correlation between CYB and scores obtained in the added scales. Regression analysis in the fourth block showed that health anxiety, obsessive-compulsive symptoms, negative cognitive beliefs, beliefs about rituals, and stop signals shared an association with CYB [12]. Those findings were partially consistent with Turkish observations, where only the ASI-3 was used to find a correlation in the evaluation of a Turkish version of the CSS [13]. Gibler et al. also found a positive correlation between PANAS and CSS scores, and regression analysis confirmed that the PANAS score for the negative effect subscale was a significant predictor of CYB [16].

Only one study researched the correlation between CYB and pain perception. Using the Pain Catastrophizing Scale (PCS), which is used to measure the tendency to catastrophize the everyday pain experience, regression analysis showed that pain catastrophizing was positively associated with the CSS total score and all of the subscales scores [16]. Similarly, only one study found a positive and weak correlation between CSS and the Beck Depression Inventory (BDI) total scores [39].

Limitations of the study

The study has several limitations. In some cases, the determination of CYB level was not reported, as the relationship between CYB and other variations was the main point of the study. Additionally, most of the reports were from Asia and the Middle East, with a scarcity of data from Europe and both Americas. Cultural differences between different regions of the world may be responsible for the obtained results. The presented studies were cross-sectional. Thus, there were no observations of changes in CYB symptoms over time. The fact that some of the research studied CYB during the COVID-19 pandemic may also be responsible for the results, as isolation and quarantine, combined with the uncertainty of the future related to a new disease, could elevate the CYB levels.

Conclusions

With the increased use of the Internet, the fact that students presented moderate levels of CYB shows that there are factors that moderate young people's perception of health. Although some of the results regarding demography and socioeconomic factors are inconsistent, studies on major groups may resolve the problem of bias. At the time of this investigation and data search, there were no longitudinal studies regarding the student population. Thus, observations regarding the evolution of CYB in participants were not provided. Observations of CYB trends over time may provide a better understanding of background processes resolving in CYB, thus providing a base for interventional strategies for reducing the burden.

The difference between scores obtained by the medical and non-medical students suggests that individuals with medical training exhibit lower levels of health-related anxiety. The potential vulnerability to CYB should be more thoroughly examined in order to introduce mechanisms for improving health literacy.

It seems that anxiety is one of the most important factors in the development of CYB. The DASS-21 and HAI scale results show that higher anxiety is one of the most common findings in those with CYB. The uncertainty of the future, caused by the lack of specialized knowledge, leads to fear and an obsessive search for information. Internet and smartphone addiction, which can be predicted by CYB, leads to

an increased amount of health-related information causing unnecessary distress.

Other factors, such as health problems, lead to anxiety, which may be the cause of higher reassurance subscale scores in such participants.

CYB should be considered a construct caused by many variables rather than a symptom of increased health anxiety. Analysis of underlying processes related to the mentioned factors during the development of CYB, such as the need for approval, blame tendency, obsession-compulsions, and factors related to academic stress, may provide a better understanding of the phenomenon.

Some of the problems may be relieved by providing professional care and psychological support for students, especially those with higher anxiety levels.

