INTERNET ADDICTION AND ITS CONSEQUENCES AMONG HEALTHCARE WORKERS

Doctoral (Ph.D.) thesis

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1. ABBREVIATIONS

BDI: Beck Depression Inventory

fMRI: Functional Magnetic Resonance Imaging

GPI: Genaralized Problematic Internet Use

IAS: Internet Addiction Scale

IAT: Internet Addiction Test

IHD: Ischemic Heart Disease

MBI: Maslach Burnout Inventory

PIU-Q: Problematic Internet Use Questionnaire

2. INTRODUCTION

2.1. Internet addiction

The widespread use of internet has dramatically changed our lives by the 21st century. Although this technological revolution has improved many aspects of our lives and it is now an essential part of the everyday routine, including work, private life and social functioning, many studies reported the misuse of internet (problematic internet use, internet addiction; IA) as summarized in a recent meta-analysis including 113 epidemiologic studies covering 693,306 subjects showed that the pooled prevalence of internet addiction was 7.02% (95% CI, 6.09–8.08%) in the population aged 7–60 years (1). Age (adolescent samples), lower cut-off scores (and type of questionnaire), sample size (more common is smaller samples), and country of origin (more frequent in Asian studies) were significant predictors of higher prevalence (2,3).

The individual suffering from internet addiction may be not aware of it and the symptoms remain unrecognized by his or her relatives, friends and colleagues (4).

IA may be classified as a compulsive-impulsive spectrum disorder based on symptomatology, but it has been under considerable research, and is not included in the recently published 5th edition of the Diagnostic and Statistical Manual DSM-V (5,6).

IA seems to have several risk factors such as younger age at the start of internet use, male gender, daily time interval, goal of internet use and low socioeconomic status (7). Psychosocial factors such as low self-concept and and lack of family support are also associated with problematic internet use (8). Problematic internet use seems to be associated with medical conditions such as anxiety, depression, drug abuse and malnutrition (9).

IA is mainly studied in adolescents aged 14–18 (who may be at heightened risk for mental health problems), raising the possibility of school based prevention (10).

2.2. Burnout

Burnout is a common phenomenon among workers in the modern age, which mainly affects those employed in the helping services- paradoxically, perhaps most the healthcare workers. Due to its frequency, it is also called the epidemic of our time (similar to diabetes).

Overload / performance constraints (either due to internal motivation or external factors - labor shortages), increased stress, work dependence and work mania are the most important factors in the development of the syndrome, especially in cases where the work is aimed at people for a long time, requires long-term concentration and emotional involvement, active intervention, while spectacular results and positive feedback is relatively rare (11-13).

Current studies are usually focusing on those working in healthcare, but burnout can occur in all types of workers. Although it is categorized as an occupational phenomenon and not as a medical condition, it seems to be strongly associated with diabetes, cardiovascular disorders, chronic musculoskeletal pain, headaches, changes in pain experiences, gastrointestinal issues, respiratory problems, severe injuries and youth deterioration of health (below the age of 45 years) as well as with psychiatric complications such as insomnia, depressive symptoms and mental disorders based on a recent systematic review (10). The burnout syndrome maybe associated with not only the physical (for example cardiovascular, musculosceletal disease, diabetes, etc), but also with mental issues (including anxiety, depression, substance abuse and addictive disorders) (14).

3. OBJECTIVES

Internet addiction is predominantly studied in adolescents, but it also occurs in adults, although the relevant literature data is far from complete. The aim of our study was to investigate the occurrence, risk factors and consequences of internet addiction among the staff of Bajai Szent Rókus Kórház.

3.1. Internet addiction and burnout among healthcare workers

In our study, we examined the following correlations:

a) the incidence of internet addiction among hospital staff,

b) analysis of risk factors for internet addiction,

c) study of internet addiction and burnout at work,

(d) identification of independent risk factors for internet addiction.

3.2. Association of internet addiction with insomnia, depression, and quality of life

In our study, we examined the following correlations:

a) the incidence of internet addiction among hospital staff,

b) the incidence of depression among hospital staff and its relationship to internet addiction,

c) the incidence of sleep disorders among hospital staff and their relationship to Internet addiction,

d) the relationship between quality of life and Internet dependence,

(e) identification of independent risk factors for internet addiction, in particular the mental health problems mentioned above.

