Internet addiction and comorbid pyschiatric disorders in adolescents

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Abstract

Aim: Internet addiction (IA) has become an increasing problem in adolescents. However, there are few studies conducted in clinical samples and examined comorbid psychiatric disorders in adolescents with IA. The aim of this study was to determine the sociodemographic characteristics and comorbid psychiatric disorders in adolescents with IA and to compare them according to gender.

Material and Methods: This cross-sectional study was conducted with 80 adolescents aged 12-18 years. Participants with a Young Internet Addiction Scale score ≥ 50 were considered as internet addicts and were included in the study. Schedule for Affective Disorders and Schizophrenia for School Age Children-Present and Lifetime Version was used to evaluate psychiatric disorders.

Results: The study was completed with 40 male and 40 female adolescents with IA. The mean age of the participants was 14.7. 83.3% of participants use the internet every day and 46.7% of participants use the internet more than six hours a day. The mean YIAS score of the participants was 63.0. All participants met criteria for at least one psychiatric disorder. The most common comorbid psychiatric disorders were depressive disorder (37.5%), ADHD (26.2%) and anxiety disorders (23.8%). When comorbid psychiatric disorders were compared according to gender, it was found that ADHD was significantly higher in boys and depressive disorder was significantly higher in girls.

Conclusion: The results of the present study showed that adolescents with IA had a high rate of comorbid psychiatric disorders. Coexistence of addiction and psychiatric disorders has negative effects on the treatment of both addictions and psychiatric disorders. Therefore, all adolescents with IA should be evaluated for comorbid psychiatric disorders. Further studies are needed to explain the causal relationship between IA and psychiatric disorders.

Keywords: Adolescents; addiction; internet; psychiatric disorders; ADHD; depressive disorder; anxiety disorder

INTRODUCTION

The development of information technologies has made the internet a part of daily life. With the ease of access to the internet and the diversity of services provided, internet use is increasing in all age groups (1). With the increasing of the internet using, Internet addiction (IA) has become a major public health problem in the world (2). The term of IA has been coming into use in the nineties, but IA is not categorized as a diagnosis in the Diagnostic and Statistical Manual of Mental Disorders (3,4). IA is considered as failure to control internet using which restricts daily life of individuals (5). It is accepted that IA is a kind of behavioral addiction (6). The other terms of IA are "compulsive internet use", "problematic internet use", "pathological internet use" and these terms generally mean the same event. In the present study, "internet addiction" definition will be used.

Previous studies and meta-analyses showed that IA was associated with depression, attention deficit/hyperactivity disorder (ADHD), anxiety, conduct disorder, obsessive compulsive disorder, alcohol abuse and aggression (7-11). Furthermore, it was determined that in adolescents, IA exacerbated psychiatric symptoms (12). Though there are studies showing the association between psychiatric disorders and IA, the causes of this association are still unclear. Yen et al. stated that IA and psychiatric symptoms may be related to each other in four different ways. Psychiatric symptoms may initiate or make permanent the IA, IA may enhance psychiatric problems, IA and psychiatric symptoms may rise vulnerability to each

other, and lastly common risk factors can lead to both conditions (12). In the light of this information explaining the relationship between IA and psychiatric comorbidity, it is clear that identification of comorbid psychiatric disorders in IA will provide important benefits both in the prognosis and treatment of psychiatric diseases and in the prognosis and treatment of IA.

There are few studies evaluating the relationship between psychiatric disorders and IA in adolescents and most of the studies were conducted in school samples (7,11,12). In almost all of these studies, psychiatric comorbidity was evaluated with questionnaires answered by the participant, parents or teachers rather than diagnostic interviews (7,11,12). There is limited number of studies in the literature in which comorbid psychiatric disorders are evaluated by diagnostic interview in adolescents with IA (8,13-15). Two of the those were conducted in inpatients (14,15), and the others were conducted with outpatients (8,13). Müller et al. reported that there was a relationship between IA and anxiety and depression in inpatients adolescents (14). Fuchs et al. determined that there was a relationship between psychopathological features and problematic internet use in inpatients adolescents (15). In another study, 60 adolescents referred with diagnoses IA were evaluated to determine the comorbid psychiatric disorders, and ADHD, social phobia, and depression were determined as the most common psychiatric comorbidity in adolescents (8).

The prevalence of IA in adolescents has been reported in varying rates of 1-25%, and recent studies suggest that the prevalence of IA is increased (1). Considering the technological developments and the increasing prevalence of IA in parallel, it is clear that more studies are needed to investigate the association between IA and psychiatric disorders through diagnostic interviews. The aim of this study was to determine the sociodemographic characteristics and comorbid psychiatric disorders in adolescents with IA and to compare them according to gender.

