

Cyberchondria and its Correlation with Depression among Parents of Under-five Children in an Urban Community of Tamil Nadu, India: A Cross-sectional Study

SU BHAVAN KUMAR¹, K BINCY², R DIWAKAR³, P KAVERI⁴, MVM PRADEEP⁵

ABSTRACT

Introduction: Cyberchondria is characterised by an increase in health-related distress or anxiety, reassurance-seeking behaviour and frequent excessive online health searches. Parents are more vulnerable to this habit because they are likely to look up not just their own illness, but also their children's.

Aim: To determine how common depression and cyberchondria are among urban parents of under-five children in Tamil Nadu, as well as the factors associated with these conditions.

Materials and Methods: A community-based cross-sectional study was conducted over three months in a selected Primary Health Centre (PHC) of Kattankulathur block, Chengalpattu district, Tamil Nadu, India among parents of under-five children aged (≥ 21 years). The minimum required sample size was calculated as 215; A total of 230 households was approached, of which 228 participants completed the questionnaire and were included in the final analysis. Participants were selected using a multistage sampling technique. Structured questionnaires - the Cyberchondria Severity Scale-12 (CSS-12) and the Patient Health Questionnaire-9 (PHQ-9) were used to measure cyberchondria and depression severity, respectively. Pearson's

correlation (between continuous CSS-12 and PHQ-9 scale scores) and multivariable linear and logistic regression analyses were employed for statistical analysis.

Results: The mean age of the study population was 32.5 ± 8.6 years, including females 101 (44.3%), graduates 161 (70.6%), and employed 207 (90.8%). The majority of them belonged to the upper middle or middle socioeconomic class 178 (78.1%). High levels of cyberchondria severity were observed in 145 (63.6%) of participants, and severe depression in 141 (61.8%) of the participants, with a strong positive correlation between cyberchondria and depression ($r=0.869$, $p<0.001$).

Conclusion: This community-based cross-sectional study among urban parents of under-five children in Tamil Nadu revealed a high prevalence of cyberchondria (63.6%) and severe depressive symptoms (61.8%), with a significant positive correlation between the two conditions. Female gender and higher socio-economic status were significant independent predictors of high cyberchondria severity. These findings underscore the need for targeted digital health literacy interventions and routine mental health screening for parents of young children in rapidly urbanising communities.

Keywords: Digital health literacy, Health anxiety, Internet use, Online health information-seeking

INTRODUCTION

All around the world, Internet usage has grown exponentially to 49.72% in the past few years [1]. About 35% of the population, that is 560 million internet users, is in India [2]. This rapid digital expansion has also had an adverse effect on mental health, contributing to loneliness, anxiety, depression, and reduced overall well-being [3]. With this context, cyberchondria is known as the 21st-century counterpart of hypochondriasis, which is characterised by escalation of health concerns driven by over-reliance on online health information instead of traditional medical sources [4]. The multidimensional approach to cyberchondria has four components: recurrent Online Health Research (OHR), negative emotional states related to OHR, disruption of activities due to OHR, and seeking physicians' advice while experiencing greater anxiety or distress [5,6]. Unverified information sharing on social media, particularly during the Coronavirus Disease-2019 (COVID-19) pandemic, has been linked to cyberchondria [7].

Previous studies have conceptualised cyberchondria as a maladaptive pattern of excessive online health information-seeking behaviour, which increases psychological distress instead of providing any relief [6,8,9]. Evidence from other studies indicates that repeated exposure to misleading health information was associated with increased health anxiety, emotional distress, and depressive symptoms,

suggesting a close link between cyberchondria and mental health problems [9-11]. Cyberchondria is a multidimensional construct that leads to mistrust of medical professionals, and can contribute to functional impairment and reduced social and psychological well-being [6,8,12]. Few studies have demonstrated a significant correlation between cyberchondria and depression, particularly during periods of high stress, indicating that continuous online health information searching may intensify depressive symptoms [10,13]. Studies in India and other countries have similarly reported a strong relationship between cyberchondria, depression, and anxiety, underscoring the importance of cyberchondria as a public health concern [10,13,14]. Parents represent the most vulnerable group for cyberchondria because they conduct proxy online health searches on behalf of their children rather than themselves. They may misinterpret symptoms after repetitive online health searches, arriving at incorrect conclusions [15-17]. Studies among parents have shown that higher levels of cyberchondria were associated with altered health-seeking behaviours and increased reassurance-seeking behaviours [10,13,16,17].