4. THE COMPLEXITY OF INTERNET ADDICTION

4.1 Introduction

Although burnout is categorized as an occupational phenomenon and not as a medical condition, it seems to be strongly associated with somatic issues such as cardiovascular disorders or chronic pain syndromes. Furthermore, it strongly correlates with mental disorders such as depression and insomnia, and a recent publication labelled burnout as a possible underlying cause of substance abuse and addiction.

Based on the above-mentioned findings, burnout can lead to substance abuse or addiction (such as internet addiction) as a coping method for anxiety symptoms, job dissatisfaction and negative emotions. Excessive internet use can lead to later school burnout and vice versa based on a recent study in adolescents (16).

However, only limited data are available about the prevalence and risk factors of the internet addiction among adults especially among healthcare professionals. Moreover, the association of burnout and internet addiction is not well studied.

The aim of our study was (a) to detect the prevalence of internet addiction, (b) to identify its risk factors and (c) to analyze its possible association with burnout among healthcare workers in a single hospital, by applying a questionnaire-based survey.

4.2. Methods

This study was conducted between January and August 2020 in Bajai Szent Rókus Kórház, Baja, Hungary.

The study was approved by the Ethical Committee of Szent Rókus Hospital, Baja, Hungary.

Inclusion criteria for the participants were working with human services, being between 18 and 65 years of age and being employed at the time of the study regardless of the type of employment (public servant, sub-contractor, etc.).

Exclusion criteria were being under 18 or over 65 years of age, taking a leave of absence or refusal to participate in the study.

Demographic criteria included age, gender, marital status, number of children, type of work, years spent with work, work schedule, legal relation, secondary employment.

Included risk factors and diseases were smoking, alcohol and illicit drug intake, diabetes, hypertension, ischemic heart disease, musculoskeletal pain, history of malignancy and depression.

Internet addiction was detected with the Problematic Internet Use Questionnaire, which is a validated self-report scale with good reliability and validity characteristics (17). The questionnaire contains 18 items, each scored on a 5-point Likert-type scale ranging from 1 (never) to 5 (always). A confirmatory factor analysis verified the three-factor model of the questionnaire, each subscale containing six items. A total score exceeding 41 points suggests internet addiction (18). Daily use, time interval and goal of internet use were also recorded.

Burnout was measured with the Maslach Burnout Inventory (19) This validated instrument has three subscales and measures emotional exhaustion (being overextended and exhausted by one's studies), cynicism (distant attitude towards studies) and professional efficacy (satisfaction with past and present accomplishments). Responses are marked on a seven-point Likert scale (0 meaning 'never' and 6 meaning 'every day') and then summed (20).

Statistical analysis: Data were evaluated as means ± SD (standard deviation) by Student's t-test, the chi-square test and the Pearson's Rank-Order Correlation. Logistic regression analysis was used to determine the significance of the different parameters as independent risk factors of IA. The analysis was performed with appropriate adjustments for differences in risk factors and medical conditions. For all odds ratios, an exact CI of 95% was constructed in our study. Data analysis was performed using SPSS (version 22.0, IBM, New York, NY, USA).

4.3. Results

Overall 600 questionnaires were successfully delivered and 485 responses received (response rate of 80.8%). A total of 49 doctors (10.1%), 198 nurses (40.9%), 123 medical assistants (25.4%), 73 other healthcare workers (15.1%), and 42 (1.7%) healthcare associated workers (cleaning, laundry, etc.) have completed our survey.

A total of 411 females (84.8%) and 74 males (15.2%) participated in our study. The vast majority of the study's participants were aged between 36 and 55 (291/485, 60.1%), were married (333/485, 58.7%), had two children (165/485, 34.1%), had secondary education (165/485, 34.1%) and had been working for 21–40 years (231/485, 47.6%) mainly in acute (223/485, 45.9%) and outpatient care (138/485, 28.5%). Details can be seen in Table 1.

