

The Effect of Smartphone Use on Neck Pain in Housewives

Ev Hanımlarında Akıllı Telefon Kullanımının Boyun Ağrısına Etkisi

Feride YARAR ^{1*}, Seda BAYRAMOĞLU ², Hande ŞENOL ³,

¹ School of Physical Therapy and Rehabilitation, Pamukkale University, Denizli, Turkey

² Pamukkale University Institute of Health Sciences, Department of Physical Therapy and Rehabilitation, Denizli, Turkey

³ Pamukkale University, Faculty of Medicine, Department of Biostatistics, Denizli, Turkey

ABSTRACT

Objective: Neck pain is becoming an important health problem lately. One of the most important reasons for this is the increase in the use of smartphones with technological developments. The aim of our study is to examine the effect of smartphone use on neck pain in housewives.

Materials and Methods: A total of 169 housewives, aged 25 and 50 (38.22 ± 7.24 years) living in Denizli and having neck pain, were included in the study. Housewives participating in the study were asked to answer a questionnaire consisting of demographic data form, Smartphone Addiction Scale (SAS), Neck Disability Index (NDI), Neck Bournemouth Questionnaire (NBQ).

Results: It was found that 42% of the housewives have been using a smart phone for 6-10 years, and when the daily phone usage times were examined, it was determined that 53.3% of the housewives used a smart phone for 2-5 hours a day. While 96.4% of the participants stated that they experienced neck pain at least once in the last 12 months, 82.8% of them experienced neck pain after using a smartphone for a long time.

Conclusions: The long usage period of smart phones, which have become indispensable in recent years, and the high addiction to smart phones cause neck disability and the severity of neck disability in housewives. We think that the effect of smartphone use on neck pain should be examined with different evaluations with more comprehensive studies in terms of public health.

Keywords: Smartphone, addiction, neck pain

Alınış / Received: 04.03.2022 Kabul / Accepted: 03.08.2022 Online Yayınlanma / Published Online: 31.08.2022



Ö Z E T

Giriş: Boyun ağrısı, günümüzde önemli bir sağlık sorunu haline gelmektedir. Bunun en önemli nedenlerinden biri de teknolojik gelişmeler ile birlikte akıllı telefonların kullanımının artmasıdır. Çalışmamızın amacı ev hanımlarında akıllı telefon kullanımının boyun ağrısına olan etkisini incelemektir.

Materyal-Metot: Çalışmaya Denizli ilinde yaşayan 25-50 (38,22 ± 7,24 yıl) yaş aralığında ve boyun ağrısı olan toplam 169 ev hanımı dahil edildi. Çalışmaya katılan ev hanımlarından demografik veri formu, Akıllı Telefon Bağımlılık Ölçeği (ATÖ), Boyun Özürülük İndeksi (BÖİ), Bournemouth Boyun Anketi (BBA)'nden oluşan anket formunu cevaplamaları istendi.

Bulgular: Ev hanımlarının %42'sinin 6-10 yıldır akıllı telefon kullandığı, günlük telefon kullanım süreleri incelendiğinde ev hanımlarının %53,3'ünün günlük 2-5 saat akıllı telefon kullandığı tespit edildi. Katılımcıların %96,4'ü son 12 ayda en az 1 kez boyun ağrısı yaşadığını belirtirken, %82,8'inin uzun süre akıllı telefon kullanımı sonrası boyun ağrısı yaşadığı kaydedildi.

Sonuç: Son yıllarda vazgeçilmez hale gelen akıllı telefonların kullanım süresinin uzun olması, akıllı telefon bağımlılığının fazla olması ev hanımlarında boyun özüne ve boyun özü şiddetinin artmasına sebep olmaktadır. Toplum sağlığı açısından daha kapsamlı çalışmalar ile akıllı telefon kullanımının boyun ağrısı üzerindeki etkisinin farklı değerlendirmeler ile ele alınarak incelenmesi gerektiğini düşünmekteyiz.

Anahtar Kelimeler: Akıllı telefon, bağımlılık, boyun ağrısı



1. Introduction

Neck pain (NP) is defined as pain occurring in the region between the occipital region and the first thoracic vertebra, due to problems such as musculoskeletal problems, incorrect posture, and psychosocial influences and ranks fourth among the causes of disability [1]. Although the prevalence of neck pain varies in studies, many studies report a one year prevalence of 15-50% [2]. Neck pain is becoming an important health problem lately. There are many factors that cause neck pain. Depression, female gender, obesity, stress and history of neck injury are considered important risk factors for neck pain [3]. One of the major reasons for this is the increasing use of hand-held devices such as smartphones [4].

