

**COMPLEX STUDY OF TWO FACTORS OF
DISABILITY TO WORK: HEADACHES AND
BURNOUT OF HEALTHCARE WORKERS**

Doctoral (Ph.D.) thesis

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1. List of abbreviations

BDI	–	Beck Depression Inventory
BDZ	–	Benzodiazepine
COPSOQ	–	Copenhagen Psychosocial Questionnaire
CT	–	Computer Tomography
DAS	–	Dysfunctional Attitudes Scale
IHS	–	International Headache Society
MBI	–	Maslach Burnout Inventory
MRI	–	Magnetic Resonance Imaging
NSAID	–	Nonsteroidal Anti- Inflammatory Drug
SD	-	Standard Deviation
SDS	–	Support Dimension Scale
SSRI	–	Selective Serotonin Reuptake Inhibitors

2. Introduction

Nowadays, it has become a basic condition for the productivity of the nation economy is the adequate human resources. Human resource management is a priority for economic operators, so preserving, maintaining and improving the ability to work is not only an individual but also a social interest. Loss of ability to work has significant economic and social consequences. Preserving the health of employees, promoting the creation of a healthy working conditions, preventing health damage, and searching for risk factors are the primary tasks of occupational healthcare. This area also has an important role to play in maintaining working capacity, maintaining physical and mental health and strengthening a preventive, proactive approach [1]. Decreased ability to work leads to a decrease in the performance of the economy, along with avoidable hospital admissions, absence from work, and an increase in the number of sick days [2].

The objective of the our work team's research is to examine two factors that adversely affect work ability: headaches and burnout of healthcare workers. Despite the fact that both headaches and burnout in the helping professions are a common phenomenon and their effects are significant at the individual, national and social levels, so far relatively a few domestic research has been conducted focusing on this topic.

Burnout is a common phenomenon among workers in the modern age, which mainly affects those employed in the helping / service - paradoxically, perhaps most the healthcare workers - profession [3, 4]. Due to its frequency, it is also called the epidemic of our time (in addition to diabetes) [5]. According to a global survey in 2020, one in five workers is affected by burnout, with the highest risk of more than 50% burnout affecting Los Angeles workers in the United States [6]. 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 [7, 8, 9]. Compared to the average 15-20% frequency of burnout in Hungary as well [10, 11] we can observe more unfavourable data among those workers in helping. 60-70% of teachers are exposed to constant stress based on domestic and international data, and up to a third of them may experience some degree of burnout [12,

13]. 44.2% of healthcare workers are affected by burnout [14], but according to some surveys, 50.6% of physicians have moderate and severe burnout syndrome [15].

Since the last third of the 20th century, the phenomenon of burnout in the service industries have been studied and defined as a syndrome. To this day there is no uniform definition to describe burnout and accurate definition of its symptoms. Burnout has been declared as a state of mental, physical and emotional exhaustion as a result of the effects of chronic stress, which associated with negative attitudes about the individual and work [7]. Based on another approach, the burnout is a mental condition that manifests itself in emotional, physical and mental exhaustion, the individual not only by work, but also in general is characterized by despair and hopelessness [9].

People, who are employed are in jobs that require emotional work and empathic skills – so are the healthcare workers - considered a vulnerable group for burnout due to the nature of their work, whereas it is essential to show empathy in the day-to-day work and it is necessary to establish an emotional relationship with regard to the feelings and health of the patients [3, 8, 16]. Constant pressure, a special situation of decision-making, inadequate infrastructure and growing number of patients and the fact that patients have to die in their daily work it is a major player in the health sector compared to the other sectors [17].

The burnout poses a challenge to healthcare workers in the 21th century, exacerbated by increased mental and physical strain, job performance, the weight of decision make during daily work and the high number of working hours [18, 19, 20]. Maintaining the health of the healthcare workers plays a key role, as the overwork of overburdened staff reduces their work capacity and ability to perform, as a result, the quality of the healthcare they provide also decreases [4, 21, 22]. Burnout also makes it difficult to treat health complaints from doctors and nurses, and thus also makes it more difficult to deal with health complaints of a significant proportion of the population. Burnout can also lead to a decrease in the professionalism of those who perform curative activities in the healthcare system, and in addition to a lack of professional commitment, it can also have an adverse effect on communication with colleagues and patients [14, 24, 25, 26, 27]. The syndrome has a negative effect on the treatment of patients and on the health of patients, causes disinterest, frustration and unmotivation in the staff, which also becomes an obstacle to professional development, as burned-out doctors are not interested in training, development, cooperation with patients [28]. In addition to a decrease in professional awareness, burnout can contribute to differences in healthcare, lead to a decrease in the quality of care, patient satisfaction and patient safety [14, 29]. Performance constraints, overwork, poor work organization, role

conflicts, inadequate working conditions, and persistent crisis situations in poor (sometimes aggressive) communication are also manifested in daily work [30, 31], and the quality of work is significantly degraded [27].

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 [32]. The burnout syndrome may be associated with not only the physical (for example cardiovascular, musculoskeletal disease, diabetes, etc), but also psychical (including anxiety, depression, etc) diseases and neuropathic pain [33, 34, 35, 36].

The aim of our study also in addition to complex questionnaire survey of possible risk factors behind the burnout of healthcare workers, the examination of headache, that have an adverse effect on individuals ability to work, health status and quality of life. Headache is a common problem with great effect both on individual and on the society [37]. Internationally the prevalence of tension- type headache is almost 78%, the prevalence of migraine is 12% (average 18% for female, 6% for male) [38]. It is it highly possible that 30–40% suffers from tension-type headache in the whole population [39], the rate of migraineurs is approximately 10% (migraine is alone ranked as third among people aged 15-49 years) [40]. About 90% of the population of Hungary suffered from headaches, 40-50% regularly struggle with this problem. It is estimated that 1,2 million people in Hungary suffer from migraine and approximately 21 million seizures occur each year [41].

In the United States absenteeism from migraine work accounts for 36 million working days yearly, the number of workdays worked with reduced efficiency is 70 million days [42]. In the European Union in 2005 the migraine was the most costly neurological diseases, approximately 27 billion Euro in a year [43]. Almost 3 million patients in Hungary suffer from headaches, which cost 440 million Euro [44], loss of working day due to migraine 1,4 million day yearly [45].

Internationally, one of the main causes of unhealthy years is headaches [40]. The headache also having a negative effect on the productivity of the national economy and causing reduced work capacity [2, 37, 46, 47, 48]. 14.9% of people with headaches in Hungary are disabled [48], their economic activity significantly behind that of a healthy worker and their employment rate is low (18%) [49]. Loss of work due to illness not only

has a negative effect on the performance of the economy, but is also associated with additional social costs, so it is important to maintain the ability to work, to preserve the physical and mental health of workers [50].