References

1. Chen J, Wang Y. Social media use for health purposes: systematic review. J Med Internet Res 2021; 23(5): e17917.
2. Hargreaves S, Bath PA, Duffin S, Ellis J. Sharing and empathy in digital spaces: qualitative study of online health forums for breast cancer and motor neuron disease (amyotrophic lateral sclerosis). J Med Internet Res 2018; 20(6): e222.
3. Tan SS, Goonawardene N. Internet health information seeking and the patient-physician relationship: a systematic review. J Med Internet Res 2017; 19(1): e9.
4. Płaciszewski K, Wierzba W, Ostrowski J, Pinkas J, Jankowski M. Use of the internet for health purposes-a national web-based cross-sectional survey among adults in Poland. Int J Environ Res Public Health 2022; 19(23): 16315.
5. Alvarez-Galvez J, Salinas-Perez JA, Montagni I, Salvador-Carulla L. The persistence of digital divides in the use of health information: a comparative study in 28 European countries. Int J Public Health 2020; 65(3): 325-333.
6. McElroy E, Shevlin M. The development and initial validation of the cyberchondria severity scale (CSS). J Anxiety Disord 2014; 28(2): 259-65.
7. Global internet penetration rate as of April 2024, by region [online] 2024 [cited 10.05.2024]. Available from URL: https://www.statista.com/statistics/269329/penetration-rate-of-the-internet-by-region/
8. Starcevic V, Berle D. Cyberchondria: towards a better understanding of excessive health-related internet use. Expert Rev Neurother 2013 Feb; 13(2): 205-13.
9. Kuss DJ, Griffiths MD, Binder JF. Internet addiction in students: prevalence and risk factors. Comput Human Behav 2013 May; 29(3): 959–66.
10. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021; 372: n71.
11. Bati AH, Mandiracioglu A, Govsa F, Çam O. Health anxiety and cyberchondria among Ege University health science students. Nurse Educ Today 2018; 71: 169-173.
12. Fergus TA, Spada MM. Moving toward a metacognitive conceptualization of cyberchondria: examining the contribution of metacognitive beliefs, beliefs about rituals, and stop signals. J Anxiety Disord 2018; 60: 11-19.
13. Selvi Y, Turan SG, Sayin AA, Boysan M, Kandeger A. The cyberchondria severity scale (CSS): validity and reliability study of the Turkish version. Sleep Hypn 2018; 20(4): 241–6.
14. Aulia A, Marchira CR, Supriyanto I, Pratiti B. Cyberchondria in first year medical students of Yogyakarta. J Consum Health Internet 2019; 24(1): 1-9.
15. Dagar D, Kakodkar P, Shetiya SH. Evaluating the cyberchondria construct among computer engineering students in Pune (India) using cyberchondria severity scale (CSS-15). Indian J Occup Environ Med 2019; 23(3): 117-120.
16. Gibler RC, Jastrowski Mano KE, O'Bryan EM, Beadel JR, McLeish AC. The role of pain catastrophizing in cyberchondria among emerging adults. Psychol Health Med 2019; 24(10): 1267-1276.
17. Ejder Apay S, Gürol A, Özdemir S, Uslu S. The reliability and validity of the cyberchondria severity scale for the Turkish students. Cukurova University Faculty of Education Journal 2020; 49(1): 430-450.
18. Dost A, Atay N, Körpe G, Tunçay HB. Evaluation of the relationship between the cybercondry levels of university students and irrational beliefs. International Journal of Caring Sciences 2021; 14(3): 1651-1660.
19. Gandla SD, Dayala PP, Kadiyala PK. Cyberchondria: an emerging form of health anxiety. Archives of Mental Health 2021; 22(2): 148-152.
20. Mrayyan MT, Al-Rawashdeh S, Abu Khait A, Rababa M. Differences in cyberchondria, internet addiction, anxiety sensitivity, health anxiety, and coronavirus anxiety among students: a web based comparative survey. Electron J Gen Med 2022; 19(3): em371.
21. Kurcer MA, Erdogan Z, Cakir Kardes V. The effect of the COVID-19 pandemic on health anxiety and cyberchondria levels of university students. Perspect Psychiatr Care 2022; 58(1): 132-140.
22. Shailaja B, Shetty V, Chaudhury S, Thyloth M. Exploring cyberchondria and its associations in dental students amid COVID-19 infodemic. Ind Psychiatry J 2020; 29(2): 257-267.
23. Selak MB, Vulić-Prtorić A, Sturnela P. Odnos između percepcije situacije, anksioznosti i nekih aspekata ponašanja povezanih s korištenjem digitalne tehnologije tijekom pandemije bolesti COVID-19 [Relationship between situation perception, anxiety and some aspects of cyber behaviour during the COVID-19 pandemic]. *Socijalna Psihijatrija* 2022; *50*(3): 297–319. (In Croatian).
24. Rashid Z, Rathore MA, Khushk IA, Mashhadi SF, Ahmed M, Shahzeb M. Intolerance of uncertainty and anxiety sensitivity as prospective risk factors for cyberchondria in undergraduate students. Annals of King Edward Medical University 2022; 28(1): 91-96.
25. Abu Khait A, Mrayyan MT, Al-Rjoub S, Rababa M, Al-Rawashdeh S. Cyberchondria, anxiety sensitivity, hypochondria, and internet addiction: implications for mental health professionals. Curr Psychol 2022; 13: 1-12.

26. Padagas R, Duay BS, Dalisay J. Cyberchondria among Filipino teacher education students. International Journal of Evaluation and Research in Education 2022; 11(3): 1074–1081.