(N=485)	%
Gender	
Female	84.8
Male	15.6
Age	
18-25 years	7.7
26-35 years	16.2
36-45 years	29.9
46-55 years	30.2
56-62 years	13.7
more than 62 years	2.3
Marital status	
single	16.7
relationship	21.0
married	47.7
divorced / widow	14.6
Number of children	
have no child	27.7
1 child	24.8
2 children	34.1
more than 3 children	13.4
Type of work	
medical clerk	6.8
assistant	25.4
nurse	40.9
doctor	10.1
other health care worker	15.1
other	1.7
Years spent with work	
1-12 months	5.0
1-5 years	13.6
6-10 years	11.1
11-20 years	20.4
21-30 years	25.8
31-40 years	21.8
more than 40 years	2.3
Workflow	
acute care	45.9
chronic care	6.1
rehabilitation	8.0
outpatient care	28.5
Secondary employment	
yes	82.3
no	17.7

Table 1. Baseline characteristics of the study population

Concomittant diseases (%)	
taking any medication regularly	37.3
smoker	31.8
taking alcohol	2.9
taking drugs	1.9
diabetes	4.5
hypertension	26.4
cardiovascular disease	12.4
musculosceletal pain	17.5
history of cancer	3.3
depression or other psychiatric disease	2.7
Daily internet use (approximately) (%)	
1 hour	34.0
2 hours	26.8
3 hours	22.7
4 hours	7.4
5 hours	4.3
6 hours	4.0
> 6 hours	0.8
Daily time interval of internet use (multiply answer) (%)	
between 0-3 am.	16.1
between 3-6 am.	2.5
between 6-9 am.	5.2
between 9-12 am.	8.5
12-3 pm	4.1
3-6 pm.	15.3
6-9 pm.	52.0
9.12 pm.	13.2
Goal of internet use (multiply answer) (%)	
learning/working	43.1
internet gaming	11.3
chat	29.1
community portal (Facebook. Twitter etc)	48.9
matchmaking	1.2
movies	29.5
music	37.7
other	22.3

Table 2. Concomittant diseases. substance abuse and internet use in the study population

A total of 31.8% (154/485) were regular smokers, 2.9% (14/485) drank alcohol and 1.9% (9/485) took illicit drugs more or less regularly.

A total of 26.4% (128/485) had hypertension, 4.5 % (22/485) had diabetes, 12.4 % had ischemic heart disease (60/485), and 17.5% (90/485) suffered from musculoskeletal pain. A total of 3.3 % (16/485) had a history of malignancy and 2.7% (13/485) a history of mood disorder (Table 2).

A total of 34% (165/489) spent less than one hour online and 0.8% (4/485) used the internet more than six hours a day. More than half of the examined workers preferred being online between 6 and 9 p.m. (52%, 252/485). The main goals of internet surfing were to visit social media sites in 48.9% (237/485), everyday work in 43.1% (209/485) and listening to music in 37.7% (183/485). Detailed data can be seen in Table 2.

Internet addiction was detected in 3.9% (19/485) based on the Problematic Internet Use Questionnaire.

A total of 24.1% (117/485) suffered from mild, 71.4% (346/485) from moderate and 4.5% (22/485) from severe burnout based on the Maslach Burnout Inventory. Mean values were the following in the subcategories: emotional exhaustion 25.91 ± 9.4 points, depersonalization 19.67 ± 6.7 points, personal accomplishment 9.37 ± 5.1 points. Mild emotional exhaustion occurred in 25.6% as moderate, in 58.7% as severe, and in 15.7% of all workers. The rate of mild, moderate and severe depersonalization was 61.6%, 34% and 4.4%, respectively. A total of 16.2% suffered from mild, 78% from moderate and 5.8% from severe personal accomplishment (not shown).

There was a significant association between the duration of being online and being addicted to the internet ($r = 0.46$, $p < 0.001$). The cut-off of spending 5 h or more online predicted IA. Being online between 12 and 3 p.m. (3.9 vs. 10.5%) and 3 and 6 p.m. (14.6 vs. 31.6 %, $p < 0.05$ in both cases) also predicted IA (Supplementary Table S2). Among the types of internet services, chatting (27.9 vs. 57.9%, $p = 0.004$) and watching movies (28.3 vs. 57.9%, $p = 0.005$) were significantly associated with IA (Table 3).