In the examination of patients with headache, in addition to a detailed medical history (start of complaints, frequency, duration, severity, nature, accompanying symptoms, localization, alarm signals, social and familial history, vascular risk factors, possible contraindications to drugs), physical examination, neurological examination, which in the vast majority of cases lead to a clear diagnosis. Imaging or hospital admission is not routinely required under the Hungarian professional protocol for the treatment of headaches [51]. Indications for imaging may include, but are not limited to, a rapid onset of headache, an altered headache attack, a focal mark during the study, progressive or recent persistent headache or if treatment does not lead to improvement [51, 52].

In the case of drug treatment protocols for headaches, a separate directive applies to the treatment of seizures as well as to preventive treatment. Analgesics (e.g. aspirin, paracetamol, diclofenac, etc.), antiemetics and combinations may be used as nonspecific drugs in the treatment of headache attacks. Among specific drugs, the administration of ergotamine and dihydroergotamine is recommended, triptans can be used as second-line therapy. Beta-blockers (e.g. propranolol, metoprolol, nadolol, etc.), antidepressants, Calcium channel blockers (flunarizine), antiepileptics (e.g. valproate), serotonin receptor antagonists as well as vitamins and trace elements are also used in prophylactic treatment. In migraine prophylaxis, the efficacy of selective serotonin reuptake inhibitors has not been demonstrated in a sufficient number of clinical trials, and nonsteroidal anti-inflammatory drugs and / or triptans are recommended [51]. National and EU directives recommend avoiding overuse of the drug, as it can lead to headaches [53].

Recent studies showed the increasing rate of speciality referrals and advanced imaging for simple headache which can result in unnecessary hospital admissions. Patients may have to take a long journey until getting to a specialist to receive appropriate treatment [37, 54]. As only several reports (and no studies from our country) are available with regard to primary care management of headache patients characteristics (including duration of symptoms, headache type, brain imaging, treatment and cardiovascular risk factors).

3. Objectives

Our research group examination the two factors of disability to work: headache and burnout.

The aim of complex study to analyze the burnout of healthcare workers, examination of correlations, dependent factors.

I. We wanted to determine the research of burnout:

- i) prevalence of burnout of healthcare workers,
- ii) sociodemographic risk factors (including gender, age, marital status, type of work, levels of care)
- iii) associations between burnout and depression and dysfunctional attitudes,
- iv) associations between effort- reward – imbalance and burnout,
- v) the effect of social support on the syndrome of burnout,
- vi) workplace and work determining risk factors (allowance, work schedule, secondary employment), consequences.

II. The examination of headache

The examination based on data of patient of a Specialized Headache Center established in 2014 in Szigetvar, accepting referrals from 25 general practitioners, general outpatient clinics and 3 primary hospitals overall covering more than 70 000 patients in South West Hungary. The objective of the working group was to analyze the characteristic of patients referred to the selected specialized headache clinic between 01/01/2014 and 01/01/2015 due to examination including:

- i) type of headache,
- ii) duration of symptoms, the prevalence of headache,
- iii) emergency admissions / observations,
- iv) cardiovascular risk factors,
- v) treatment strategies,
- vi) brain imaging.

4. The examination of burnout

4.1 Methods of burnout

This (paper- based, self- administrated) questionnaire based cross- sectional study was carried out between 01 April 2018 and March 2019 in Hungary among healthcare workers in a legal relationship in Healthcare Center Komló, EÜ-MED Ltd., University of Pecs and in the city of Kecskemét. The study was approved by the Ethical Committe of the University of Pecs (reference number: PTE/96773-2/2018).

The sampling was simple, not random sampling. Inclusion criteria were working with human services being employed at the time of the study apart from the type of employment (public servant, sub-contractor, etc.). Employees who were permanently absent at the time of the investigation were not included. A total of 473 questionnaires were distributed and 441 fully completed questionnaires were returned by the end of the investigation period. Incomplete questionnaires were not taken into account, so when examining each factor, the total number of sample items may not have included the questionnaires containing the incomplete data.

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

The structure of the questionnaire consisted of three main parts (104 questions in total): a total of 11 self-edited, close-ended questions (Part A) examining the above sociodemographic factors (Part A), structured, validated (typically Likert scales and close-ended questions).

The last part of the survey was aimed at assessing the health status of the target group, focusing on the symptoms observed during burnout with a total of 10 closed questions (mainly yes - no questions). In addition to general questions assessing health status, the questionnaire also included examining pain and estimating the extent of pain using the Pain Detect questionnaire. In the framework of the present research, no questions related to health status were evaluated or analyzed.

Burnout was measured with the widely used **Maslach Burnout Inventory (MBI)**, which is an introspective psychological (easy to fill) inventory consisting of 22 items pertaining to three dimensions of burnout: emotional exhaustion, depersonalization, and

personal accomplishment. The Maslach Burnout Inventory focuses on defining burnout syndrome in a workplace context [55, 56]. Responses were rated on a 7-point (0-6) Likert Scale by respondents. The total score of burnout can be determined by thirding the degree of burnout, and the total score of each burnout dimension can be determined by thirding the burnout dimensions: low (between 0–33%, total score: 0-44), moderate (between 34–66%, total score: 45-88) and severe (between 67–100%, total score: 89-132) burnout [57].

The abbreviated **Dysfunctional Attitude Scale (DAS-SF1)** is a validated version of the 17-item scale developed by Weismann et al. Total 9 items measures how characteristic the given phenomenon for the respondent, between the total agree and total disagree extremes. It is designed to identify and measure approval, need for love, performance, perfectionism, the need for omnipotence, external control and legitimate [58, 59].

Severity of depression was measured by the **Beck Depression Inventory (BDI)** which is a 9-question inventory. It is composed of following symptoms: withdrawal, indecision, sleep disturbance, fatigue, excessive anxiety about physical symptoms, incapacity of work, pessimism, dissatisfaction, lack of joy, self-blame. Each item is rated from 1 to 4, can be separated when evaluating the scale severe / moderate / mild depression and normal [60, 61].

The Effort-Reward-Imbalance Questionnaire the work-related stress questionnaire developed by Siegrist at al. consists of three main dimensions of work-related effort, rewards, and overcommitment [62, 63]. 15 questions analyze how typical the statements are for respondents on a four- and five-point Likert Scale, respectively. An important factor in the development and severity of burnout is whether the work effort made by the given employee and the reward, remuneration and recognition received for it are in line with each other's judgment [62]. If an employee perceives a discrepancy between the quantity and quality of the work the human performs and the financial and moral recognition the worker has received for it, it can lead to stress at work [64].

