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Electronic format: Morse SS. Factors in the emergence of infectious diseases. Emerg Infect Dis (serial online) l995 Jan-Mar (cited 1996 June 5): 1(1): (24 screens). Available from: URL: http:/ www.cdc.gov/ncidodlElD/cid.htm.

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Keywords

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Methods

Results

Discussion

Conclusion

Acknowledgement

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Discussion

Conclusion

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Conclusion

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AUGUST 2022 **VOLUME 9** **NUMBER:2**

CONTENTS

EDITORIAL

Our new issue...

We are happy to publish the second issue of this year. This issue includes three studies and two case reports. We would like to express our sincere thanks to all researchers who submitted research to our journal.

Our magazine will grow with you.

Hope to see you in our other issues...

PhD, Assoc. Prof. Ülkü KARAMAN

Editor

ODU TIP DERGİSİ/ODU MEDICAL JOURNAL (ODU MED J) **August 2022;9(2):45-55**

RESEARCH ARTICLE

Quality of Life in Patients with Shoulder Pain and the Effect of Physical Therapy on Quality of Life

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Abstract

Objective: We aimed to investigate to what extent the quality of life of people is affected by shoulder pain originating from the shoulder joint and the contribution of physical therapy to the quality of life in our study.

Methods: In our study, a total of 30 patients who applied to our outpatient clinic with the complaint of shoulder pain were evaluated. A physical therapy program consisting of 10 sessions of hot pack, transcutaneous electrical nerve stimulation (TENS) and ultrasound (US) was applied to the patients for 2 weeks. During the treatment, the patients were included in an exercise program and used nonsteroidal anti-inflammatory drugs (NSAID). Evaluation was performed three times in total, before physical therapy, at the end of the treatment, and 3 months after the treatment. In controls, joint range of motion (ROM) was evaluated with the goniometer, pain was evaluated with the Visual Analog Scale (VAS) at rest, movement, and night, functional status was evaluated with the Shoulder Pain and Disability Index (SPADI) and the Shoulder Disability Questionnaire (SDQ), and quality of life was evaluated with Short Form-36 (SF 36).

Results: A statistically significant improvement was detected in the physical function, physical role limitation and pain parameters of ROM, VAS, SPADI, SDQ and SF-36 at the end of the treatment and at the 3rd month controls compared to the pre-treatment. When the end of the treatment and the 3rd month values were compared, the improvement continued, albeit weaker.

Conclusion: A significant improvement was observed in the VAS score, SF-36, SPADI, SDQ, ROM, and shoulder-specific tests in movement, rest and sleep in patients with shoulder pain at the end of the treatment and at the 3rd month controls. Physical therapy combined with exercise is considered as an efficient, cost-effective and safe method in patients with shoulder pain.

Key Words: Shoulder pain, quality of life, SF-36, physical therapy

Omuz Ağrılı Hastalarda Yaşam Kalitesi ve Fizik Tedavinin Yaşam Kalitesine Etkisi

Özet

Amaç: Çalışmamızda omuz ekleminden kaynaklanan omuz ağrılarında insanların yaşam kalitesinin ne derece etkilendiğini ve fizik tedavinin yaşam kalitesine olan katkısını araştırmayı amaçladık.

Yöntem: Çalışmamızda polikliniğimize omuz ağrısı şikayetiyle başvuran toplam 30 hasta değerlendirmeye alındı. Hastalara 2 hafta boyunca toplam 10 seans hot pack, Transkutanöz elektrik sinir stimulasyonu (TENS) ve ultrasound (US) dan oluşan fizik tedavi programı uygulandı. Hastalar tedavi süresince egzersiz programına alındı ve nonsteroid anti inflamatuvar ilaç (NSAID) kullandı. Değerlendirme fizik tedavi öncesi, tedavinin bitiminde ve tedavi bitiminden 3 ay sonra olmak üzere toplamda üç kez yapıldı. Kontrollerde eklem hareket açıklığı (ROM) gonyometre ile, ağrı; istirahat, hareket, gece ağrısı olmak üzere visual analog skala (VAS), fonksiyonel durum Shoulder Pain and Disability Index (SPADI) ve Shoulder Disability Questionnaire (SDQ) ve yaşam kalitesi Short form-36 (SF 36) ile değerlendirildi.

Bulgu: Tedavi bitiminde ve 3. ay kontrollerinde tedavi öncesine göre EHA, VAS, SPADI, SDQ VE SF-36'nın fiziksel fonksiyon, fiziksel rol kısıtlaması ve ağrı parametrelerinde istatistiksel anlamlı düzelme tespit edildi. Tedavi bitimi ile tedavi sonrası 3. ay değerleri karşılaştırıldığında ise düzelme daha zayıf olmakla birlikte devam etti.