IA was more common in males (26.3 vs. 14.8%, $p = 0.04$) and workers aged between 18 and 25 (42 vs. 6.2%, $p = 0.047$). IA was more prevalent among singles (16.1 vs. 31.6%, $p < 0.001$), unmarried couples (20.4 vs. 36.8%, $p < 0.001$) and childless (26.8 vs. 47.3 %, $p = 0.049$) (Table 4).

Internet addiction was more common among medical clerks (6.2 vs. 21% p < 0.001), and among healthcare associated workers (14.8 vs. 21% p <0.001) Internet addiction was more common among those working in chronic care (5.8 vs. 15.8%, p = 0.011) (Table 4).

	Not addicted to internet (n= 466)	Internet addiction (n= 19)
Concommittant diseases		
taking any medication regularly	175 (37.6%)	6 (31.6%)
smoker	145 (31.1%)	9 (47.3%)
taking alcohol	13 (2.8%)	1 (5.3%)
taking drugs	**6 (1.3%)**	**3 (15.8%)****
diabetes	**19 (4.8%)**	**2 (10.5%)***
hypertension	121 (26%)	7 (36.8%)
cardiovascular disease	55 (11.8%)	5 (26.3%)
musculosceletal pain	81 (17.4%)	4 (21%)
history of cancer	15 (3.2%)	1 (5.2%)
depression or other psychiatric disease	12 (2.6%)	1 (5.2%)
Daily internet use (approximately)		
1 hour	163 (35%)	2 (10.5%)
2 hours	127 (27.2%)	3 (15.8%)
3 hours	102 (21.9%)	8 (42.1%)
4 hours	33 (7.1%)	3 (15.8%)
5 hours	**19 (4.1%)**	**2 (10.5%)****
6 hours	18 (3.9%)	1 (5.2%)
> 6 hours	4 (0,8%)	0 (0,0%)
Daily time interval of internet use (multiply answer)		
between 0-3 am.	77 (16.5%)	1 (5.2%)
between 3-6 am.	10 (2.1%)	2 (10.5%)
between 6-9 am.	24 (5.2%)	1 (5.2%)
between 9-12 am.	39 (8.4%)	2 (10.5%)
12-3 pm	**18 (3.9%)**	**2 (10.5%)***
3-6 pm.	**68 (14.6%)**	**6 (31.6%)***
6-9 pm.	242 (52%)	10 (52.6%)
9.12 pm.	64 (13.7%)	0 (0,0%)
Goal of internet use (multiply answer)		
learning/working	201 (43.1%)	8 (42.1%)
internet gaming	51 (10.9%)	4 (21%)
chat	**130 (27.9%)**	**11 (57.9%)***
community portal (Facebook. Twitter etc)	225 (48.3%)	12 (63.2%)
matchmaking	5 (1.0%)	1 (5.2%)
movies	**132 (28.3%)**	**11 (57.9%)***
music	173 (37.1%)	10 (52.6%)
other	100 (21.5%)	3 (15.8%)

Table 3. Comparism of concommittant diseases. substance abuse and internet use in the study subgroups.(**p<0.00, *p<0.05)

