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ORIGINAL ARTICLE / ÖZGÜN ARAŞTIRMA

The effects of internet use intensity on quality of life, anxiety and depression scores in pediatric migraine

İnternet kullanım sıklığının migrenli çocuk hastalarda yaşam kalitesi, anksiyete ve depresyon skorları üzerine etkileri

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ABSTRACT

Objective: We aim to compare the quality of life, anxiety and depression scores of schoolchildren and adolescent migraineurs with healthy subjects according to the intensity of their Internet use.

Methods: The migraine and control groups consisted of 142 migraineurs and 128 healthy children (age 9-17 years), respectively. Subjects were divided into 3 groups according to the intensity of their Internet- use intensity: Group 1: occasional Internet users, Group 2: regular Internet users, group 3: heavy Internet users. The children were divided into two groups according to the age while psychiatric tests were done: school children (<12 years), adolescents (>12 years). The psychiatric scales were accomplished by the Child Depression Inventory, the State-Trait Anxiety Inventory for Children and the Pediatric Quality of Life Inventory for Children. Statistical analysis was performed with PASW Statistics, v.13.0.

Results: For the children with migraine under 12 years in our study, different intensity of Internet use did not differ from the depression or anxiety scores compared with the control group. In the adolescent group, the scores about emotional role restriction and psychosocial functioning were higher than in the control group to a statistically significant level (p=0.008 and 0.02, respectively).

Conclusion: The misuse of Internet in adolescents with migraine might led to emotional and psychosocial impairment.

Key words: Migraine, intensity of Internet use, quality of life, anxiety, depression, children

ÖZET

Amaç: Migren tanısı ile takipli okul çocuğu ve ergenlerin internet kullanım sıklığına göre yaşam kalite indeksi, anksiyete ve depresyon skorlarının, sağlıklı çocuklarla karşılaştırılması amaçlanmıştır.

Yöntemler: 9-17 yaş arasında, migren tanısı alan 142 hasta ile aynı yaş ve cinsiyetteki 128 sağlıklı çocuk çalışmaya alındı. Hastaların öykü, öz ve soy geçmiş ve antropometrik ölçümleri de içeren fizik muayene bulguları kaydedildi. Hastalar ergen (>12 yaş) ve ergen öncesi (<12 yaş) olarak gruplandırıldı. Her yaş grubu, İnternet kullanım sıklığına göre 3 gruba ayrıldı: Grup 1: seyrek internet kullananlar (< 1 saat/hafta) Group 2: düzenli internet kullananlar (< 2 saat/ gün, haftada birkaç gün), group 3: sürekli internet kullananlar (>2 saat /gün, haftanın her günü). Psikiatrik testler çocuklar için yaşam kalitesi ölçek formu (Pediatric Quality of Life Inventory for Children: PedQL), çocuk depresyon ölçeği (Child Depression Inventory: CDI) ve nasıl hissediyorum anketi 1,2 (the State-Trait Anxiety Inventory for Children: STAI-C) ile yapıldı.

Bulgular: Yaş, cinsiyet ne antropometrik ölçümlerde gruplar arasında fark saptanmadı. 12 yaşın altındaki hastalarda, kontrol grubu ile migren grubu arasında, internet kullanım sıklığına göre depresyon anksiyete ve yaşam kalitesi skorlarında anlamlı fark saptanmadı. Ergen ve sürekli internet kullanan migren grubunda, duygulanım ile ilgili sorunlar ve başkaları ile ilgili sorunlar kategorisinde, kontrol grubuna göre anlamlı fark saptandı (p=0,008 ve p=0,02).

Sonuç: Ergen hastalarda, internet kullanımının yoğun olması psikososyal ve duygulanım sorunlarına yol açabilir.

Anahtar kelimeler: Migren, internet kullanım sıklığı, yaşam kalite indeksi, anksiyete, depresyon, çocuk

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INTRODUCTION

Using the Internet has become the most commonplace activity among young people and adults as it provides the opportunity to easily seek information and communicate with other people. However, Internet addiction among children and adolescents has become a new problem associated with physical problems such as headache and musculoskeletal pain [1,2] as well as psychiatric problems like anxiety disorders, depression [4,5].

Migraine, the most common acute and recurrent headache syndrome during childhood and adolescence, is characterized by periodic episodes of paroxysmal headache accompanied by nausea, vomiting, abdominal pain, and relief with sleep [6]. Problematic Internet use in children known to associate with physical problems such as headaches and backaches [1,2] and might be associated with migraine.