Social support is a positive benefit for the individual in the form of emotional reinforcement and help, so having a negative effect on stressors. Social support is closely related to burnout and helps to overcome the symptoms of burnout syndrome. [65]. Hungarian adaptation of of Caldwell et al.'s **Support Dimension Scale (SDS)** [50], the Copenhagen Psychosocial Questionnaire (COPSOQ II) examines workplace psychosocial risk factors along 28 scales and 7 dimensions [66, 67].

Statistical analysis

Statistical analysis were performed using IBM SPSS version 25.0. Statistical analysis data were evaluated as means, frequency, standard deviation and distribution ratios. The data were analyzed using descriptive statistics, linear regression analysis, correlation, analysis of variance and factor analysis. The examinations were performed with 95%-os confidence interval, $p < 0,05$ was considered statistically significant.

4.2 Results of burnout

4.2.1 Occurrence and severity of burnout

The study measured the three dimensions of burnout with the Maslach Burnout Inventory (MBI): emotional exhaustion, depersonalization, and personal accomplishment.

The results did not show a significant proportion severe of burnout, the symptom is moderate in the whole sample. The mean burnout score was 58,6 (SD= 16,3), 63 workers (14,2%) had mild, 356 had moderate (80,7%) and 22 workers (5,1%) had severe burnout. The emotional exhaustion of 441 healthcare workers had an average score 25,25 (SD=8,6), the personal accomplishment's average score was 11,03 (SD=4,9) and the depersonalisation average score was 23,48 (SD= 6,3). (Figure 1.)

21.2% of the respondents had low, 70.6% had moderate, and 8.2% had severe emotional exhaustion. 43,8% of the participant had low, 51,5% had moderate and 4,7% had severe depersonalisation. 11,6%- of responses had low, 84% had moderate, 4,4% had severe personal accomplishment. (Figure 1.)

Figure 1.

The three dimension of burnout of healthcare workers

mean burnout score	Emotional exhaustion 25,25	Depersonalisation 23,48	Personal accomplishment 11,03
Low	21,2% (0-17 total score)	43,8% (0-10 total score)	11,6% (0-15 total score)
Moderate	70,6% (18-36 total score)	51,5% (11-20 total score)	84% (16-32 total score)
Severe	8,2% (37-54 total score)	4,7% (21-30 total score)	4,4% (33-48 total score)

4.2.2 Sociodemographic risk factors of burnout

44,1% of participants are male, 55,9% of participants are female. In Hungary, there is a continuous increase in the mean age of healthcare workers, which is reflected in the study: the 48,5% of examined workers more than 46 years old, 7,3% of the workers was entrant. The workers were between 36-55 years of age (63,1%). 50,1% of the people were married, 31,2% of participant were single and 17,7% of workers lived in relationship. 15,2% of workers had no child. 2,1% of participants had primary education, 68,4% of workers had secondary education, 29,5% had a tertiary education.

36,1% of the examined workers has been working in acute care, 33,4% has been working in outpatient care, 6,8% in rehabilitation, 5,4% in chronic care, and 18,3% worked in the service staff. The research did not cover the examination of individual professions (due to the low level of representativeness). 76,7% of the respondents has been working as a nurse or assistant, 7,9% has been working as a doctor. 38,5% of healthcare workers has been working more than 20 years.

14,5% of respondent had a secondary employment. The largest proportion of doctors (48,6%) had a secondary employment. 4,8% of workers had second position had severe burnout, 5,11% of workers did not undertake second job had severe burnout. Based on the results of the study, the role of the secondary employment undertaken in burnout cannot be justified ($p > 0,05$, 95% confidence intervall).

The mild and severe **emotional exhaustion** occurred significantly more frequently the healthcare workers have been working between 11-30 years (87,1% vs mean years spent with work 77,2%, $p=0,014$), and nurses (89,9% vs mean type of work 78%, $p=0,025$) and the worker have been working in acute and chronic inpatient care (86,0%, 87,5% vs mean levels of care 81,3 %, $p= 0,033$). The rate of emotional exhaustion was higher among the workers between 46-55 years of age (87,5% vs mean age 79,2%, $p=0,001$). The mild and severe emotional exhaustion occurred significantly more frequently the workers had a tertiary education than workers had primary education (85,2% vs mean type of education 73,8%, $p < 0,05$). (Figure 2.)

Figure 2.

Mild and severe burnout in the study population

moderate/severe (%, N)	Emotional exhaustion	Depersona- lisation	Personal accomplishment
Study population (N)	348	248	390
Gender			
Female	81,4% (197/242)	46,9% (113/241)	88,1% (213/242)
Male	81,1% (155/191)	56,4% (106/188)	87,3% (167/191)
Age			
18-25 years	80,6% (26/31)	43,8% (14/32)	77,4% (24/31)
26-35 years	81,2% (39/48)	51,1% (25/47)	85,4% (41/48)
36-45 years	83,1% (118/142)	55,2% (81/143)	90,2%*(133/143)
46-55 years	87,5%* (112/128)	51,2% (66/129)	89,8%* (114/127)
56-62 years	71,4% (40/56)	48,1% (26/54)	86,2% (50/58)
more than 62 years	71,4% (15/21)	47,6% (10/21)	85,7% (18/21)
Marital status			
single	84,0% (63/75)	50,0% (37/74)	86,7% (65/75)
relationship	80,3% (61/76)	51,3% (39/76)	90,9% (70/77)
married	81,3% (174/221)	50,2% (111/221)	86,5% (191/221)
divorced	81,0% (51/63)	57,4%* (35/65)	88,9% (56/65)
Number of children			
have no child	80,0% (52/65)	44,6% (29/65)	84,6% (55/65)
1 child	84,5% (109/129)	55,8% (72/129)	91,5% (119/130)
2 children	80,0% (100/125)	51,6% (64/124)	86,4% (108/125)
3 or more children	81,4% (83/102)	49,0% (51/104)	86,6% (90/104)
Education			
primary education	55,6% (5/9)	37,5% (3/8)	66,7% (6/9)
secondary education	80,7% (243/301)	52,2% (157/301)	86,3% (260/301)
higher education	85,2%* (110/129)	50,0% (65/130)	92,1%* (118/128)

*p<0,05 in all cases

The mild and severe **depersonalisation** occurred significantly more frequently the workers has been working in acute care (60,5% vs mean level of care 47,0%, p=0,036) and nurses (56,6% vs mean type of work 50,8%, p=0,007). (Figure 3.) The marital status was significant determinant of depersonalisation: the divorced and widows (57,4% vs mean marital status 52,2%, p=0,020) had higher burnout. (Figure 2.)