Though there is a growing body of literature on cyberchondria and its correlation with mental health symptoms, most of the studies have focused only on general populations and students only [8,9]. Some researchers have explored cyberchondria among parents of

newborns and pregnant women, showing that parents have more caregiving demands and increased uncertainty regarding symptom interpretation [15-17]. While anxiety has been extensively examined in relation to cyberchondria, the correlation of depression with cyberchondria remains underexplored, especially among the parent population [10,11]. Evidence from Western countries, hospital-based setups, and pandemic situations limits the applicability of those findings to a routine, non clinical, middle-income community setting like India, where rapid digital expansion has significantly transformed parents' health-seeking behaviour [8,10,11].

Rapid urbanisation, rising caregiving responsibilities, and frequent health concerns among parents of young children have increased digital health access. Cyberchondria may negatively influence caregiving practices and timely decision-making, potentially resulting in delayed professional consultation or inappropriate self-medication based on online information [18]. Hence, this is considered a major public health concern, and there is a need to address the effects of cyberchondria among parents to promote appropriate health-seeking behaviour and safeguard child health. However, local evidence examining cyberchondria and its mental health correlates remains very limited. The aim of the present study is to assess the prevalence of cyberchondria and depression among urban parents of under-five children in Tamil Nadu and to determine their correlation. Objectives: 1) To estimate the prevalence of cyberchondria and depression among urban parents of under-five children; 2) To identify sociodemographic factors associated with cyberchondria and depression severity; 3) To examine the correlation between cyberchondria severity and depression severity in this population.

The null hypothesis was that there is no significant correlation between cyberchondria severity and depression among urban parents of under-five children. Alternate Hypothesis (H1): There is a significant positive correlation between cyberchondria severity and depression among urban parents of under-five children.

MATERIALS AND METHODS

This community-based cross-sectional study was conducted for three months (January 2024 to March 2024) in the Kattankulathur block of the Chengalpattu district, Tamil Nadu, India. Ethical approval was obtained from the Institutional Ethics Committee (IEC) prior to the initiation of the study (IEC Approval No.: SRMIEC-ST1225-4082), and all procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 2013. All participants provided written informed consent.

Inclusion criteria: Parents of under-five children aged 21 years and above, residing in the urban community of Kattankulathur block for the past six months, having access to a smartphone or internet, and able to read and respond in English or Tamil were included in the study.

Exclusion criteria: Parents who were unable to provide informed consent, those with incomplete questionnaire responses, and parents with known psychiatric diagnoses were excluded from the study.

Sample size calculation: Based on an earlier study by Srivastava SP et al., that reported a prevalence of 45.3% of cyberchondria, the sample size was calculated using the formula [11]: $n = Z^2 \times p \times q / d^2$, where $Z = 1.96$ (at 95% confidence interval), $p = 0.453$ (prevalence), $q = 1 - p = 0.547$, and $d = 0.07$ (precision of 7%). This yielded $n = 195$. Accounting for a 10% non response rate, the sample size was adjusted to 215. Although the minimum required sample size was 215, a total of 230 eligible households were approached to accommodate field-level variations.

Sampling technique

Chengalpattu district of Tamil Nadu was selected for the study. A multistage sampling technique was employed. Stage 1: The

district comprises eight blocks, of which the Kattankulathur block was selected using the lottery method. Stage 2: From the selected block, a list of all PHCs was obtained, and one PHC was selected by simple random sampling. Stage 3: From the selected PHC, the list of field practice areas under its coverage was prepared, and one field practice area was selected randomly. Stage 4: A complete list of eligible households with under-five children from the selected field practice area was obtained from the under-five register maintained at the selected PHC, which served as the sampling frame. Using computer-generated random numbers, 230 households were selected. From each selected household, one eligible parent (aged ≥ 21 years) of an under-five child was selected for the study. Face-to-face interviews were conducted to collect the data. Out Of the 230 households, 228 eligible parents completed the questionnaire and were included in the final analysis.

Study Procedure

The questionnaire included three sections. Section-A consisted of socio-demographic details. Section-B comprised the Cyberchondria Severity Scale-12 (CSS-12) to assess the severity of distress and anxiety caused by excessive online health information seeking [19]. It has four subscales: excessiveness, compulsion, distress and reassurance seeking. Each subscale had three items. Items 1, 3, and 6 belong to Excessiveness (repetitive and escalating online health searches); Items 2, 7, and 10 under Compulsion (interference of web searches with daily activities); Items 4, 8, and 9 under Distress (anxiety and emotional discomfort from health-related searches); Items 5, 11, and 12 belong to Reassurance Seeking (tendency to seek confirmation or professional medical advice following online searches). Each item is scored on a 5-point Likert scale (1=Never to 5=Always), yielding a total score ranging from 12 to 60. A CSS-12 total score of ≤ 36 was classified as Low cyberchondria severity and >36 as High cyberchondria severity [20].