	Not addicted to internet (n= 466)	Internet addiction (n= 19)
Gender		
Male	**69 (14.8%)**	**5 (26.3%)***
Female	397 (85.2%)	14 (73.7%)
Age (years)		
18-25 years	**29 (6.2%)**	**8 (42%)***
26-35 years	76 (16.3%)	3 (15.8%)
36-45 years	141 (30.2%)	4 (21%)
46-55 years	144 (30.9%)	2 (10.5%)
56-62 years	64 (13.2%)	2 (10.5%)
more than 62 years	12 (2,6%)	0 (0.0%)
Marital status (%)		
single	**75 (16.1%)**	**6 (31.6%)****
relationship	**95 (20.4%)**	**7 (36.8%)****
married	227 (48,7%)	4 (21%)
divorced / widow	69 (14.8%)	2 (10.5%)
Number of children		
have no child	**125 (26.8%)**	**9 (47.3%)***
1 child	117 (25.1%)	4 (21%)
2 children	163 (35%)	4 (21%)
more than 3 children	63 (13.5%)	2 (10,5%)
Type of work		
medical clerk	**29 (6.2%)**	**4 (21%)****
assistant	121 (26%)	2 (10.5%)
nurse	190 (40.8%)	8 (42.1%)
doctor	49 (10.5%)	0 (0.0%)
other healthcare worker	69 (14.8%)	4 (21%)
other	8 (1.7%)	1 (5.2%)
Years spent with work		
1-12 months	22 (4.7%)	2 (10.5%)
1-5 years	**59 (12.6%)**	**7 (36.8%)***
6-10 years	50 (10.7%)	4 (21%)
11-20 years	97 (20.8%)	2 (010.5%)
21-30 years	124 (26.6%)	1 (5.3%)
31-40 years	103 (22.1%)	3 (15.8%)
more than 40 years	11 (2.4%)	0 (0.0%)
Workflow		
acute care	216 (46,3%)	7 (36.8%)
chronic care	**27 (5.8%)**	**3 (15.8%)***
rehabilitation	37 (7,9%)	2 (10.5%)
outpatient care	136 (29,2%)	2 (10.5%)
healthcare associated work	50 (10.7%)	5 (26,3%)

Table 4. Comparism of baseline characteristics of the study subgroups.(**p<0.001, *p<0.005)

Internet addiction was more prevalent among illicit drug users (15.8 vs. 1.3 %, p < 0.001) and among diabetic individuals (10.5 vs. 4.8%, p = 0.011) (Table 3).

There was no significant association of burnout and internet addiction, also taking the subcategories into account (Table 5).

In a multivariate analysis including all factors (demographic criteria, burnout, internet habits, comorbidity, etc.), internet addiction was significantly associated with ages 18-25 (OR: 2.6, p = 0.024), surfing on the internet > 5 h daily (OR 25.583, p < 0.001), being single (OR:4.275, p = 0.006), being childless (OR: 3.81, p = 0.011), working less than five years (OR 2.135, p = 0.048) and job type (being healthcare associated worker, OR: 2.907, p = 0.009). Illicit drug intake (OR 52.494, p < 0.001) and diabetes (OR: 4.122, p = 0.043) were also strongly correlated with IA.

	Not addicted to internet (n= 466)	Internet addiction (n=19)
Burnout		
low	114 (24.5%)	3 (15.8%)
moderate	330 (70.8%)	16 (84.2%)
severe	22 (4.7)	0 (0,0%)
emotional exhaustion	20.89 ± 9.7	22.9 ± 8.05
depersonalisation	9.32 ± 5.08	9.89 ± 1.13
personal accomplishment	19.53 ± 7.08	19.68 ± 1.9

Table 5. Burnout and internet addiction (**p<0.001, *p<0.05)

4.4. Discussion

Internet addiction is a well known phenomena among adolescents, but only few studies focused on its prevalence and rik factors among adults, especially including middle-aged or older people.

IA has been under considerable research, and has generated controversy, debate and quarreling among expert researchers, healthcare and non-healthcare professionals due to insufficient data, poor quality research and the lack of randomized studies (2). However, internet addiction seems to be more than just the consequence of mental instability of adolescents. It can be associated with atrophy in the prefrontal and striatal areas similar to other type of addictions and can be related to psychiatric diseases, overweight (metabolic syndrome/diabetes) and chronic musculoskeletal pain (2,7,18). Futhermore, pooled estimate of the persistence can be as high as 50% (2).

In a recent meta analysis the rate of internet addiction was 9.7% among healtcare professionals, which is far lower than it would be expected by the IA rate of medical students, which can be as high as 30% (1,10). In our study the rate of IA was 3.9%, which is significantly lower comparing to the above mentioned findings and futhermore, no IA could be found among doctors, which underlies the possible protective effect of growing age (and workload) or late-onset internet use (21).