Figure 3.

Mild and severe burnout in the study population (work related data)

moderate/severe (%, N)	Emotional exhaustion	Depersona- lisation	Personal accomplishment
Years spent with work			
1-12 months	69,4% (25/36)	39,5% (15/38)	85,3% (29/34)
1-5 years	71,2% (37/52)	48,1% (25/52)	83,0% (44/53)
6-10 years	81,1% (43/53)	55,8% (29/52)	90,7% (49/54)
11-20 years	86,75* (78/90)	51,7% (47/91)	94,5%* (86/91)
21-30 years	87,5%* (91/104)	56,7% (59/104)	82,1% (87/106)
31-40 years	84,6% (66/78)	51,3% (41/80)	88,3% (68/77)
more than 40 years	60,0% (9/15)	40,0% (6/15)	93,3%* (14/15)
Levels of care			
acute inpatient care	86,0%* (136/158)	60,5* (95/157)	89,3% (142/159)
chronic care	87,5%* (21/24)	33,3% (8/24)	91,7% (22/24)
rehabilitation	83,3% (25/30)	43,3% (13/30)	96,7% (29/30)
outpatient care	84,1% (122/145)	47,6% (70/147)	87,0% (128/147)
service staff	65,4% (51/78)	50,0% (40/80)	81,0% (64/79)
Type of work			
medical clerk	76,0% (19/25)	56,0% (14/25)	92,0% (23/25)
assistant	82,5% (94/114)	50,0% (59/118)	86,3% (101/117)
nurse	89,9%* (116/129)	56,6%* (77/136)	89,8% (122/136)
doctor	80,0% (28/35)	48,6% (17/35)	91,4% (32/35)
other healthcare worker	81,4% (48/59)	42,4% (25/59)	89,8% (53/59)
swabber	79,3% (23/29)	48,1% (13/27)	82,8% (24/29)
economical – technical workers	56,8% (21/37)	54,1% (20/37)	78,4% (29/37)
Secondary employment			
Yes	81,3% (301/370)	52,6% (195/371)	86,6% (321/371)
No	84,1% (53/63)	45,2% (28/62)	93,7% (59/63)

*p<0,05 in all cases

The mild and severe **personal accomplishment** occurred significantly more frequently the workers had tertiary education (92,1% vs mean level of education 81,7%, p=0,01), and healthcare workers were between 36-55 years aged (90,0% vs mean age 85,5% p=0,006). (Figure 2.) The mild and severe personal accomplishment occurred at a higher rate in the workers have been working for 11-20 years and more than 40 years in healthcare industry (94,5%, and 93,3% vs mean years spent with work 88,2%, p=0,012). (Figure 3.)

4.2.3 Burnout and depression

Psychological and physiological stress can lead not only to burnout but also to the development of depressive symptoms. Decreased performance, failure can be coupled with

a feeling of chronic overload [68, 69]. Based on Beck Depression Inventory 56,7% of participant healthcare workers had no depression, 37,0% suffered from mild and 5,6% had moderate, 0,7% had severe depression. The workers who had normal and mild burnout, had normal or mild depression. 6,3% of participant healthcare workers with mild burnout, 19% of people with severe burnout were moderate or severe depressed (19%).

Males had more than five times as many moderate and severe mood disorders as females (10,0% vs 1,7%, $p=0,000$). 3,1% of workers were between 18-25 years age, 9,5% of people more than 62 years age had moderate and severe depression (3,1% és 9,5% vs 5,9%, $p=0,000$) based on the results of Beck Depression Inventory. Mood disorder is also affected by marital status: 56,0% of married, 28,0% of single had moderate depression.

The healthcare workers has been working for 21-40 years had higher rate of moderate and severe depression (17,9% vs mean years spent with work 5,3%, $p=0,004$). There was no significant difference in the severity of depression in terms of age, marital status and education.

There was a positive relationship between severity of depression and burnout (Pearson correlation coefficient= 0,238, $p <0,001$). The dependent variable was the total score of the Maslach Burnout Inventory (based on Maslach Burnout Inventory) and independent variable was the total score of the abbreviated Beck Depression Inventory in the correlation model. The severity of depression affected the variance of burnout by 5.6%.

77.1% of those with severe emotional exhaustion and 66.7% of those with severe personal accomplishment are depressed, based on the results of Beck Depression Inventory. 9,7% of respondents feel prospects for the future on weekly, 48,6% of them had mild or severe depression.

4.2.4 Dysfunctional attitudes

There was a slight positive correlation between dysfunctional attitudes and burnout (Pearson correlation coefficient = 0,212, $p <0,001$). In the correlation model, the dependent variable was the total score of the Maslach Burnout Inventory (based on Maslach Burnout Inventory) and independent variables were the factors of the Dysfunctional Attitude Scale. The dysfunctional attitudes affected the variance of burnout by 4,5%.

The need for performance and love mostly affected the variance of burnout and than by external recognition and perfectionism. Based on the significance of the question measuring

the need for external control, it can be said that the severity of depression is not affected in the present linear model. (Figure 4.)

Figure 4.

Correlations between the severity of burnout and dysfunctional attitudes

Dysfunctional attitudes	r (correlation coefficient)	r² (coefficient of determination)	p
External control	0,093	0,009	0,059
External recognition	0,203	0,041	0,018
Need for love	0,204	0,042	0,000
Perfomance	0,224	0,050	0,000
Perfectionism	0,207	0,043	0,020
Total score of DAS			0,000

4.2.5 Coping strategies, social support

The research and increase of the social support have a positive effect on burnout [65, 70, 71, 72]. The social support of participating healthcare workers was good. On average, 65,7% of the respondents rated their relationship with their employees and managers as good or excellent. 2,3% of participant rated their private life as unhappy, in general or always, 70,3% felt happy and balanced in this area of their lives. 71,7% of people who had low burnout felt most happy.

54,5% of healthcare workers often feel overwhelmed due to time constraints. 75,7% of respondents believed that the work has required more and more effort in recent years. 54,8% of participants felt secure about the job, 41,0% have already thought about changing careers.

The vast majority of employees considered that there was no chance of promotion, but the fact did not bother less than half of the respondents. The unfavorable subjective assessment of allowance was also reflected in the survey: 75,2% of respondents was not satisfied with the income received for their efforts. The doctors considered it the most favourable: 48,6% of doctors satisfied with the payment, 15,6% of nurses pleased to their salaries. In correlation analysis, burnout was strongly correlated with the lack of adequate remuneration (Pearson correlation coefficient = 0,399, $p < 0.001$).