MATERIAL and METHODS

Participants
This study was conducted in Child and Adolescent Mental Health Clinic of Malatya Training and Research Hospital. Adolescents aged 12–18 years who were admitted to child and adolescent mental health outpatient clinics with IA and agreed to participate between April and October 2019 were included in the study. The aim and methods of the study were explained to the adolescents and their parents in detailed. Consent was obtained from both adolescents and their parents before participating in the study. Individuals with a psychiatric problem involving disrupted judgment, such as an intellectual disability (IQ < 70 on the Wechsler Intelligence Scale for Children-Revised), psychotic disorder, or bipolar disorder were not included in the study. The study, approved by the Malatya Clinical Research Ethics Committee (Date and report number: 2019/76), conducted its research in accordance with the principles of the Helsinki Declaration.

Psychiatric Evaluation
Psychiatric evaluations of the subjects were carried out with the Turkish version of the Schedule for Affective Disorders and Schizophrenia for School Age Children-Present and Lifetime Version-Turkish Version (K-SADS-PL-T). K-SADS-PL-T is a semi-structured interview schedule used to evaluate psychiatric disorders in children and adolescents based on DSM-IV criteria (16). Turkish validity and reliability were validated (17). The psychiatric interviews were performed by child and adolescent psychiatrists (YED) who were certified in applying the K-SADS-PL-T.

Socio-demographic and Internet Use Characteristics Data Form
This form was designed by the authors and consists of nine questions. The form included questions regarding gender, age, family structure, family income, psychiatric disease in parents, daily internet usage time, internet access tool and internet usage purpose. Family income status was evaluated at three levels. The income level below the gross minimum wage was defined as low, between the gross minimum wage and twice the gross minimum wage was defined as medium, and over twice the gross minimum wage was defined as high.

Young's Internet Addiction Scale (YIAS)
YIAS is a Likert type self-report scale consisting of 20 questions. (18). 20-100 points can be taken from the scale and three types of IA are defined according to the score. Participants with 20–49 scores are designated as normal internet users, participants with 50–79 scores are designated as having moderate IA and participants with ≥80 YIAS scores are designated as having severe IA (19). According to these definitions, it was accepted that the participants with ≥50 YIAS scores had IA in our study. Turkish translation and adaptation of scale was done by Bayraktar and its internal consistency is 0.91 (20). This scale was used in many studies on IA (9,21,22).

Statistical Analysis
Statistical analyses were completed using SPSS version 22.0. Descriptive data related to the quantitative variables are given as the mean (x) ± standard deviation (SD) and minimum-maximum, while data related to the qualitative variables are given as numbers and percentages. Pearson-Fisher chi-square test was used for statistical analysis of qualitative variables. Values of $p < 0.05$ were accepted as statistically significant.

RESULTS

This study was completed with 40 male and 40 female internet addicted adolescents aged 12-18 years. The mean age of the participants was 14.7. It was found that approximately 75% of the participants lived in the town center and their family structure was nuclear family. In addition, family income status of 40 (50%) participants was moderate and that of 22 (27.5%) participants was high. The sociodemographic characteristics of participants were given in Table 1. There was no statistically significant difference between the genders in terms of demographic characteristics Table 2.

Table 1. Demographic characteristics of participants			
		n	%
Gender	Female	40	50.0
	Male	40	50.0
Residential area	Rural	18	22.5
	Central	62	77.5
Family structure	Nuclear	63	78.8
	Extended	6	7.5
	Dispersed	11	13.8
Family income	Low	18	22.5
	Moderate	40	50.0
	High	22	27.5
		Min-Max	Mean	SD
Age		12-16	14.71	1.24

The mean YIAS score of the participants was 63.08 ± 12.39 (min = 50; max = 98). It was determined that 45% (n = 36) of the participants had a computer with internet connection and 87.5% (n=70) had a mobile phone with internet connection. The most used tool for accessing the internet was mobile phone. In terms of the frequency of internet usage, it was found that 83.7% (n = 67) of the participants used the internet every day and 47.5% (n = 38) used the internet more than six hours a day. While 63.7% (n = 51) of the participants used the internet for communication purposes, these rates were 17.5% (n = 14) for playing games, 10% (n=8) for watching movies or videos, and 7.8% (n=6) for academic activities. In addition, 70% (n=56) of the participants reported having a conflict with their family regarding problematic internet use.