Smartphones are one of the most important items used for many purposes such as communication and information exchange, which have become necessary in daily life [5].

Lately, the use of smartphones is increasing quickly. According to the Ericsson Mobility Report published in June 2021, there are 6.06 million smartphone subscribers worldwide in 2020 [6]. It was determined that 86% of women over the age of 18 living in Kenya and Algeria use mobile phones [7]. According to the data published by the Turkish Statistical Institute (TURKSTAT) in 2021, 93.7% of the female population between the ages of 16 and 74 use mobile phones in our country. [8]. The most common musculoskeletal disease in smartphone users is neck pain [9]. As a result of neck flexion and forward head posture observed while looking at the phone screen, the cervical vertebrae, joints, and muscles are overloaded [10]. These long-term and repetitive positions cause pain, fatigue around the neck region [11]. Studies have reported that 51% of housewives experience neck pain, 3.3% of women use the phone more than men. There is a significant relationship between the female gender and neck pain. Lately, most housewives spend their free time using smartphones and have a high

prevalence of neck pain at any time in their lives [12,13]. We could not find any study in the literature on the effect of smartphone use on neck pain in housewives.

The aim of this study is to examine the effect of smartphone use on neck pain in housewives.

2. Material and Method

Study Design and Sample Size

This study was approved by Pamukkale University Faculty of Medicine, Non-Invasive Clinical Research Ethics Committee on 16.02.2021 with the approval number E-60116787-020-20742. Informed consent was obtained from the housewives who agreed to participate in the study, and information was given about the study based on the Declaration of Helsinki.

As a result of the power analysis made according to the reference study [14], it was calculated that 80% power could be obtained at the 95% confidence level when at least 169 people were included in the study.

Sampling and Participant

The study was carried out on an online platform between February and April 2021. The population of our study consists of housewives living in Denizli, between the ages of 25 and 50 (38.22 ± 7.24 years) and having neck pain. The inclusion criteria; being a housewife, being between the ages of 25 and 50, residing in Denizli, having neck pain while answering questions, using a smartphone for at least 2 years, and those who can understand the questions were included in the study. The exclusion criteria; housewives who had undergone neck region surgery, had a neurological disease, had a migraine attack, left the questionnaire unfinished or did not want to answer, and did not meet the inclusion criteria were excluded from the study.

Data Collection Tools

The questionnaire prepared with Google Forms was applied on the online platform. Housewives participating in the study were requested to answer a questionnaire consisting of demographic data form, Smartphone Addiction Scale (SAS), Neck Disability Index (NDI), Neck Bournemouth Questionnaire (NBQ).

Demographic Data Form: Housewives' age, height, weight, BMI, dominant hand, education level, marital status, exercise habit, how many years they have been using a smartphone, how many hours a day they have used a smartphone, the last 12 months, It is a form that questions whether there is neck pain in the last 1 week and at the time of the survey and whether there is neck pain when using the phone for a long time.

Smartphone Addiction Scale (SAS): SAS was developed by Kwon et al to measure the risk of smartphone addiction. This scale consists of 33 items with a 6-point Likert scoring system. The total score varies between 33-198 points. A high score indicates that smartphone addiction is high [15]. The Turkish validity and reliability of the scale were performed by Demirci et al [16].

Neck Disability Index (NDI): NDI, developed by Vernor and Mion, evaluates the effects of neck pain and its symptoms during activities of daily living. It consists of 10 sections: neck pain intensity, personal care, lifting, reading, headache, concentration, work, driving, sleep, and leisure activities. The total score ranges from 0 to 50 [17]. The higher the score, the higher the disability. The Turkish validity and reliability of the scale were performed by Telci et al in 2009 [18].

Neck Bournemouth Questionnaire (NBQ): NBQ is a questionnaire based on the biopsychosocial disease model developed by Bolton et al. It consists of 7 questions in total: pain intensity, disability in activities of daily living, disability in social activities, anxiety, depression, fear- avoidance behavior, and pain locus of control. A 10 cm numerical scale is used for each question. The total score ranges from 0 to 70 points. As the total score obtained from the questionnaire increases, the severity of disability increases [19]. The Turkish validity and reliability of the scale were performed by Telci et al in 2019 [20].