Problematic internet use was more common among males, younger people (<25 years), singles and childless couples similar to previous results (16,20,22,23). These were independent predictors of problematic internet use. We have also found different patterns of internet use as predictors of addiction such as chatting or watching movies and significant association of the duration of being online and problematic internet use as described before (16,20,22,23). Surfing on the internet > 5 hours daily was significant predictor of addiction.

IA was more prevalent in medical clerks and among healthcare associated workers, which was not published before. In contrast to medical management of patients, they are involved in electronic health record use, which was recently shown as a contributor of lower satisfaction and higher frustration possibly leading to addictive behaviours such as problematic internet use (24). Secondly, their work is usually computer (internet)-based, and they can easily be online during working hours. The above mentioned parameters were significant predictors of IA in a multivariate analysis also.

IA was also more prevalent among those working in chronic care. We have found no explanation to this phenomena as we found no studies focusing on the association of internet

addiction and workflow among healthcare professionals. Possibly differences in working conditions (workload, daily working hours, number of seen patients and night duties, sleep irregularity) can explain this finding (25).

Based on a recent meta-analysis each additional 1 h/d of internet use was associated with 8% increased odds of overweight and obesity, which can probably lead to metabolic syndrome, diabetes and cardiovascular morbidity (26). IA was a significant predictor of diabetes in this study and our paper is the first showing IA as a possible risk factor of diabetes.

IA was also associated with illicit drug intake both in uni- and multivariate analysis. The pathophysiology is not well-understood, an underlying psychopathology (history of addiction) may precipitate internet addiction or IA may lead to co-addictions, and finally they may enhance each other (17,19,27,28).

Recent studies showed possible association of burnout with physical, psychological and occupational consequences such as cardiovascular disorders, diabetes, depression and addictive behaviour (10-12). There are limited data about the association of burnout and problematic internet use as a behavioural addiction.

Taking the subcategories of burnout into account, emotional exhaustion can result in higher anxiety levels, and reduced communications skills with subsequent social isolation and can be associated with IA as well as depersonalization which results in weaker communication or social skills based on a very recent study (29-32). However, the causality is not entirely clarified and only one study focused on the association of burnout and IA showing positive correlations among healthcare professionals (29-32).

Although vast majority of the included workers suffered from mild, and 5% from severe burnout we found no association with IA. This should be interpreted with caution as only half of our population worked in acute patient care and the number of doctors were pretty low (~10%). The possible association merits further investigation.

In summary, this is the first study from Hungary showing the prevalence and risk factors of internet addiction in a single hospital. A small, but significant proportion of our healthcare workers suffered from IA, which was associated with substance abuse and diabetes in multivariate analysis. Our study also draws attention to the risk factors of IA such as younger age, family status, working type and working hours internet use.

Our study has some limitations. The study sample was limited and represented individuals working at a single hospital in Hungary. As it was a questionnaire based survey, physical examination was not carried out and we had no detailed information about the medical history of the study population. And finally, follow-up were not carried out.

5. ASSOCIATION OF INTERNET ADDICTION WITH INSOMNIA, DEPRESSION, AND QUALITY OF LIFE

5.1. Introduction

We have previously examined the incidence and risk factors of Internet addiction among health care workers at Bajai Szent Rókus Kórház, as described in detail above. The aim of our present study is to investigate the relationship between internet addiction, depression, sleep disturbance, and quality of life using a questionnaire survey.

5.2. Methods

This study was conducted between January and August 2020 in Bajai Szent Rókus Kórház, Baja, Hungary. The study was approved by the Ethical Committee of Szent Rókus Hospital, Baja, Hungary.

Inclusion criteria for the participants were working with human services, being between 18 and 65 years of age and being employed at the time of the study regardless of the type of employment (public servant, sub-contractor, etc.).

Exclusion criteria were being under 18 or over 65 years of age, taking a leave of absence or refusal to participate in the study.

Demographic criteria included age, gender, marital status, number of children, type of work, years spent with work, work schedule, legal relation, secondary employment.

Included risk factors and diseases were smoking, alcohol and illicit drug intake, diabetes, hypertension, ischemic heart disease, musculoskeletal pain, history of malignancy and depression.