Section C comprised the PHQ-9, which consists of nine questions on depressive symptom criteria during the past two weeks [21,22]. The questions were evaluated on a 4-point Likert scale (0=Not at all, 1=Several days, 2=More than half the days, 3=Almost every day). The cumulative score ranges from 0 to 27. The severity of depression was categorised as: minimal (0-4), mild (5-9), moderate (10-14), moderately severe (15-19), and severe (20-27).

STATISTICAL ANALYSIS

Incomplete questionnaires were excluded from the analysis, and only completed responses ($N=228$) were entered into Microsoft excel and analysed using Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics (mean, standard deviation, frequencies, and percentages) were used to summarise study variables. Pearson's correlation coefficient was used to evaluate the relationship between the two continuous scale scores (CSS-12 total score and PHQ-9 total score). A multivariable linear regression model was employed to identify independent predictors of depression severity score. A multivariable logistic regression model was employed to forecast high levels of cyberchondria. A p-value below 0.05 was deemed statistically significant.

RESULTS

A total of 230 households were approached for the study. Two participants did not complete the questionnaire, resulting in 228 completed responses included in the final analysis. The mean age of the study participants was 32.5 ± 8.6 years. [Table/Fig-1] presents the socio-demographic and clinical characteristics of the participants. Males represented 127 (55.7%) and females 101 (44.3%) of the study population. Most participants were graduates (161 (70.6%)), employed (207 (90.8%)), and the majority belonged to the upper middle or middle socioeconomic class {178 (78.1%)},

with the remainder in the upper class {50 (21.9%)}. High levels of cyberchondria severity (CSS-12 score >36) were observed in 145 (63.6%) participants, while 83 (36.4%) reported low levels. Regarding depression severity, no participant had minimal depression (0-4); 141 (61.8%) had severe depression, 60 (26.3%) had moderately

Characteristics	n (%)
Age (years) (mean±SD)	32.5±8.6
Gender, n (%)	
Male	127 (55.7%)
Female	101 (44.3%)
Education, n (%)	
Graduate	161 (70.6%)
Schooling	67 (29.4%)
Employment status, n (%)	
Unemployed	21 (9.2%)
Employed	207 (90.8%)
Socioeconomic status, n (%)	
Upper middle/Middle	178 (78.1%)
Upper	50 (21.9%)
Cyberchondria severity, n (%)	
Low (CSS-12 ≤36)	83 (36.4%)
High (CSS-12 >36)	145 (63.6%)
Depression severity (PHQ-9), n (%)	
Minimal (0-4)	0
Mild (5-9)	2 (0.9%)
Moderate (10-14)	25 (11.0%)
Moderately severe (15-19)	60 (26.3%)
Severe (20-27)	141 (61.8%)

[Table/Fig-1]: Socio-demographic characteristics and cyberchondria and severity of depression among study participants (N=228).

severe depression, 25 (11.0%) had moderate depression, and 2 (0.9%) had mild depression.

Variables	CSS-12	PHQ-9	p-value
CSS-12	1	0.869	<0.001
PHQ-9	0.869	1	

[Table/Fig-2]: Pearson correlation matrix between CSS-12 total score and PHQ-9 total score.

CSS-12: Cyberchondria severity scale-12; PHQ-9: Patient health questionnaire-9.

Pearson's correlation analysis demonstrated a significant positive correlation between CSS-12 total score and PHQ-9 total score ($r=0.869$, $p<0.001$) [Table/Fig-2].

The multivariable linear regression model was statistically significant ($R^2=0.821$, adjusted $R^2=0.816$, $p<0.001$) [Table/Fig-3], explaining more than 80% of the variance in depression severity score. Cyberchondria severity emerged as the strongest predictor of depression severity ($\beta=0.851$, $p<0.001$). Higher socioeconomic status and higher education level were significantly associated with higher depression severity scores, whereas female sex was significantly associated with lower depression severity scores. Employment status, age, and religion were not significant predictors after adjustment for other variables. The linear regression equation for prediction of PHQ-9 depression score is: PHQ-9 score=2.673-0.003 (Age)-0.105 (Sex: female)+0.001 (Religion)+0.186 (Education: high)-0.009 (Employment: employed)+0.197 (SES: high)+1.278 (Cyberchondria: high).