Statistical Analyses

All statistical analyses were performed using SPSS 25.0 [IBM SPSS Statistics 25 software (Armonk, NY: IBM Corp.)]. Continuous variables were defined by the mean \pm standard deviation, median (minimum – maximum values) and categorical variables were defined by number and percent. Binary Logistic Regression Analysis was used for determining which variables affects presence of neck pain. Statistical significance was determined as $p < 0.05$.

3. Results

One hundred seventy-six housewives agreed to participate in the study. After 7 housewives were excluded because they did not meet the age criteria, 169 housewife were included in the study. 33.1% of the participants are high school graduates and 31.4% are undergraduate graduates. Demographic characteristics of the participants were given in Table 1.

Most of housewives have been reported that they have been using a smartphone for 6-10 years (%42). When the daily phone usage times are examined, it has been determined that 53.3% of the housewives use a smartphone for 2-5 hours a day. SAS results were found to be 83.41 ± 22.99 points (Table 2). 96.4% of the participants have been reported that they had neck pain in the last 12 months, and 82.8% of them reported that they had neck pain after using a smartphone for a long time. NDI results were found to be 11.33 ± 6.9 points, NBQ results were found to be 27.01 ± 16.06 points (Table 2).

Table 1. Demographic characteristics of housewives

	X \pm SD	Median (Min-Max)
Age (year)	38.22 \pm 7.24	39 (25-50)
Weight (kg)	69.31 \pm 13.21	68 (43–118)
Height (cm)	162.35 \pm 6.29	162 (147–180)
BMI (kg/m²)	26.3 \pm 4.81	25.78 (17.4–43.34)
	n	%
Dominant hand		
Right	154	91.1
Left	15	8.9
Education		
Primary school	21	12.4
Secondary school	16	9.5
High school	56	33.1
Associate degree	23	13.6
Undergraduate	53	31.4
Marital Status		
Single	13	7.7
Married	147	87
Divorced	6	3.6
Widow	3	1.8
Physical exercises		
Always	11	6.5
Sometimes	78	46.2
No	80	47.3

X \pm SD: mean \pm standard deviation, Min-max: minimum -maximum, kg:kilogram cm: centimeter, kg/m²: kilogram/meter²

Table 2. SAS, NDI, NBQ results of housewives, smartphone usage time and presence of neck pain in housewives

	X ± SD	Median (Min-Max)
SAS	83.41±22.99	81 (35-148)
NDI	11.33±6.9	10 (1-34)
NBQ	27.01±16.06	24 (7-70)
	n	%
Smartphone usage time (years)		
2 - 5 years	31	18.3
6 - 10 years	71	42
11 - 15 years	48	28.4
16 - 20 years	14	8.3
More than 20 years	5	3
Daily smartphone usage time (hours)		
Less than 2 hours	41	24.3
2 - 5 hours	90	53.3
6 - 10 hours	35	20.7
More than 10 hours	3	1.8
Presence of neck pain in the last 12 months		
Yes	163	96.4
No	6	3.6
Presence of neck pain after prolonged smartphone use		
Yes	140	82.8
No	29	17.2

SAS: Smartphone Addiction Scale, NDI: Neck Disability Index, NBQ: Neck Bournemouth Questionnaire, X ± SD: mean ± standard deviation, Min-max: minimum –maximum

When the factors affecting the presence of neck pain in the last 1 week of the participants were examined, it was found that the duration of using a smartphone for 11-15 years compared to 2-5 years increased the risk of neck pain in the last 1 week. The presence of neck pain after long-term use of a smartphone and the increase in NDI and NBQ scores have increased the risk of neck pain. It was observed that the most effective risk factor on the presence of neck pain in the last 1 week was the increase in NDI and NBQ results (Table 3).

Table 3. Factors affecting presence of neck pain in the last one week in housewives

	B	S.E.	Wald	p	O.R.	95% CI for O.R.	
						Lower	Upper
Age	0.023	0.023	0.968	0.325	1.023	0.978	1.070
BMI	-0.004	0.034	0.013	0.908	0.996	0.931	1.066
Smartphone usage time							
6-10 years	-0.372	0.454	0.670	0.413	0.690	0.283	1.678
11-15 years	1.204	0.581	4.287	0.038*	3.333	1.066	10.419
16-20 years	-0.154	0.677	0.052	0.820	0.857	0.227	3.233
More than 20 years	-1.147	0.990	1.342	0.247	0.317	0.046	2.212
Daily smartphone usage time							
2-5 hours	-0.035	0.413	0.007	0.932	0.966	0.430	2.170
6-10 hours	-0.232	0.495	0.220	0.639	0.793	0.301	2.091
More than 10 hours	-1.576	1.272	1.534	0.215	0.207	0.017	2.503