The proportion of participants in regular education was 75,9%. 72,9% of low burnout regularly educated themselves.

In order to reduce burnout and fatigue, 33,7% of the respondents live a conscious lifestyle, 19,9% relax, 12,0% improve their self-esteem, 16,4% use other methods (e.g. rest, sleep, hobby, sports, reading, traveling, etc.) try to counteract the feeling of exhaustion. The respondents 18,0% do nothing to reduce burnout.

In the univariate analysis of the whole sample, the severity of burnout was associated with the hopeless future ($p=0,023$), employee social support ($p=0,017$), continuing education and allowance ($p < 0,001$).

In the **multivariate analysis** the burnout was associated with levels of care (OR=1,018), age (OR=2,514), marital status (OR= 1,148), type of work (OR= 1,246) and social support (OR=1,189), allowance (OR=9,719) ($p < 0,05$ in all cases).

4.3 Discussion

Our survey examines the complex phenomenon of burnout among healthcare workers. Burnout of healthcare workers worsens the quality of care, complications are more common, the quality of care is deteriorating, which leading to patients dissatisfaction [73]. According to international and hungarian studies, burnout can affect up to about 40% of healthcare workers, however our study results a higher rate than this: the vast majority (85,8%) of the participants suffer from moderate or severe burnout [74, 75]. The rate of emotional exhaustion is particularly high, severe burnout can affect up to one tenth of the workers.

In connection with the research results in Hungary and abroad - however, higher than the average 40-50% described [15, 76] -, our examination showed among those working in the sector, the situation of those working in inpatient care, doctors and nureses, is the most unfavorable compared to the other jobs more than 88% suffer from moderate or severe burnout and 87,4% of workers in acute inpatient care have moderate burnout.

In terms of the number of years spent in healthcare, those who have chosen this profession for 11-20 years and more than 30 years have been more affected by severe burnout based on their results, but it is remarkable that more than 80% of career starters suffer from at least moderate burnout, so the phenomenon can already develop during studies and this also has a negative effect on subsequent work [73]. The detected ratio is about one and a half times what is described in the international studies [72, 77]. According to some research,

burnout mainly affects early-stage healthcare workers, as the practical experience, skills and competencies needed to work effectively are still lacking, and they are exposed to higher stress loads [78, 79, 80].

The marital status and age affect the severity of burnout [81, 82]: among divorced and widows have twice the rate of severe burnout as married, living in relationship and single. The relationship between the number of children and burnout has been confirmed by other research findings, while according to some surveys significantly higher rates of burnout (35,4%) can be observed among workers who have no child, until then, despite the positive role of family background and support, the results of the present research showed the highest burnout rate among those raising more than three children (87,1%) [15, 75]. Giving the vast majority of workers are female, in addition to their daily work, they also bear a burden of raising children and running a household, which may explain the ratios described above.

Negative work attitude develop as a result of chronic stress [83]. The vast majority of those who completed the questionnaire (56,7%) do not report depression. Our results compared to previous research results [21, 84] more favorable than the results of previous research, which confirmed depressive, anxiety symptoms among almost a third of the respondents. 77,1% of severe emotional exhaustion and 66,7% of severe personal accomplishment have depression and there was a significant association between severity of depression and burnout. An intensively studied issue in occupational health is the relationship between burnout and mood disorders. Our results confirmed a significant association between the severity of depression and burnout.

The study of burnout and dysfunctional attitudes in Hungary, so far little research has been done on the joint study of the phenomena. Our study also confirmed a strong association between burnout and dysfunctional attitudes. Dysfunctional attitudes can play an important role in the development of burnout since if an employee places too high expectations on her workplace and herself, it can easily lead to the development of a failure or a sense of failure, which can result in deteriorating self-esteem, anxiety, thus causing burnout. DAS measures those - not necessarily pathological - attitudes at work in this case, which tend to make a person unhappy, cause stress, certain behavior (mostly the need for performance and love, based on our study), the existence of which carries a higher risk of burnout, filtering this out and developing appropriate control strategies can be important in preventing burnout.

In addition to organization-focused intervention, strengthening social relationships plays - not only in private life but also in the case of contacts at work- an important role in

reducing the rate of burnout syndrome [85]. Social support seeks to reduce the rate of burnout and depression [72]. Healthcare workers were positive about the social network that played a supportive role in coping strategies, thus, the more favorable values observed in the case of mood disorders can even be attributed to the higher level of social support.

The study also revealed an unfavorable employee perception of allowance as a significant risk factor for burnout. 84,4% of the nurses surveyed were dissatisfied with their salary, which can also be traced back to inadequate material and moral esteem. This is in line with the results of the Hungarostudy 2006 survey, which proved that other healthcare workers are more satisfied than nurses [85].

Previous research has quantified a significantly higher rate of burnout among second-time job takers, than among those with one job, however, there was no significant difference among those surveyed in the univariate analysis: those working more than one workplace were 0,3% less affected by severe burnout [15, 72]. Compared to the results of other domestic surveys [82], the respondents of the working group's questionnaire take a second job (5.5%), which may explain the above more favorable data compared to other surveys. International surveys show a burnout rate of 36% for working 40 hours a week and more than 40% for working more than 40 hours a week [73].

Reducing burnout is possible in a number of ways, including: reducing workload, overtime, conflict management, reorganizing work schedules, strengthening social relationships, improving communication, relaxing, and preferring exercise and healthy lifestyle [86, 87]. Decreased work performance due to burnout, deteriorating communication and quality of care can also be managed with cognitive therapy, improved working conditions, clear goal and task setting and individual motivation [88]. The incidence of burnout is reduced by relaxation trainings, dispute resolution and support group trainings, such as the use of the Bálint group. The doctor-patient relationship group is based on a problem-oriented analytical discussion of conflict situations [89]. Complementary therapeutic measures: sports activities, physiotherapy, relaxation, time out are also beneficial. Recognition and continuous monitoring of early warning signs also play an important role in successfully combating this phenomenon [90]. Those who are constantly training themselves are affected by lower levels of burnout [91, 92, 93]. Participation in trainings and professional development opportunities have a positive effect on burnout syndrome. This statement was also confirmed by the results of the research, as more than two-thirds of those who participated in regular education were affected by low levels of

burnout. The work atmosphere and the lack of support at work proved to be a predictive factor of burnout based on the results of previous Hungarian studies [15].

Burnout is a nonacute phenomenon that develops over a long period of time, years, decades. This process can and must intervene to protect healthcare staff and patient care. Our study draws attention to the risk factors of burnout, the role of both the employee and the employer is important in recognizing this, adequate internal and external assessment of one's own condition and supportive behavior to seek help. We can contribute to the prevention and treatment of burnout in many ways, and recognition, advanced studies and the publication of professional knowledge also play an important role, in addition to psychological help and the strengthening of coping strategies.