Limited data examines the relation of pediatric migraine and Internet use intensity. In this study, we aim to investigate the association between pediatric migraine and intensity of Internet use in school children and adolescents and compare their quality of life, anxiety, and depression scores with the healthy age and gender matched subjects according to the intensity of their different Interne use.

METHODS

This prospective, randomized study was performed on 142 children and adolescents (aged 9-17 years) who had been referred to our pediatric neurology department with primary complaints related to headache and diagnosed as migraine. The control group was composed of 128 healthy age- and gender- matched school children and adolescents who had been admitted during the same period to our outpatient clinic for reasons other than childhood diseases.

Migraine cases were defined according to the International Headache Society criteria for migraine [6], who had secondary headache (from sinusitis, an intracranial lesion, severe anemia, etc.) were not included in the study. None of the participants had a history or evidence of current metabolic, cardiovascular, respiratory, or hepatic disease.

The migraine group was divided into 3 groups according to intensity of Internet use: occasional Internet user (OIU: < 1 hour/week), regular Internet user (RIU: several days per week and < 2 hour/ day), and heavy Internet user (HIU:>2 hours /day). The control group consisted of children who are occasional Internet users who represent the current norm of Internet use of schoolchildren and adolescents of Internet use over the prior 30 days was categorized according to consensus of previous reports [7-9].

Pshychiatric evaluation

Physicians introduced the study to the family at the time of the medical evaluation, and conducted private, in-person interviews with each child in the presence of one or both parents. Interviews were took place in the offices of the medical center. The children and their parents were told that the study's aim was to assess psychiatric disorders in pediatric migraine patients due to the intensity of Internet use.

While the children were being evaluated, they were divided into two groups according to the age: school children (<12 years) were in Group 1, adolescents (>12 years) were in Group 2. Psychiatric tests were done by a child psychiatrist using the Child Depression Inventory developed by Kovacs [10], the State-Trait Anxiety Inventory for Children developed by Spielberger [11], and the Pediatric Quality of Life Inventory for Children developed by Varni [12-14], all of which have been translated into Turkish by Memik NÇ [15,16]. These inventories measure health-related quality of life, depression, and anxiety by self-reported scales, and investigate the physical and non-health related psychosocial functioning of children 2-18 years old.

Children's Depression Inventory (CDI): Kovacs (1985) developed this self-report depression scale for children between 6 and 17 years old. Each of the 27 items is scored as 0, 1, or 2, according to the severity of the symptoms within the prior two weeks. Higher scores positively correlate with higher levels of depression. The reliability and validity study of the scale for the Turkish population was conducted by Öy [17].

State/Trait Anxiety Inventory for Children (STAI-C): The State/Trait Anxiety Inventory for Children 's two subscales each contain 20 items that assess state and trait anxiety [11]. This widely

used self-report instrument has demonstrated good concurrent validity and reliability in Turkish children and adolescents [18]. The Cronbach alpha for the scale was reported to be between 0.83 and 0.86. Scores ranged from 20 to 80, with higher scores indicating greater anxiety and depression. The questions both measures a person's disposition to respond with anxiety when faced with situations perceived as threatening, and they assess depression in addition to anxiety and negative effect [19]. This test has shown a higher correlation with other anxiety subscales .

Paediatric Quality of Life Inventory: Parent and child version (PedsQL-P and C): These scales were developed by Varni et al. [12] to investigate physical and psychosocial functioning. These short, easy-to-apply instruments are scored by a five point Likert-type scale. The 36 questions yield 4 domain scores: physical health functioning, emotional role restriction, school functioning, and psychosocial functioning. The reliability and validity study of the scale for 8–12 year old and 13–18 year old Turkish children was conducted by Memik et al. [14,15].

Statistical analysis was performed with PASW Statistics, v.13.0. Paired t-test was used to calculate the difference of two parameters in groups; One-way ANOVA test was used in calculation of difference of two parameters in groups with more than two in the same group and between different groups. Multiple comparisons were done with the Spearman correlation test. Categorical data were evaluated using the chi-square test; $p<0.05$ was accepted as statistically significant.

The study was approved by the local ethical committee. Written informed consent was obtained from parents.