Presence of neck pain after long-term smartphone use	1.056	0.417	6.406	0.011*	2.876	1.269	6.517
SAS	0.007	0.007	0.848	0.357	1.007	0.992	1.021
NDI	0.142	0.035	16.853	0.001*	1.153	1.077	1.234
NBQ	1.058	0.191	30.749	0.001*	2.879	1.981	4.184

p<0.05 statistically significant; wald: logistic regression analysis coefficient; S.E: Standard Error; O.R:Odds Ratio; CI: Confidence Interval, SAS: Smartphone Addiction Scale, NDI: Neck Disability Index,

When the factors affecting the presence of neck pain as a result of long-term use of a smartphone were examined, it was observed that the presence of neck pain, the increase in the results of SAS and NDI increased the risk of neck pain as a result of long-term use of a smartphone (Table 4).

Table 4. Factors affecting the presence of neck pain as a result of long-term phone use in housewives

	B	S.E.	Wald	p	O.R.	95% C.I.for O.R.	
						Lower	Upper
Age	0.011	0.028	0.146	0.702	1.011	0.957	1.068
BMI	0.022	0.043	0.263	0.608	1.023	0.939	1.114
Smartphone usage time							
6-10 years	0.269	0.561	0.231	0.631	1.309	0.436	3.928
11-15 years	0.519	0.630	0.678	0.410	1.680	0.489	5.777
16-20 years	-0.511	0.746	0.469	0.494	0.600	0.139	2.590
More than 20 years	-1.022	1.020	1.004	0.316	0.360	0.049	2.657
Daily smartphone usage time							
2-5 hours	-0.232	0.521	0.199	0.656	0.793	0.286	2.200
6-10 hours	-0.188	0.630	0.089	0.765	0.829	0.241	2.846
More than 10 hours	-1.070	1.302	0.676	0.411	0.343	0.027	4.399
Presence of neck pain in the last 1 week	1.056	0.417	6.406	0.011*	2.876	1.269	6.517
SAS	0.029	0.010	8.281	0.004*	1.030	1.009	1.051
NDI	0.076	0.037	4.344	0.037*	1.079	1.005	1.159
NBQ	0.341	0.182	3.499	0.061	1.407	0.984	2.012

P<0.05 statistically significant; wald: logistic regression analysis coefficient; S.E: Standard Error; O.R:Odds Ratio; C.I: Confidence Interval, SAS: Smartphone Addiction Scale, NDI: Neck Disability Index, NBQ: Neck Bournemouth Questionnaire

4. Discussion and Conclusion

In our study, in which we investigated the effect of smartphone use on neck pain in housewives, we found that 96.4% of housewives had neck pain in the last 12 months, and 82.8% had neck pain after long-term use of smartphones. When we examined the factors affecting the presence of neck pain last week, we are thinking neck pain after long-term use of a smartphone, increased NDI and NBQ results, and 11-15 years of use compared to less frequent smartphone use increased the risk of neck pain. When we examined the factors affecting the presence of neck pain as a result of long-term use of a smartphone, we found that the presence of neck pain in the last one week, the increase in the results of SAS and NDI results increased the risk of neck pain.

There are studies investigating the effect of smartphone addiction on neck pain and the relationship between them, but there are no studies on housewives [11,21,22]. Therefore, we aimed to examine

the effect of smartphone use on neck pain by including housewives in our study. Although the prevalence of neck pain, which has become an important health problem lately varies, an annual prevalence of 15-50% is reported [2]. One of the most important causes of neck pain is the increased use of hand-held devices such as smartphones [4]. According to 2019-2021 TURKSTAT data, the rate of using mobile phones among the female population aged 16 and 74 in our country has increased by 3.5 in two years [8]. Most the housewives, who spend most of their time at home, spend their free time using smartphones. In a study, it was reported that 3.3% of women use phones more than men [12].