5. The examination of headache

5.1. Methods of headache

202 patients were referred to the Hungarian Headache Society established Headache Center of Szigetvár service between 01/01/2014 and 01/01/2015 and date were retrospectively analyzed the baseline data of patients, duration of symptoms, headache type (due to International Headache Society's guidelines), previous disease, previous outpatient / hospital admissions, treatment strategies, brain imaging (including plain CT, contrast-enhanced CT and MRI), and cardiovascular risk profile factors (hypertension, dyslipidemia, ischemic heart disease, history of stroke, peripheral artery disease) smoking habit, diabetes mellitus. A concomitant medication history – prescribed by the general practitioners- was taken with the respect to use of non steroidal anti- inflammatory drugs, triptans, prophylactic treatment, benzodiazepines, selective serotonin reuptake inhibitors and opioids.

Statistical analysis

Statistical analysis were performed using IBM SPSS version 25.0. The toolkit of descriptive statistics was used to analyze the mean, frequency, standard deviation and distribution ratios. The data were evaluated as means \pm SD (standard deviation) by Student's

t-test and the chi square test. The examinations were performed with 95%-os confidence interval, $p < 0,05$ was considered statistically significant.

5.2 The examination of headache care

202 patients (100 males, 102 females, mean age $53,6 \pm 17,6$ years) were evaluated in our clinic, males are significantly older than females (mean age $57 \pm 18,1$ years vs. $50,14 \pm 16,11$ years, $p < 0,01$). Duration of symptoms were 9,3 years overall (11,6 years in females, 7,1 years in males, $p < 0,01$). 202 plain brain CT (94 for females, 108 for males), 60 contrast- enhanced CT (30 for males, 30 for females) és 128 MRI examinations (68 for females and 60 for males) were carried out. Patient had an average of 5,5 emergency observations / admissions (SD= 0,3).

5.2.1 Migraine

Migraine was diagnosed in 84 patients (mean age $46,1 \pm 14,7$ years) corresponding to the International Headache Society (IHS) criteria [106], 66 females (mean age $47,12 \pm 15,3$ years) and 18 males (mean age $42,22 \pm 11,3$ years). Mean age was not significantly different among the genders ($p=0,1$). 20 patients had migraine with aura (14 with visual aura, 4 with sensory and 2 with motoric aura) and 6 patients had vestibular migraine. Duration of symptoms were 13,8 years overall (14,2 years for females and 12,2 years for males, $p = 0,21$). (Figure 5.)

Figure 5.

Baseline data, brain imaging and emergency observations in the study population

	Patient number	Mean age (years)	Duration of symptoms (years)	Brain CT (number)	Contrast - enhanced brain CT (number)	Brain MRI (number)
Study population	202	$53,6 \pm 17,6$	9,3	202	60	128
	males	$57 \pm 18,1$	7,1	108	30	60
	females	$50,14 \pm 16,11^*$	11,6	94	30*	68
Migraine	84	$46,1 \pm 14,7$	13,8	68	32	66
	males	$42,22 \pm 11,3$	12,2	10	2	14
	females	$47,12 \pm 15,3$	14,2	58	30	52

Tension-type headache	76	59,66 ± 17,9	6,81	100	16	46
males	54	54,18±18,4	6,74	74	12	36
females	22	61,8 ±17,3*	7	26	4	10
Patient number	Mean age (years)	Duration of symptoms (years)	Brain CT (number)	Contrast - enhanced barin CT (number)	Brain MRI (number)	
Trigeminal – autonomic cephalgia	18	45,33 ± 12,3	6,16	14	14	12
males	8	35,4 ± 5,1*	7,3	6	4	5
females	10	57,7 ± 5,1	4,75	8	7	7
Secondary headaches	24	67 ± 11,82	2,62	18	0	4
mles	20	69 ± 10,68	2,4	14	0	3
females	4	61 ± 14*	4	4	0	1

*p<0,05 in all cases

Overall 68 plain brain CT (58 for females and 10 for males, $p = 0,28$), 32 contrast-enhanced CT (30 for females and 2 for males, $p < 0,05$) and 66 MRI examinations (52 for females and 14 for males, $p = 0,89$) were carried out. Patients had an average 5,2 emergency observatons/ admissions (5,9 for females and 2,4 for males, $p < 0,05$). As all patients had at least one brain imaging before referral, no further imaging modalities were required to arrange by us due to long standing pain and the absene of red flags.

Non steroidal anti- inflammatory drugs (NSAID) were prescribed for all patients and triptans were prescribed for 16%, 25% of patients received prophylactic treatment. Selective serotonin reuptake inhibitors (SSRIs) were prescribed for 6 patients (7,1%) and benzodiazepines (BDZs) for 8 patients (9,5%) by their gernal practitoners without any clinical evidence of depression or anxiety. Opioids for pain relief were prescribed for 16 patients (19%).

5.2.2 Tension- type headache

Patients with tension type headache (76 patients, mean age 59,66 ± 17,9 years) were significantly older than migraineurs, and had more vascular co- morbidites (22 females, mean age 61,8 ± 17,3 years and 54 males, mean age 54,18 ± 18,4 years, $p < 0,05$) (vascular co- morbidites: hypertension, stroke, diabetes, ischemic heart disease, etc.). Duration of symptoms were 6,81 years overall (7 years for females, 6,74 years for males, $p = 0,43$).

Overall 100 plain brain CT (26 for females, 74 for males, $p = 0,66$), 16 contrast-enhanced CT (4 for females, 12 for males, $p = 0,74$) and 46 MRI examinations (10 for females and 36 for males, $p = 0,76$) were carried out. Patients had an average of 5,6 emergency observations / admissions (4 for females and 6,3 for males, $p = 0,07$).

Non steroidal anti-inflammatory drugs were prescribed for all patients and triptans were not prescribed at all. 29% of patients (22/76) received treatment in accordance with the current European guidelines. SSRIs were prescribed for 10,5% of patients and BDZs for 22,4% of patients by their general practitioner without any clinical evidence of depression or anxiety. Opioids for pain relief were prescribed for 13,1% of patients.

5.2.3 Trigeminal – autonomic cephalgia

Trigeminal-autonomic cephalgia was diagnosed in 18 patients (mean age $45,33 \pm 12,3$ years) corresponding to the IHS criteria (8 females, mean age $57,7 \pm 5,1$ years and 10 males, mean age $35,4 \pm 5,1$ years, $p < 0,05$). Duration of symptoms were 6,16 years overall (4,75 years for females and 7,3 years for males).