27. Sravani D, Reddy CG, Murthy PS, Chaudhury S. Coronavirus anxiety and cyberchondria among undergraduate medical students during the COVID-19 pandemic in a Tertiary Care Hospital: a cross-sectional study. Medical Journal of Dr DY Patil Vidyapeeth 2022; 15(8): 240-247.

28. Mrayyan MT, Al-Atiyyat N, Abu Khait A, Al-Rawashdeh S, Algunmeeyn A, Abunab HY. Does cyberchondria predict internet addiction among students during the COVID-19 pandemic? A web-based survey study. Nurs Forum 2022; 57(3): 337-343.

29. Zhou Y, Dai L, Deng Y, Zeng H, Yang L. The moderating effect of alexithymia on the relationship between stress and cyberchondria. Front Psychiatry 2022; 13: 1043521.

30. Rasouli M, Atayi Mirabadi N, Sarvi Hampa M, Borimnejad L. Cyberchondria in nursing students during the COVID-19 pandemic. JCCNC 2022; 8 (1): 9-14.

31. Sohail M, Zafar N. Fear of COVID-19 and stress in university students: mediating role of cyberchondria and moderating role of creative coping and social supports. J Pak Med Assoc 2022; 72(8): 1564-1571.

32. Patanapu SK, Sreeja CS, Veeraboina N, Reddy KV, Voruganti S, Anusha P. Prevalence and effect of cyberchondria on academic performance among undergraduate dental students: an institutional based study. Ind Psychiatry J 2022; 31(2): 228-234.

33. Molu B, Ozpulat F, Bas MT. Investigation of nursing students' cyberchondria perceptions and health anxiety. International Journal of Caring Sciences 2023; 16(1): 72-79.

34. Sabir S, Naqvi I. Prevalence of cyberchondria among university students: an emerging challenge of the 21st century. J Pak Med Assoc 2023; 73(8): 1634-1639.

35. Maryam H, Ali Z, Idrees Z, Fatima S, Hamid S, Mansoor M. Exploring cyberchondria among medical students doing clinical rotations in PNS Shifa hospital, Karachi, Pakistan. RMJ 2023; 48(3): 752-790.

36. Varer Akpinar C, Mandiracioglu A, Ozvurmaz S, Kurt F, Koc N. Cyberchondria and COVID-19 anxiety and internet addiction among nursing students. Curr Psychol 2023; 42(3): 2406-2414.

37. Mrayyan MT, Alkhawaldeh JM, Alfayoumi I, Algunmeeyn A, Abunab HY, Suliman WA, et al. COVID-19 era-related e-learning: a cross-sectional web-scale study of cyberchondria, internet addiction and anxiety-related symptomatology among university nursing students. BMJ Open 2023; 13(8): e071971.

38. Zhu X, Zheng T, Ding L, Zhang X. Exploring associations between eHealth literacy, cyberchondria, online health information seeking and sleep quality among university students: a cross-section study. Heliyon 2023; 9(6): e17521.

39. Aydın Kartal Y, Kaya L, Özcan H. Investigation of the relationship between depression, cyberchondria levels and the quality of life of female students during the COVID-19 pandemic. Women Health 2023; 63(8): 669-680.

40. Robles-Mariños R, Alvarado GF, Maguiña JL, Bazo-Alvarez JC. The short-form of the cyberchondria severity scale (CSS-12): adaptation and validation of the Spanish version in young Peruvian students. PLoS One 2023; 18(10): e0292459.

41. Agrawal V, Khulbe Y, Singh A, Kar Sujita K. The digital health dilemma: exploring cyberchondria, well-being, and smartphone addiction in medical and non-medical undergraduates. Indian Journal of Psychiatry 2024; 66(3): 256-262.

42. El-Zoghby SM, Zaghloul NM, Tawfik AM, Elsherbiny NM, Shehata SA, Soltan EM. Cyberchondria and smartphone addiction: a correlation survey among undergraduate medical students in Egypt. J Egypt Public Health Assoc 2024; 99(1): 7.

43. Bahadir O, Dundar C. The impact of online health information source preference on intolerance to uncertainty and cyberchondria in a youthful generation. Indian J Psychiatry 2024; 66(4): 360-366.

44. Lathabhavan R, Akhil MP, Banik A. Cyberchondria and perceived stress as mediated by fear of pandemic fear: a pandemic and post-pandemic comparative study from India. Environment and Social Psychology 2024; 9(5): 2253.

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