In our study, it was found that 96.4% of housewives experienced neck pain in the last 12 months. Korpinen et al. reported that among the musculoskeletal system diseases, neck pain was most common in women and 65% of women experienced neck pain in the last 12 months. The reason for this high rate in our study was that our age range was 25-50 years. Korpinen et al. The age ranges of 18 and 30 were reported in his study [12]. Because studies have reported that the prevalence of neck pain increases with age [23]. Demirci et al. study of the validity and reliability of the SAS, the mean value of the SAS result for women was found to be 78.63 points [16]. Our study contains results consistent with the literature. In the study of Mustafaoğlu et al., 45.4% of the participants reported that they had neck pain in the last 1 week, and it was found that smartphone use for more than 9 years was significantly associated with the prevalence of neck pain [24]. Our results, neck pain was detected in the last week with a rate of 68.6%. Our results are compatible with the literature. We think that the risk of neck pain increases due to longer years of use of the phone.

Our study highlighted, we found that the daily smartphone usage time of housewives doesn't affect the risk of neck pain in the last week. Xie et al., reported that there was no relationship between the total daily smartphone use time of the participants and musculoskeletal problems such as neck pain [25]. It was concluded that daily phone use doesn't affect neck pain and when the literature was reviewed, our results were in parallel with the literature. We think that daily phone use is not effective in the evaluation of neck pain in the last week. It was found that neck pain in housewives after long-term use of smartphones increases the risk of neck pain in the last week. However, we could not find any study on this subject in the literature. In our results, long-term smartphones use causes neck pain. When we look clinically, according to these results, it is seen that the level of neck disability of housewives also affects the severity of the disability. We think that housewives are negatively affected by the severity of the disability, in which many factors play a role. The increase in the result of NBQ may also be a clinical risk factor.

The strengths of our study are that there is no such study in the literature for housewives; to evaluate the addition of long-term phone use, neck disability, and disability severity parameters together. Although there are studies on long-term phone use in the literature, it is the first study in the literature to investigate the effect of smartphone use on neck pain, especially on housewives [25]. We think that the presence of neck pain in the last week, the increase in addiction, and the level of neck disability also affect this case. Kwon et al. found that smartphone addiction was high in their study [15]. Addiction is also increasing in our results. Also, we think that an increase in the severity of disability may constitute a clinical risk factor. Our limitations, not being able to reach more cases due to pandemic conditions, are limited to a single province. We think that more comprehensive studies should be done on this subject.

The long usage period of smart phones, which have become indispensable in recent years, and the high addiction to smart phones cause neck disability and the severity of neck disability in housewives. We think that the effect of smartphone use on neck pain should be examined with objective evaluations with more comprehensive studies in terms of public health.

Declaration of Ethical Code

In this study, we undertake that all the rules required to be followed within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" are complied with, and that none of the actions stated under the heading "Actions Against Scientific Research and Publication Ethics" are not carried out.