Overall 14 plain brain CT (8 for females and 6 for males), 14 contrast – enhanced CT (7 for females and 7 for males) and 12 MRI examinations were carried out (7 for females and 5 for males) before referral. Patients had an average of 5,8 emergency observations/admissions (6 for females and 5,6 for males). Due to low patient number, gender differences were not calculated. Patients with trigeminal-autonomic cephalgia had no significant cardiovascular risk factors apart from smoking (5%). Despite of previous brain imaging, to attach to the guidelines and exclude other etiology than primary headache, several MRI scans were arranged by us further on as they had only a plain CT before referral.

Triptans, indomethacin and steroids were not prescribed at all. No patients received treatment in accordance with the current European guidelines. Opioids (27,8%) and BDZs (27,8%) for pain relief were prescribed for patients. NSAIDs were prescribed for all patients, and BDZs were used for 12/24 (50%) patients and opioids were prescribed for 8/24 (33%) patients.

5.3 Discussion

Headache is a common problem, burdening both the individual and the society. Based on our results about 20% of headache patients were properly managed in primary care which resulted in unnecessary emergency admissions and enormous number of brain imaging.

Surprisingly, despite of strong recommendation against routine scanning of headache, our patients were scanned usually more than once for an uncomplicated headache by their general practitioners or primary care physicians including neurologists. According to the guidelines of the Association of European Neurological Societies, a brain CT scan is not required in all cases and especially not as a first step in the treatment of headaches [51]. Based on our results, all 202 patients underwent CT examination before the outpatient appearance of the headache. A total of 100 brain CT scans were available for patients with tension-type headache (76 people, a total of 74 brain CT scans for 54 male and a total of 26 brain CT scans for 22 female), although professional guidelines only recommend to repeat and extend CT scans in professionally justified cases [51]. The diagnostic yield of plain CT and contrast-enhanced CT scans (apart from emergency situations such as probable subarachnoidal hemorrhage or brain injury) is very limited in the diagnostic work-up of headache [94, 95]. Furthermore, ionizing radiation can cause damage to deoxyribonucleic acid (DNA), increasing the risk of malignancies, especially in the case of recurrent scannings or dose exceedings [96, 97, 98, 99]. About 4000 future cancers can be related to head scannings based on the US database and probably 2 percent of future new cancers per year will be caused by radiation from unnecessary CT scannings [99, 100, 101]. In general, about one-third of all CT scans (in 2006, 19 million of the 70 million CT scans per year were CT scans) can be unnecessary and a constant increase of neuroimaging ordered during outpatient headache visits can be detected based on healthcare database in the US [99, 100, 101, 102, 103, 104, 105]. In Europe, too, the rate of exposure to radiation due to a request for a test that violates the guidelines is high, and medically unjustified procedures account for one-fifth of all CT scans on our continent [106].

Apart from NSAIDs, triptanes are the first line treatment of acute migraine, and they seem to be effective in tension-type headache [107, 108]. However, these agent were prescribed for 10 percent of migraineurs and were not used in tension-type or trigeminal-autonomics cephalalgias in our region. Despite all guidelines recommend against opioids as first-line treatment for acute migraine and other primary headaches, they were prescribed for about 20% of our patients (higher than the 15,8% opioid prescribing rate published previous

studies [109]). However, opioids may be considered as adjunctive therapy for short-term relief in therapy-resistant cases, but their long term use can be associated with severe side effects, increased tolerancy and dependency [101, 110]. Futhermore, the combination of different analgesics and opioids can precipitate the development of medication-overuse headache [110]. An average of 14,9% of patients enrolled in the survey used BDZs during headache medication, albeit analgesic effects of classical BDZs have occasionally been reported, they are not recommended for migraine (and any pain) treatment [102, 111]. Long-term intake can be associated with a significant increase of migraine occurrence [112]. SSRIs were also used for pain relief among studied patients (7,1% in migraine), but the SSRI's efficacy in any primary headache in not supported by robust evidence [107].

Vast majority of our primary headache patients fulfilled the criteria of chronic headache, but less than one-third of them received proper prophylactic or maintenance therapy in accordance with the current European and Hungarian recommendations [52]. Chronic pain (and headache) usually have neuropsychiatric complications including mood disorders and insomnia which are usually treated with BDZs and SSRIs [53].

We have also detected the relatively high rate of cardiovascular risk factors of patients with migraine and tension-type headache (especially the rate of smoking, diabetes and hypertension).

This is in concordance with recent studies, the diagnosis and management of migraine (and other primary headache syndromes - especially chronic forms) are still a challenge for primary care physicians [52]. The explanation of the overuse of brain imaging and the undertreatment of headache in the primary care can be multifactorial [113]. The excessive (all examined patients) imaging diagnostic tests compared to professional guidelines may also be due the pression of urgent head imaging from the public, and physicians indicate a native brain CT scan as a definitive imaging procedure in addition to the primary examination to establish the diagnosis. A comprehensive, individual approach is needed to adopt effective and safe medication, but based on our results, few physicians apply the recommendations of neurological professional societies and ministries. Furthermore a significant proportion of junior doctors did not receive formal teaching on how to take a complete headache history and the vast majority of them have not attended at all an outpatient headache clinic [114].

6. Summary

The aim of our study was to perform a complex analysis of two factors that cause disability: headache and burnout. Syndromes that also adversely affect individual quality of life and the performance of the national economy affect a significant proportion of the population, they can also be associated with the workplace stress. It should be mentioned that the costs caused by work-related stress in Hungary are estimated at about 440 billion Forints a year, which can reach € 136 billion (41,2 trillion HUF) in the European Union [115]. Maintaining work capacity, proactivity, intervention and prevention are great important in occupational health, which plays a role not only in treating headaches but also in reducing burnout. The common objective is to maintain the employee's ability to work, or to restore the reduced ability to work in both areas.

The research is among the first to examine the complex phenomenon of burnout among healthcare workers by type of work. In view of the Hungarian surveys so far, no complex analysis has been made in this area, which examines not only burnout, but also depression, dysfunctional attitudes, social support and coping strategies. The results of the survey also confirm that burnout syndrome also has adverse effects on healthcare and further complicates the current sectoral situation of human resources, as our results show that a significant part of the study population suffers from moderate burnout and a small but significant proportion from severe burnout. While previous studies [14, 15, 74, 78] quantified an average burnout rate of 40-50% in the sector, the work team's study found data above 80% among physicians and nurses. The high level of involvement of career starters was also confirmed by our study. Compared to the average 10-20% burnout rate detected in the national economy [10, 11], the high burnout exposure among the surveyed workers also draws attention to the sectoral significance of burnout.