Internet addiction was detected with the Problematic Internet Use Questionnaire, details can be seen under Chapter 4.2.

The abbreviated Beck Depression Questionnaire was used to detect mood disorder, which examines the severity of depression using 9 questions. It contains the following questions: social withdrawal, indecision, sleep disturbance, fatigue, excessive worry about physical symptoms, incapacity for work, pessimism, dissatisfaction, lack of joy, self-blame. Scoring is done from 1 point to 4 points (34,35).

Sleep disturbance was detected with the Athens Insomnia Scale (AIS) (36,37). It contains eight questions, five assess the symptoms at night (difficulty falling asleep and falling asleep, waking up early) and three ask about ist daily consequences. The higher the score, the

worse the sleep quality (maximum 24 points possible). Scoring 10 points or above indicates clinically significant insomnia.

Quality of life was measured using a self-administered questionnaire suitable for the general measurement of health-related quality of life (EQ-5D) (38). The questionnaire measures 5 dimensions (mobility, self-sufficiency, normal daily activities, pain / malaise, and anxiety / depression), each of which is accompanied by a series of statements corresponding to a 3-point scale. By combining the individual values of the 5 dimensions, we can condense the overall health status into an index. The questionnaire was It is complemented by a EuroQol scale, also known as a VAS (Visual Analog Scale), which is 100 degrees and is most reminiscent of a thermometer. Respondents should indicate on this scale what they consider their health to be. A score of 0 on the scale represents the worst conceivable condition, while a 100 reflects the best conceivable state of health (39).

Statistical analysis: Data were evaluated as means ± SD (standard deviation) by Student's t-test, the chi-square test and the Pearson's Rank-Order Correlation. Logistic regression analysis was used to determine the significance of the different parameters as independent risk factors of IA. The analysis was performed with appropriate adjustments for differences in risk factors and medical conditions. For all odds ratios, an exact CI of 95% was constructed in our study. Data analysis was performed using SPSS (version 22.0, IBM, New York, NY, USA).

5.3. Results

According to the score points of the Problematic Internet Use Questionnaire, 3.9% of workers suffered from internet addiction (19/485). The relationship between internet dependence and demographics and the risk factors / diseases examined has already been described in Section 4.3. chapter.

Based on the results of the abbreviated Beck Depression Questionnaire, only 33.9% of workers do not suffer from mood disorders (164/485), the majority (64.1%, 298/485) have mild, and 2% have moderate (23/485) depression, severe depression could not be detected. The incidence of mild depression was significantly higher among internet addicts (78.9 vs. 60.7%, p <0.001) (Table 6).

The vast majority of the study participants (76.3%) had mild sleep disturbance (insomnia), while severe sleep disturbance detected in 23.1% (112/485). Interestingly, only 0.6% (3/485) reported normal sleep quality based on the results of the Athens Insomnia

questionnaire. The development of severe sleep disturbance was significantly more common among internet addicts (42.1 vs 22.3%, p <0.05) (Table 6).

	Not addicted to internet (n= 466)	Addicted to internet (n= 19)
Depression		
absent	160 (34.3%)	4 (21%)
mild	**283 (60.7%)**	**15 (78.9%)***
moderate	23 (4.9%)	0 (0.0%)
severe	0 (0.0%)	0 (0.0%)
Insomnia		
absent	3 (0.6%)	0 (0.0%)
mild	358 (76.8%)	12 (57.9%)
severe	**104 (22.3%)**	**8 (42.1%)***
Quality of life (points)	**82.6 ± 19.04**	**76.7 ± 23.51***
mobility	1.32	1.42
selfcare	**1.03**	**1.38***
daily activities	1.15	1.42
pain	**1.44**	**1.79***
anxiety/depression	1.25	1.47

Table 6. Association of internet addiction, depression, insomnia and quality of life (*p<0,05)

Internet addiction was associated with a significantly lower quality of life based on the results of the EQ-5D questionnaire (82.6 ± 19.04 vs. 76.7 ± 23.51 points, p <0.05). In a subgroup analysis, there was a difference in self-care and pain subgroups, Internet dependence was associated with lower levels of self-sufficiency, and pain was more common (Table 6).