RESULTS

Age and gender distribution were not statistically different between the migraine and control groups of children <12 years (p=0.1 and 0.17, respectively). Subjects of the migraine group had no significantly higher BMI (p=0.82) compared with the control group (Table 1).

Psychiatric tests showed that the scores of children <12 years with migraine did not differ to a statistically significant degree compared with those in the healthy control group. Spearman correlation test was used to compare the groups. For the children with migraine younger than 12 years in our study, intensity of Internet use scores did not differ from the depression or anxiety scores of the control group (Table 2).

Age and gender distribution were not statistically different between the migraine and control groups of children >12 years (p=0.6 and 0.17, respectively). Subjects of the migraine group had no significantly higher BMI (p=0.17) compared with the control group (Table 3).

Table 4 reviews the depression or anxiety scores of adolescents according to the intensity of Internet use compared with the healthy, occasional Internet user control group. The difference of the total scores did not reach statistically significant levels with Spearman correlation test. However, the study group' scores about emotional role restriction and psychosocial functioning were higher than those of the control group to a statistically significant degree (p=0.008 and 0.02, respectively).

Table 1. Demographical features of children < 12 years

	Migraine group (n=68) (mean ± SD)	Control group (n=70) (mean ± SD)	p
Age (years)	10.4±0.7	10.1±0.7	0.1
Male/female	34/34	34/36	0.7
BMI (kg/m²)	19.3±2.7	19.3±3.2	0.82

Table 2. The scores of children <12 years according to the intensity of Internet use

		Migraine group			Control group n=70	r**; p*
		OIU* (n=40)	RIU** (n=15)	HIU*** n=13)		
(PedsQL)[1]	Physical health functioning	74.1±16.8	76.2±14.8	77.2±17.6	74.3±19.3	0.463; 0.1
	Emotional role restriction	73.5±17	74.4±16.2	76.4±16.3	71.5±18.7	0.406; 0.1
	School functioning	66.2±19.8	68.1±17.6	69.4±18.7	69.2±22.2	0.355; 0.2
	Psychosocial functioning	90±12.1	91.4±14.2	91±11.3	86.9±16.6	0.351; 0.2
	Total	76.5±13.3	77.5±15.7	78.5±16.1	75.2±16.5	0.464; 0.1
STAI-C[2]	State	31.2±7.7	33.1±6.8	32.6±5.5	29.5±5.9	-0.441; 0.15
	Trait	34.5±5.1	35.8±4.7	36.9±5.2	33.1±6.8	-0.483; 0.1
CDI[3]		9.6±5.8	9.2±2.2	9.3±3.4	6.58±3.7	-0.307; 0.3

Spearman correlation test is used for comparison of the groups. [1](PedsQL): Pediatric Quality of Life Inventory for Children[2] STAI-C: State-Trait Anxiety Inventory for Children (state and trait),[3]CDI: Child Depression Inventory
** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed)
*OIU: occasional Internet user, **RIU: Reguler Internet user, ***HIU: heavy Internet user

Table 3. Demographical features of children > than 12 years

	Migraine group (n=74) (mean ± SD)	Control group (n=58) (mean ± SD)	p
Age (years)	13.6±1.3	13.7±1.2	0.66
Male/female	38/36	28/30	0.8
BMI (kg/m²)	20.6±3.7	22.2±3.5	0.17

Table 4. The scores of children > 12 years according to the intensity of Internet use

		Migraine group			Control group (n=58	r**; p*
		OIU* (n=27)	RIU** (n=33)	HIU*** (n=14)		
(PedsQL)[1]	Physical health functioning	70.2±16.6	72.4±12.4	74.3±18.2	65.3±22.1	-0.222; 0.15
	Emotional role restriction	64.5±19.1	68.4±20.2	70.4±18.3	60.3±24.6	-0.316; 0.008
	School functioning	61.9±20.3	64.8±18.5	61.2±18.2	58.9±26.7	-0.134, 0.39
	Psychosocial functioning	91.4±12.8	93.6±14.2	97.4±22.6	80.8±26.4	0.509[φ]; 0.02
	Total	72.1±13.7	74.8±16.2	75.8±19.3	66.2±21.4	-0.212; 0.2
STAI-C[2]	State	36.4±6.5	38.3±4.2	39.1±5.4	36.0±7.3	0.226; 0.12
	Trait	38.3±8.3	37.5±9.1	39.2±7.6	37.4±9.9	0.099; 0.5
CDI[3]		12.8±6.9	13.9±7.2	13.1±5.2	12.6±8.6	0.289; 0.06