Sonuç: Omuz ağrılı hastalarda hareketle, istirahatte ve uykudaki VAS skoru, SF-36, SPADI, SDQ, EHA ve omuza spesifik testlerde tedavi bitiminde ve 3. aydaki kontrollerde belirgin düzelme kaydedilmiştir. Omuz ağrılı hastalarda egzersizle kombine edilen fizik tedavi etkili, maliyeti düşük ve güvenli bir yöntem olarak görülmektedir.

Anahtar Kelimeler: Omuz ağrısı, yaşam kalitesi, SF-36, fizik tedavi

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Note: It was presented as a poster at the National Medicine and Rehabilitation Congress (2015).

INTRODUCTION

Shoulder pain is a common musculoskeletal problem in the general population. It ranks third in the society after low back and neck pain (1). The prevalence of shoulder pain ranges from 6.9% to 34% (2). Primary shoulder pathologies consist of rotator cuff pathologies, bicipital tendinitis, glenohumeral joint pathologies, glenoid labrum tears, acromioclavicular joint pathologies and glenohumeral instability (3). The most common cause is subacromial impingement syndrome (SIS), which is seen as a result of the compression between the rotator cuff structures, subacromial bursa and humeral head of bicipital tendon, and the coracoacromial arch (4). Studies have shown that the quality of life in patients with shoulder pathologies is significantly reduced (5).

A diagnosis should be made and treatment should be started quickly, with anamnesis, physical examination, shoulder-specific tests and, if necessary, radiographic evaluations in a patient with shoulder pain. Conservative treatment is recommended primarily in the treatment. Conservative treatment methods are rest, ice application, non-steroidal anti-inflammatory (NSAID) and analgesic drugs, exercise, physical therapy modalities, mobilization, and injection therapy (6,7). Heat agents used in physical therapy provide muscle relaxation, increase soft tissue elasticity, and reduce joint stiffness in various musculoskeletal pathologies (8). The effect of therapeutic ultrasound (US) is mainly due to thermal and non-thermal effects, while the mechanical ultrasound energy is absorbed by the tissues and increases tissue healing and repair. It is widely used in the treatment of many diseases such as myofascial pain syndrome, low back pain, pelvic pain, and knee osteoarthritis (9). Transcutaneous electrical nerve stimulation (TENS) is a low-frequency electrical current applied with superficial electrodes placed on the skin. It is used to relieve pain in acute and chronic painful conditions (10). These physical therapy modalities are frequently used in musculoskeletal disorders. In our study, we aimed to investigate how shoulder pain affects the quality of life of people and to what extent physical therapy with a combination of US, TENS, hot pack, and exercise changes the quality of life, pain and functional status.

METHODS

A total of 30 patients aged between 30-73 years who applied to the Physical Therapy and Rehabilitation and Orthopedics outpatient clinic with the complaint of shoulder pain and limitation between December 2009 and February 2010 were evaluated in
our study.

Of all patients participating in the study, detailed anamnesis was taken, necessary radiological examinations (shoulder AP/lateral, cervical AP/lateral, PA chest graphy) were performed together with orthopedic and neurological examinations, and complete blood

count, sedimentation, and C-reactive protein levels were recorded. Moreover, Neer, Hawkins, Jobe, Painful arc, Speed and Yergason tests were performed before the treatment, at the end of the treatment and three months after the treatment. Magnetic resonance imaging (MRI) was requested from patients with full-thickness tears and suspected malignancy. Those with systemic inflammatory rheumatic disease, malignant disease, decompensated heart failure, cardiac pacemaker, those with a history of neurological and psychiatric diseases, those who have undergone shoulder and neck surgery, those who received shoulder physical therapy and steroid injection in the last 3 months, those with impaired shoulder integrity after major trauma, and those with full-thickness tears were excluded from the study.

A total of 10 sessions of physical therapy consisting of US, TENS and hot pack were applied to 30 patients included in the study five days a week. Active US was applied as a continuous and pulsed on 1.5 watts/cm² dose at a frequency of 1 MHz for 5 minutes. Active TENS was performed with the conventional method, transarticularly with 4 electrodes.

The exercise program was started with passive range of motion (ROM), stretching and pendulum exercises (Codman exercises). Shoulder strengthening exercises were started in patients with full or nearly full range of motion. After good strengthening was achieved, movements of the shoulder above 90 degrees and activities of daily living were allowed.