Several studies of occupational health have focused on the relationship between burnout and depression, but the research of the working group is new in terms of dysfunctional attitudes and burnout. Based on our results, a significant relationship was found between burnout and mood disorders, as well as dysfunctional attitudes. Less than 10% of respondents were affected by moderate to severe mood disorders, however, more than a third of those affected by burnout had depressive symptoms.

Burnout has both controllable (type of work, social support, allowance) and uncontrollable factors (age, gender, marital status), which must be taken into account in any preventive or intervention. The frequency of the syndrome and the significance of its effects in order to maintain the ability to work, the treatment of the syndrome, the reduction of its extent and the strengthening of coping strategies are also a priority task at the economic and social level. We need to emphasize the importance of creating the appropriate work atmosphere, which clearly has a preventive role.

Our study highlights the burdens of headache in our region. The economic cost of migraine to the national economy in the European Union can reach 27 billion euros (6,69 trillion Forints). According to some estimates, the economic cost of sick days in Hungary is approximately 149 billion HUF [116]. This is the first report from Hungary with regard to the primary management of headache based on the data of a specialty clinic (headache type, brain imaging, treatment strategies and cardiovascular risk factors). Overall the management of this condition is still a challenge for primary care physicians leading to medical overuse (and thus to an increase in costs). Vast majority of our patients should not be referred to our Headache Clinic as they had uncomplicated headache or other underlying conditions than pain. Our study aims to draw attention to the inadequate treatment and therapy of patients with headaches in Hungary (compared to international recommendations) and its importance, as headaches are a problem affecting a wide range of society. Ionizing radiation exposure caused by an unreasonably high number of imaging tests indicated during inadequate treatment may result in further deterioration of health. Our findings of our study emphasize the importance of using non-compliant drug therapy, as it can also lead to headaches due to overdose and in addition, the higher use of opioids, benzodiazepines and selective serotonin reuptake inhibitors has an adverse effect on health, thereby also contributing to a reduction in working capacity [101, 110, 112, 117].

The questionnaire survey of the working group also included the recording of data on the health status of the workers involved. Another main research objective was to investigate the relationship between burnout, depression, dysfunctional attitudes and health status. Future research directions include the analysis of the effects of health status, headaches and neuropathic pains on working capacity and the above syndromes. As the syndrome is a common phenomenon in today's society, an additional goal is to research an effective burnout prevention strategy.

The Limitation of examination

Our study of burnout has some limitations, as it was a self-administrated questionnaire based survey, it was not representative of healthcare workers in Hungary. The results are limited, they cannot be generalized due to the heterogeneity of the sample, as they affected different jobs, workplaces and employment areas.

There was some limitation in our examination of headache. No physical examinations were not carried out to determine the health status. This study was conducted in a single headache center, did not cover more of patients of another headache centers and a referral bias was inherently present in our study, does not reflect normal age and gender distribution of headache syndroms, and patients with long standing and disabling headaches were referred as it was conducted at a specialty care center. We did not evaluate the burden of headache such as disability and impact of headache by using an instrument.

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List of publications

Artical related to the thesis

1. Fejes E, Feher G, Gurdan Z, Gombos K, Koltai K, Pusch G, Tibold A. Characteristics of Patients Referred To A Specialized Headache Clinic. *Scientific Reports* 10. 2020; 1146. <https://doi.org/10.1038/s41598-020-58234-w>
2. Fejes E, Mák K, Pohl M, Bank Gy, Fehér G, Tibold A. Kiegész vizsgálata egészségügyi dolgozók között. *Ideggyógyászati Szemle*. 2021; 74 (5-6): 000-000. <https://doi.org/10.18071/isz.74.0000> |

Oral and poster presentations related to the thesis

- International Conference Work and health in the XXI. century: Center of Excellence University of Pécs Faculty of Health Science: Relationship of burnout and health status of healthcare workers (Pécs, 23/02/2018).

Other papers

- 1) Mák K, Fejes É, Pohl M, Kolonics G, Tóth G, Zádori I, Nemeskéri Zs, Hesszenberger D, Fehér G, Tibold A. Kiegésző előfordulása a szociális munkások körében. *Orvosi Hetilap*. 2020; 161 (44): 1884-1890. <https://doi.org/10.1556/650.2020.31796>
- 2) Bank Gy, Kapus K, Mészáros J, Mák K, Pohl M, Pusch G, Fejes E, Tibold A, Fehér G. Framingham Risk Stratification of Middle-Aged Migraineurs. *Behavioural Neurology*. 2020; 7351214:5. <https://doi.org/10.1155/2020/7351214>
- 3) Tóth G, Kapus K, Hesszenberger D, Pohl M, Kósa G, Kiss J, Pusch G, Fejes E, Tibold A, Fehér G. Internet Addiction and Burnout in A Single Hospital: Is There Any Association? *Int. J. Environ. Res. Public Health*. 2021; 18: 615. <https://doi.org/10.3390/ijerph18020615>
- 4) Tóth G, Kapus K, Hesszenberger D, Pohl M, Kósa G, Kiss J, Pusch G, Fejes É, Tibold A, Fehér G. Prevalence and risk factors of internet addiction among hungarian high school teachers. *Research Square*. 2020. <https://doi.org/10.21203/rs.3.rs-109349/v1>
- 5) Mák K, Kapus K, Tóth G, Hesszenberger D, Pohl M, Pusch G, Fejes É, Fehér G, Tibold A. Association of neuropathic low back pain and burnout in a large cohort of workers. *Int. J. Environ. Res. Public Health*. 2021; 18, 2693. <https://doi.org/10.3390/ijerph18052693>
- 6) Tóth G, Tibold A, Fejes É, Kapus K, Fehér G. Internetfüggőség, alvászavar, depresszió és életminőség összefüggésének vizsgálata a bajai kórház dolgozóiak körében. *IME* 2021
- 7) Kapus K, Tóth G, Mák K, Fejes É, Bank Gy, Hesszenberger D, Fehér G, Tibold A. Kiegésző vizsgálata a pedagógusok körében. *Lege Artis Medicine*. 2020.
- 8) Kapus K, Mák K, Tóth G, Hesszenberger D, Pohl M, Kiss J, Pusch G, Fejes É, Tibold A, Fehér G. Internet addiction and burnout among Hungarian adolescents. *Preventive Medicine*.
- 9) Kapus K, Mák K, Tóth G, Hesszenberger D, Pohl M, Kiss J, Pusch G, Fejes É, Tibold A, Fehér G. Internet addiction and its consequences in high school students. *International Journal of Environmental Research and Public Health*. 2021; 18:615. <https://doi.org/10.3390/ijerph18020615>.