Variables	B (Unstandardised)	SE	β (Standardised)	p-value
Intercept	2.673	0.189	-	<0.001
Age (years)	-0.003	0.003	-0.032	0.33

Gender (female)	-0.105	0.048	-0.072	0.03
Religion	0.001	0.026	0.001	0.97
Education (high)	0.186	0.059	0.117	0.002
Employment (employed)	-0.009	0.076	-0.004	0.90
Socioeconomic status (high)	0.197	0.066	0.113	0.003
Cyberchondria (CSS-12 high)	1.278	0.044	0.851	<0.001*

[Table/Fig-3]: Multivariable linear regression analysis - predictors of depression severity score.

B=unstandardised coefficient, SE= standard error, β : standardised coefficient; $p<0.001$ is statistically significant

The multivariable logistic regression analysis for cyberchondria severity has been depicted in [Table/Fig-4]. Depression severity was excluded from this model due to high multicollinearity with cyberchondria (Pearson $r=0.869$); its inclusion would have violated the assumption of multicollinearity (Variance Inflation Factor>10), rendering the model unstable. Therefore, depression was appropriately excluded as an independent variable in the logistic regression predicting cyberchondria. Higher socioeconomic status was strongly associated with high cyberchondria (OR=2.92, 95% CI: 1.22–6.99, $p=0.02$). Female sex was also significantly associated with high cyberchondria severity (OR=2.76, 95% CI: 1.27–5.98, $p=0.04$). No significant correlation was observed between cyberchondria severity and religion, education level, employment status, or age.

Variables	B	SE	OR (95% CI)	p-value
Intercept	0.309	1.268	1.36 (0.11-16.37)	0.81
Age (years)	-0.010	0.018	0.99 (0.95-1.03)	0.57
Gender (female)	1.015	0.395	2.76 (1.27-5.98)	0.04
Religion	0.061	0.164	1.06 (0.77-1.47)	0.71
Education (high)	-0.288	0.415	0.75 (0.33-1.69)	0.49
Employment (employed)	0.293	0.507	1.34 (0.50-3.62)	0.56
Socioeconomic status (high)	1.072	0.445	2.92 (1.22-6.99)	0.02*

[Table/Fig-4]: Multivariable logistic regression analysis- predictors of high cyberchondria severity.

CI: confidence interval; OR: Odds ratio; SE: Standard error; $p<0.05$ is statistically significant

These results indicate a strong positive correlation between cyberchondria and depression, where cyberchondria is the dominant predictor for depression. Socioeconomic status is also a significant determinant of both cyberchondria and depression.

DISCUSSION

The present study demonstrated a substantial burden of cyberchondria and depressive symptoms among parents of children residing in an urban block of Kattankulathur. A high proportion of participants exhibited high cyberchondria severity (63.6%) and severe depressive symptoms (61.8%). Pearson's correlation analysis indicated a significant positive correlation between cyberchondria severity and depression levels (Pearson $r=0.869$ for continuous scores; highlighting a close linkage between maladaptive online health information-seeking behaviour and depressive symptomatology among urban parents. Multivariable linear regression analysis demonstrated that cyberchondria severity is the strongest independent correlate of depression severity ($\beta=0.851$, $p<0.001$), explaining more than 80% of the variance in depression score after adjusting for sociodemographic variables. These findings underscore that cyberchondria is a prominent psychological correlate of depression among parents of children under five in an urban community setting, extending earlier observations by Varma R et al., and Srivastava SP et al., [10,11].

High socioeconomic status was independently associated with high cyberchondria in multivariable logistic regression analysis,

suggesting that greater access to digital devices leads to higher exposure to health information and greater vulnerability to distress. Similar findings have been noted by Ergün Özdel ZG et al., who observed higher cyberchondria levels among socioeconomically advantaged parents [13]. Female sex was a significant independent correlate of high cyberchondria severity. Studies by Üstüner Top F and Kaya B, and Kan A et al., reported higher cyberchondria severity among mothers, attributing this to greater caregiving responsibility, emotional involvement, and decision-making roles related to child health [14,16]. In contrast, age, education level, employment status, and religion were not significantly associated with cyberchondria, consistent with findings by Dagar D et al., and Agrawal V et al., suggesting that gender-related psychosocial factors and digital exposures play a more influential role in determining cyberchondria risk among parents of under-five children [9,12].