In a multivariate analysis (including demographics, risk factors, and disease listed above), sleep disturbance (OR: 1.137, p = 0.022) and depression (OR: 3.949, p <0.001) were found to be independent risk factors for internet addiction. We could not show a similar correlation in terms of quality of life.

5.4. Discussion

We have previously investigated the risk factors and prevalence of internet addiction among the staff ofBajai Szent Rókus Kórház. About 4% of workers are internet addicted, which is below the previosly described 10%. Based on our previous study, age (<25 years), marital status (unrelated or childless workers), Internet use for more than 5 hours per day, employment status and type of work (other health professionals) <5 years, and drug use and diabetes has been shown to be an independent risk factor for abnormal internet use.

In our present study, depression and sleep disturbance were also strongly associated with Internet addiction. The relationship between these issues is not fully clarified. It is possible that the symptoms existed before the use of the Internet, and the mood or sleep disturbance led to the abnormal use of the Internet, possibly exacerbated by the addiction or triggered the psychiatric symptoms (27,28,40). In our previous study, previous history of mood disorders did not show a correlation with the phenomenon, so the triggering role of internet addiction in the development of mood and sleep disorders may arise based on our findings. Prevention and treatment of depression are of paramount importance, with the World Health Organization (WHO) stated that by 2030, depression will be the leading disease due to constant performance pressure and overwork, and the resulting suicide will be one of the leading causes of death (41).

According to our study, internet addiction is associated with a poorer quality of life, which is mainly manifested in self-sufficiency difficulties and more frequent development of pain. Prolonged internet use can lead to a sedentary lifestyle, compulsive posture, which plays a role in the development of chronic musculoskeletal pain, which is one of the main reasons for dropping out of work. In addition, each hour spent online can increase the risk of becoming overweight by 8%, and in our previous work internet addiction showed a strong association with diabetes. And the factors listed above (psychic + somatic) can clearly lead to self-sufficiency difficulties. However, quality of life did not prove to be a factor closely related to abnormal internet use in a multivariate analysis, controversary to previous papers (42,43).

In summary, our study draws attention to the incidence and mental consequences of internet addiction in a single hospital. It is important to keep in mind and recognize this phenomenon, as in the age of digitalisation medicine will also face new challenges.

Finally, it should be mentioned that our study also has limitations, which are discussed in Chapter 4.4.

6. SUMMARY OF NEW RESULTS

In summary, this is the first study from Hungary showing the prevalence and risk factors of internet addiction in a single hospital. A small but significant proportion of our healthcare workers suffered from IA, which was associated with substance abuse and diabetes as well as with depression and insomnia in a multivariate analysis. Our study also draws attention to the risk factors of IA such as younger age, family status, working type and working hours internet use.

7. ACKNOWLEDGEMENT

8. PUBLICATIONS

Related to the thesis:

1. Toth G, Kapus K, Hesszenberger D, Pohl M, Kosa G, Kiss J, Pusch G, Fejes E, Tibold A, Feher G. Internet Addiction and Burnout in A Single Hospital: Is There Any Association? Int J Environ Res Public Health. 2021;18(2):615. IF: 2.849

2. Toth G, Tibold A, Fejes E, Kapus K. Az internetfüggőség, alvászavar, depresszió és életminőség összefüggésének vizsgálata a Bajai Szent Rókus Kórház dolgozóinak körében. Interdiszciplináris Magyar Egészségügy (in press)

Other publications:

1. Tóth G, Kapus K, Hesszenberger D, Pohl M, Kósa G, Kiss J, Pusch G, Fejes É, Tibold A, Feher G. Prevalence and Risk Factors of Internet Addiction among Hungarian High School Teachers. Life. 2021; 11(3):194. IF: 2.991

2. Mák K, Kapus K, Tóth G, Hesszenberger D, Pohl M, Pusch G, Fejes É, Fehér G, Tibold A. Neuropathic Low Back Pain and Burnout among Hungarian Workers. Int J Environ Res Public Health. 2021;18(5):2693. IF: 2.849

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