Spearman correlation test is used for comparison of the groups. [1](PedsQL): Pediatric Quality of Life Inventory for Children[2] STAI-C: State-Trait Anxiety Inventory for Children (state and trait),[3]CDI: Child Depression Inventory
** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed)
*OIU: occasional Internet user, **RIU: regular Internet user, ***HIU: heavy Internet user; φ Control group vs HIU group

DISCUSSION

Computer use by children is common in their daily lives as Internet is used extensively in and outside the school. It is important to distinguish pathological Internet use intensity with the addictive form, and regular Internet use without longer than intended is a normative behavior. Defining the behavioral problems related to Internet use in standard diagnostic criteria can be difficult.

Problematic Internet use [20], pathological Internet use [21], or Internet addiction [22] and its association between other comorbid psychiatric disorder and physical problems in childhood are current issues which need to study. Internet addiction is defined as having five or more of the following eight characteristic symptoms: preoccupation, uncontrolled impulse, usage more than intended, tolerance, withdrawal, impairment of control, excessive time and effort spent on the Internet, and impairment of decision-making ability [23]. Schoolchildren and adolescents who spend a significant amount of time on Internet are known to have physical problems such as headaches and backaches because of immobilization [1,2] and have a risk of being obese due to decreased physical activity [23- 26]. Besides that, anxiety disorders, depression, and even suicidal ideation are reported among adolescent Internet problematic users [20].

Studies have reported that adolescents with migraine reported greater depression symptoms and school difficulties compared with nonmigranuers [27], but the contribution of Internet use in the depression symptoms has not been investigated. In our study, we both categorized the migraine group according to the intensity of Internet use and compare the group by itself and as well as to healthy subjects. Three different scales were used in order to help determine depression, anxiety and quality of life scores in children with migraine. Heavy Internet users among the adolescents were found at risk of having higher depressive and anxiety scores compared with healthy ones, and the misuse of Internet in adolescents leads to significant impairment in emotional role restriction and psychosocial functioning.

There was no significant difference of anxiety and depression scores in schoolchildren compared with migraineurs and healthy ones. The schoolchildren (<12 years) did not score higher in scales. The difference of scores between the school children and adolescents can be explained by more protective parenting for this age of schoolchildren, as well as adolescents' poorer self control, worse self regulation, and desire for independence. Among the migraine groups in both schoolchildren and adolescents, the heavy Internet users had higher depression scores than occasional and regular Internet users but the difference did not reach to a statistically significant level. This result would depend on the small sample size, a limitation of this study. In addition, the evaluative scales measured the short term effects of the social, psychological, and physical well-being but it is difficult to prove these disorders were caused by intensive Internet usage. Clinic–based research suggests that pediatric patients with migraine already have elevated symptoms of anxiety and depression compared with healthy patients [23], and personal factors may also play role in the development of adolescent problematic Internet use. However among the migraineurs, heavy Internet users had higher depression scores than occasional and regular users.

Our study did not investigate the criteria of Internet addiction [23], but investigated the depression in addition to anxiety and negative effects in the prior two-four weeks. Different studies in adolescents and adults have confirming the association of Internet use and psychiatric disorders such as social anxiety and depression. Bernardi and Pallanti found that 15% of the adult cases of internet addiction were classified to have anxiety disorder [28]. Milani et al. reported that adolescents with symptoms of problematic internet use had worse interpersonal relationships [29]. The association between Internet addiction and social anxiety has also been found among adolescents in Taiwan [30]. The study conducted by Kaczynski et al. investigated the relations between chronic headache syndromes and depression and anxiety by PedsQL- and CDI confirming our study [27]. Without evaluating Internet use intensity, it revealed that the adolescents suffering from chronic headache had higher scores which indicated greater difficulty in school-functioning.

In conclusion, heavy Internet use adolescents had higher depressive and anxiety scores compared with healthy ones, and the misuse of Internet in adolescents leads to significant impairment in emotional role restriction and psychosocial functioning. However, there was no significant difference

of anxiety and depression scores in schoolchildren compared migraineurs and healthy subjects. Despite difficulties in proving these disorders were caused by intensive internet usage and need to be studied in large samples, we can conclude that migraineurs are vulnerable to the temptations of Internet.

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