The burden and severity of depressive symptoms observed in this study exceeded those reported in previous studies with mixed adult populations. Srivastava SP et al., identified a significant correlation between cyberchondria and depression during the COVID-19 pandemic, a crisis situation with multiple concurrent stressors [11]. In contrast, the present study was conducted in a non-pandemic, community-based setting specifically among parents of under-five children, suggesting that the severity of depressive symptoms may reflect sustained caregiving-related psychological strain rather than situational stressors alone. Varma R et al., described a significant but comparatively moderate relationship between these variables in the general adult population [10]. In the present study, cyberchondria demonstrated a markedly stronger correlation with depression and remained a dominant independent correlate in multivariable analysis, suggesting that cyberchondria may assume a more central psychological role among parents of under-five children. Parents of young children represent a uniquely vulnerable group, as their children frequently present with recurrent minor illnesses and non specific symptoms, prompting proxy online health information-seeking on behalf of their children-a pattern described as emotionally driven by Jadhav A and Billingham J et al., [15,17]. Repeated exposure to alarming and ambiguous online health information may be linked to reassurance-seeking behaviour and emotional distress, potentially contributing to higher depressive symptom scores. Studies by Özdel ZG et al., and Üstüner Top F et al., similarly reported correlations between cyberchondria severity, emotional distress, and altered health-seeking behaviours in parental populations [13,14].

There was a very strong correlation observed between cyberchondria and depression, which may raise concern regarding conceptual overlap. However, multicollinearity was formally assessed during the regression analysis, and depression severity was appropriately excluded from the logistic regression model predicting cyberchondria due to high collinearity. Although the cross-sectional study design precludes causal inference and the study was conducted in a single urban block, the findings remain contextually relevant to rapidly urbanising communities with widespread digital access.

Regular screening for cyberchondria and depressive symptoms among parents of under-five children attending the PHC is required. Health education initiatives, focused on digital health literacy and the responsible use of online health information systems, should be integrated into community-based parenting programs. Primary care physicians and community health workers should be trained to identify maladaptive online health-seeking behaviour and provide appropriate counselling or referrals. Policy makers should incorporate mental health-promoting strategies addressing cyberchondria into existing urban health and family welfare programs.

Limitation(s)

The present study has several limitations that warrant consideration. First, the study was restricted to a single urban block (Kattankulathur, Chengalpattu district), limiting the generalisability of findings to other

urban and rural settings. Second, the sample was skewed towards educated (70.6% graduates), employed (90.8%), and higher socioeconomic status (78.1% upper middle/middle class) individuals, which may not be representative of the broader urban Tamil Nadu parent population. Third, the cross-sectional design precludes the determination of causal relationships between cyberchondria and depression. Fourth, the use of self-reported questionnaires may be subject to recall and social desirability bias. Fifth, no internet usage frequency or smartphone usage data were collected as baseline variables, which may have strengthened the analysis. Additionally, the cut-off value used to classify high cyberchondria severity was derived from a Chinese population study, which may limit its direct applicability to the present Indian urban population. Sixth, the potential non-transferability of this Chinese-population-derived cut-off (CSS-12 >36) to an Indian urban population represents a methodological limitation; future validation studies using Indian-specific normative data are needed to establish culturally appropriate cut-off values for the CSS-12. Future longitudinal and multi-site studies with more diverse sociodemographic samples are warranted to confirm and extend these findings.

CONCLUSION(S)

The present community-based cross-sectional study demonstrates a high prevalence of cyberchondria (63.6%) and severe depressive symptoms (61.8%) among urban parents of under-five children in Tamil Nadu, with a strong positive correlation between the two conditions. Cyberchondria severity was the strongest independent predictor of depression in multivariable analysis. Female sex and higher socioeconomic status were significant predictors of high cyberchondria severity. These findings highlight the psychological burden of maladaptive online health information-seeking behaviour among parents during early caregiving and underscore the need for targeted digital health literacy interventions and routine mental health screening at primary health care level.

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PARTICULARS OF CONTRIBUTORS:

1. Postgraduate Student, Department of Community Medicine, SRM Medical College Hospital and Research Centre, Chengalpattu, Tamil Nadu, India.
2. Tutor, Department of Community Medicine, SRM Medical College Hospital and Research Centre, Chengalpattu, Tamil Nadu, India.
3. Senior Resident, Department of Community Medicine, Trichy SRM Medical College Hospital and Research Centre, Tiruchirappalli, Tamil Nadu, India.
4. Associate Professor, Department of Community Medicine, SRM Medical College Hospital and Research Centre, Chengalpattu, Tamil Nadu, India.
5. Associate Professor, Department of Community Medicine, SRM Medical College Hospital and Research Centre, Chengalpattu, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. P Kaveri,
Associate Professor, Department of Community Medicine, SRM Medical College Hospital and Research Centre, Kattankulathur-603203, Tamil Nadu, India.
E-mail: kaveripalanisaamy@gmail.com

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