Table 2. Comparison of the genders in terms of demographic characteristics					
		Female n (%)	Male n (%)	x^2	p
Residential area	Rural	11 (61.1)	7 (38.9)	1.147	0.422
	Central	29 (46.8)	33 (53.2)		
Family structure	Nuclear	33 (52.4)	30 (47.6)	0.961	0.618
	Extended	3 (50.0)	3 (50.0)		
	Dispersed	4 (36.4)	7 (63.6)		
Family income	Low	6 (33.3)	12 (66.6)	2.900	0.235
	Moderate	23 (57.5)	17 (42.5)		
	High	11 (50.0)	11 (50.0)		
		Mean	SD	t	p
Age		14.87	1.42	-1.138	0.258
		14.55	1.04		

Table 3. Psychiatric disorders in IA subjects aged 10–18 years (n = 80)		
Diagnosis	n	%
Depressive disorder	30	37.5
Attention deficit hyperactivity disorder	21	26.2
Anxiety disorders	19	23.8
Conduct disorder	9	11.2
Obsessive compulsive disorder	5	6.2
Conversion disorder	5	6.2
Dissociative disorder	2	2.5
Substance abuse	2	2.5

As a result of semi-structured psychiatric interviews, all participants met criteria for at least one psychiatric disorder. In addition, 13 participants (16.3%) had more than one psychiatric disorder. The findings related to the psychiatric disorders of the participants were shown in Table 3. The most common comorbid psychiatric disorders were depressive disorder (37.5%), ADHD (26.2%) and anxiety disorder (23.8%). When comorbid psychiatric disorders were compared according to gender, it was found that ADHD was significantly higher in boys and depressive disorder was significantly higher in girls   Table 4.

Table 4. Comparison of the genders in terms of psychiatric diagnosis					
Psychiatric diagnosis		Female n (%)	Male n (%)	x^2	p
Depressive disorder	No	15 (37.5)	35 (87.5)	21.333	0.000
	Yes	25 (62.5)	5 (12.5)		
Attention deficit hyperactivity disorder	No	34 (85.0)	25 (62.5)	5.230	0.041
	Yes	6 (15.0)	15 (37.5)		
Anxiety disorders	No	33 (82.5)	22 (55.0)	2.900	0.235
	Yes	7 (17.5)	18 (45.0)		

DISCUSSION

The current study investigated comorbid psychiatric disorders in internet addicted adolescents and it was found that all internet addicted adolescents met the diagnostic criteria for at least one psychiatric disorder. Furthermore, in the current study, comorbid psychiatric disorders and sociodemographic characteristics of internet addicted adolescents were compared according to gender. The results showed that sociodemographic characteristics were similar in both genders, ADHD was significantly higher in boys and depressive disorder was significantly higher in girls. To our knowledge, the current study is one of the few studies in the literature investigating the comorbid psychiatric disorders in adolescents with IA according to gender.

Previous research indicated that psychiatric disorders, especially ADHD, depressive disorder and anxiety disorders, are closely associated with IA (7-11). Consistence with the literature data, the present study found that the most common diagnoses of adolescents with IA were depressive disorder, ADHD and anxiety disorder, respectively. In addition, the results of present study showed that 16.3% of participants had more than one psychiatric disorder. In another study examining psychiatric comorbidity in adolescents with IA, Bozkurt et al. found that 88% of participants had two or more comorbid psychiatric disorders (8). The result of the current study on the presence of more than one comorbid psychiatric disorder was different from Bozkurt et al.'s findings. Methodological differences between these two studies may explain this inconsistency. In their study, Bozkurt et al. used YIAS and accepted those who scored 80 or more as internet addicts (8). However, in the current study, those who scored 50 and above were accepted as internet addicts. A higher YIAS score is an indication that IA is more severe. High rate of comorbid psychiatric disorders in severe IA can be considered as an expected result. In addition, parents now have more information and awareness about IA and their demand for psychiatric support is increasing. In the present study, the low rate of multiple comorbid psychiatric disorders may be due to the parents' referral to psychiatry at the right time and early.