References

- [1]Bovim, G., Schrader, H., Sand, T. 1994. Neck pain in the general population. *Spine*, 19(12), 1307- 1309.
- [2]Cohen, SP. 2015. Epidemiology, diagnosis, and treatment of neck pain. *Mayo Clinic Proceedings*, 90(2), 284–299.
- [3]Ferrari, R., Russell, AS. 2003. Regional musculoskeletal conditions: Neck pain. *Best Practice & Research. Clinical Rheumatology*, 17(1), 57–70.
- [4]Cevik, S., Kaplan, A., Katar, S. 2020. Correlation of cervical spinal degeneration with rise in smartphone usage time in young adults. *Nigerian Journal of Clinical Practice*, 23(12), 1748–1752.
- [5]Haug, S., Castro, RP., Kwon, M. Filler, A., Kowatsch, T., Schaub, M, P. 2015. Smartphone use and smartphone addiction among young people in Switzerland. *Journal of Behavioral Addictions*, 4(4), 299–307.
- [6]Ericsson. Ericsson Mobility Report June 2021. 2021. <https://www.ericsson.com/49f7c7/assets/local/mobility-report/documents/2021/june-2021-ericsson-mobility-report.pdf> (Date of Access: 10.07.2021)
- [7]GSMA- The Mobilite Gender Gap Report 2020. 2020. <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/05/GSMA-The-Mobile-Gender-Gap-Report-2020.pdf> (Date of Access: 12.07.2021)
- [8] Son üç ay içinde bireylerin yaş grubu, cinsiyet, eğitim ve işgücü durumlarına göre cep telefonu kullanım oranı, TÜİK, Hanehalkı Bilişim Teknolojileri (BT) Kullanım Araştırması, 2018-2021, <https://data.tuik.gov.tr/Kategori/GetKategori?p=Bilim,-Teknoloji-ve-Bilgi-Toplumu-102> (Date of Access: 14.11.2021)
- [9]Toh, SH., Coenen, P., Howie, EK., Straker L. M. 2017. The associations of mobile touch screen device use with musculoskeletal symptoms and exposures: A systematic review. *PloS One*, 12(8), e018122.
- [10] Kim, HJ., Kim, JS. 2015. The relationship between smartphone use and subjective musculoskeletal symptoms and university students. *Journal of Physical Therapy Science*, 27(3), 575–579
- [11] Berolo, S., Wells, RP., Amick, BC. 2011. Musculoskeletal symptoms among mobile hand-held device users and their relationship to device use: A preliminary study in a Canadian university population. *Applied Ergonomics*, 42(2), 371–378.
- [12] Korpinen, L., Pääkkönen, R. 2011. Physical symptoms in young adults and their use of different computers and mobile phones. *International Journal of Occupational Safety And Ergonomics*, 17(4), 361–371.
- [13] Fazli, B., Ansari, H., Noorani, M. Jafari M. S., Sharifpoor Z., Ansari, S. 2016 The prevalence of musculoskeletal disorders and its predictors among Iranians' Housewives. *International Journal of Epidemiologic Research*, 3(1), 53-62.
- [14] Gunel A, Pekçetin S. 2019 Relationship Between Smartphone Addiction and the Pain in Cervical Region-Upper Extremity among University Students. *Sted*,28(2),114-119.
- [15] Kwon, M., Lee, J. Y., Won, W. Y. Park, J. W., Min, J. A. Hahn, C., et al., 2013 Development and validation of a smartphone addiction scale (SAS). *PLoS One*, 8(2), e56936.
- [16] Demirci, K., Orhan, H., Demirdas, A. Akpınar, A., Sert, H. 2014. Validity and reliability of the Turkish version of the Smartphone Addiction Scale in a younger population. *Bulletion of Clinical Psychopharmacology*, 24, 226-234.
- [17] Vernon, H., Mior, S. 1991 The Neck Disability Index: a study of reliability and validity. *Journal of Manipulative and Physiological Therapeutics*, 14(7), 409–415.
- [18] Telci, EA., Karaduman, A., Yakut, Y., Bahar, A., Şimşek İ. E., Yağlı, N. 2009. The cultural adaptation, reliability, and validity of Neck Disability Index in patients with neck pain: a Turkish version study. *Spine*, 34(16), 1732–1735.
- [19] Bolton, JE., Humphreys, BK. 2002. The Bournemouth Questionnaire: a short-form comprehensive outcome measure. II. Psychometric properties in neck pain patients. *Journal of Manipulative and Physiological Therapeutics*, 25(3), 141–148

- [20] Aslan Telci, E., Baş Aslan, Ü., Yağcı, N. Cavlak, U., Gur Kabul, E., Kara, G., et al. 2019. The Turkish version of the Neck Bournemouth Questionnaire in patients with chronic neck pain a cultural adaptation reliability and validity study. *Archives of Medical Science: AMS*, 17(3), 708–713
- [21] Al-Hadidi, F., Bsisu, I., AlRyalat, SA. Al-Zu'bi, B., Bsisu, R., Hamdan, M. et al. 2019. Association between mobile phone use and neck pain in university students: A cross-sectional study using numeric rating scale for evaluation of neck pain. *PLoS ONE*, 14(5), e0217231.
- [22] Klussmann, A., Gebhard, H., Liebers, F. Rieger, M. A. 2008 Musculoskeletal symptoms of the upper extremities and the neck: a cross-sectional study on prevalence and symptom-predicting factors at visual display terminal (VDT) workstations. *BMC Musculoskeletal Disorders*, 9, 96.
- [23] Mustafaoglu, R., Yasaci, Z., Zirek, E., Griffiths M. D., Özdingler A. R. 2021. The relationship between smartphone addiction and musculoskeletal pain prevalence among young population: a cross-sectional study. *The Korean Journal of Pain*, 34(1), 72–81.
- [24] Xie Y, Szeto G, Dai J. 2017. Prevalence and risk factors associated with musculoskeletal complaints among users of mobile handheld devices: A systematic review. *Applied Ergonomics*, 59(Pt A), 132–142.
- [25] Hidalgo, B., Hall, T., Bossert, J. Dugeny, A., Cagnie, B., Pitance, L. 2017. The efficacy of manual therapy and exercise for treating non-specific neck pain: A systematic review. *Journal of Back and Musculoskeletal Rehabilitation*, 30(6), 1149–1169.