The results of the present study showed that the most common comorbid psychiatric disorder in adolescents with IA was depressive disorder (37.5%). Previous studies revealed that the prevalence of depression was high in problematic internet users, and in their meta-analysis study, Ho et al. determined that the prevalence of depression in internet addicts was 26% (11,23). Additionally, Ha et al. found that the most common comorbid psychiatric disorder with IA was ADHD in children and depression in adolescents (13). Merikangas et al. showed that depression was more common than ADHD in adolescents, and ADHD was more common in males than females (24). However, various studies suggest that ADHD is the most common psychiatric disorder in adolescents with IA (7,8,11). In a study with 60 internet addicted adolescents (45 male, 15 female), Bozkurt et al. determined the most common psychiatric disorder as ADHD (8). Another 2-year prospective study conducted with adolescents, researchers determined that ADHD was the important risk factor for IA, and depression had predictive effect for IA in female (7). This inconsistency may be explained by methodological differences between studies. The male participants were higher than female participants in studies which suggested that the most common psychiatric disorder was ADHD in adolescents with IA. Consistent with the literature, the present research revealed that depressive disorder was the most common comorbid psychiatric disorder in female adolescents with IA. Depression may be both the cause and the result of IA (7,22). However, this cause and result relationship has not been explained clearly yet. Individuals with depression overuse the internet to cope with negative emotional symptoms and the stress caused by destructive life events, and this overuse may result in addiction (25,26). From other perspective, pathological internet use can increase the risk for depression (22). According to this theory, problematic internet uses causes decrease in sleep time, decrease in physical activity, loneliness and low self-esteem and may result in depression (21).

When male and female adolescents were examined together, ADHD was the second most common comorbid psychiatric disorder in IA, however, in male adolescents; ADHD was the most common comorbid psychiatric disorder. Previous studies have been stated that IA is usually related to ADHD, and adolescents with IA are also more likely to be diagnosed with ADHD than those without IA (7,12,27). In addition, it was found that ADHD symptoms were more severe in individuals with IA (27). Consistent with previous studies, the current study determined that the prevalence of ADHD was higher in adolescents with IA than community sample. The association between ADHD and IA has been tried to be explained by various theories. According to the biopsychosocial model, "be bored easily" and "having an aversion for delayed rewards" are the key symptoms of ADHD (28,29). Using the internet allows various activities at the same time and instantly rewards the individual, and this may reduce the boredom emotion and delayed aversion of adolescents diagnosed with ADHD and make them vulnerable to IA (27). The other theory that explains the association between ADHD and IA is the mechanism of impaired inhibition. Impaired inhibition which may lead to lack of self-control ability has been found in patients with ADHD; therefore the internet users with ADHD may become more vulnerable to being an internet addict (30).

In the present study, the third most common comorbid psychiatric disorder of the participants was anxiety disorders. It has been revealed in previous studies that individuals with anxiety disorders are prone to addictive behaviors and there is an association between anxiety and IA (31-33). Anxiety level may be increased as a symptom of withdrawal in individuals with IA or anxious individuals can use the internet to cope with their anxiety (34,35). According to another theory, behavioral inhibition is a risk factor for anxiety disorders and facilitates IA. (36). High behavioral inhibition causes avoidance of face-to-face social interaction in anxious individuals and these individuals feel more comfortable in the virtual world (37). Thus, behavior inhibition can play a key role on vulnerability to IA.

Apart from the studies showing that ADHD, depressive disorder and anxiety disorders are associated with IA, there are also various studies displaying an association between IA and conduct disorder (CD). Gunes et al., indicated that presence of comorbid CD increased the risk for IA in adolescents (38). Furthermore, Bozkurt et al. determined that the prevalence of CD in adolescents with IA is 15% (8). In the present study, the prevalence of CD was determined as 11%, close to the results of Bozkurt et al.'s study, and these rates were higher than

the prevalence of CD in community sample (6.8%) (24). Impulsivity and aggression is the significant symptoms of CD, has a close relation with IA (2,39). Studies have stated that aggression may cause to IA and may be the result of IA (2). In addition, similar neurobiological changes were found in individuals with aggression and with IA (39). These high rates and common points indicate that there is a possible association between CD and IA.

The current study had potential limitations. This study is a cross-sectional study, the control group was not included in the study and the number of samples was low. These limitations do not allow the generalization of the findings of the study. Despite these limitations, the fact that this study was conducted in a clinical sample, that psychiatric disorders were identified by a semi-structured interview schedule and that the gender distributions of the participants were equal constituted the strengths of this study.

CONCLUSION

In conclusion, this study revealed a high prevalence of comorbid psychiatric disorders in adolescents with IA. Coexistence of addiction and psychiatric disorders has negative effects on the treatment of both addictions and psychiatric disorders (8). We suggest that all patients admitted with IA should be evaluated for psychiatric disorders, especially depressive disorder, ADHD and anxiety disorder. From a broad perspective, we believe that the treatment of comorbid psychiatric disorders will contribute positively to the IA treatment process. Further studies are needed to explain the causal relationship between IA and psychiatric disorders.

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