VAS (visual analog scale) was used for pain assessment. Rest, movement, and night pain were evaluated separately. For this, a line 10 cm long was drawn, and this line was numbered at 1 cm intervals. It was explained that 0: painless and 10: the most severe pain, and the patient was asked to mark the value corresponding to his pain on the scale.

Joint range of motion (ROM) was measured actively and passively with a goniometer. The patient's shoulder abduction, flexion, internal and external rotation range of motion values were measured and recorded. Values were measured with the patient in the supine position.

The 16-item Shoulder Disability Questionnaire (SDQ) was used to assess pain-related disability. The patient was asked to tick one of the options ‘yes’, ‘no’ or ‘not applicable’ for each item, depending on whether or not s/he had done it in the last 24 hours. Is/f he has done the activity and has pain, the option ‘yes’ was marked, if s/he has done the application but has no pain, the option ‘no’ was marked, and if he has not done this in the last 24 hours, the option ‘not applicable’ was marked. In this scale, zero points indicate maximum well-being, and 100 points indicate maximum illness state.

The Shoulder Pain and Disability Index (SPADI) was used to measure pain and disability associated with shoulder pain. This questionnaire

consists of two parts, namely pain and disability, and includes a total of 13 questions. The patients were asked to rate the severity of pain during different activities they performed in the past week, by scoring between zero (no pain) and 10 (most severe pain). According to these answers, pain and disability were evaluated separately. In this questionnaire, zero points indicate maximum well-being, and 130 points indicate maximum illness state.

In our study, the SF-36 form, whose reliability and validity has been demonstrated by studies and which could also be filled in by the patient as a general quality of life scale, was used in patients with musculoskeletal disorders. This 36-item questionnaire includes 8 different health-related parts: 10 items about physical function, 2 items about social function, 3 items about role limitations due to physical problems, 5 items about mental health, 4 items about energy-vitality, 2 items about pain, and 5 items about general perception of health. The patients were asked to evaluate the questions considering the last four weeks. The answers given were converted into a scored scale from 0 (worst health condition) to 100 (best health condition) for each part. The subjects were evaluated before treatment, after treatment and at the 3rd month.

Statistical analysis

SPSS 15.0 (Statician Package of Social Science) program was used to evaluate the study results. Paired Samples T Test was used in dependent groups to compare the pre- and post-treatment values of the patients, and Bivariate Correlation Analysis was used to investigate the correlations between the parameters. The normality of the groups was determined by the Kolmogorov Smirnov test. A p value of <0.05 was considered significant.

RESULTS

Of our patients, 9 were male, 21 were female, one of them was single and the rest were all married. The mean age was 53.03 ± 9.45 (30 – 73 years) and the education level was 16 primary school, 3 secondary school, 4 high school and 1 university graduate. According to distribution by occupation, 18 people were housewives and 12 people were retired. Of them, 17 had right shoulder pain and 13 had left shoulder pain. The duration of pain ranged from 1 month to 48 months, with a mean of 8.9 ± 11.4 months. While 29 of the patients were right-handed, 1 of them was left-handed. No correlation was found between the hand used and the shoulder with pain. Details are presented in Table 1.

Table 1. VAS Score and correlation results of variables

		P Value	Correlation Coefficient
Hand used and the shoulder with pain		0,26	0.212
The Rate of Improvement of Pain and	Age	0,31	0,208
	Duration of pain	0,44	0,162
	Gender	0,38	0,416
	Painful shoulder	0,56	0,121
	Education level	0,68	-0,86
	Weight	0,69	-0,84

It was determined that the VAS scores of the patients during movement, rest and sleep decreased

statistically significantly before the treatment, at the end of the treatment and 3 months after the treatment. Details are presented in Table 2. According to the VAS scores, there was no correlation between the rate of improvement of pain and age, duration of pain, gender, painful shoulder, education level and weight. Details are presented in Table 1.

Active and passive external rotation, flexion, and abduction angles of the patients showed a statistically significant increase at the end of the treatment and at the controls after 3 months compared to the pre-treatment. In the active and passive internal rotation angles, there was a statistically significant increase at the end of the treatment compared to the pre-treatment, but there was no more increase in the third month control. The details are presented in Table 3.

Shoulder movements of the patients were evaluated with Hawkins, Yergason, Supraspinatus, Speed, and Neer tests for specific diagnosis. While Hawkins test was positive in 86.7% of the patients before the treatment, it was found positive in 36.7% at the end of the treatment ($p<0.001$). The difference between them was statistically significant. Likewise, Yergason test was 56.7%, Supraspinatus test was 86.7%, Speed test was 96.7% and Neer test was 83.3% positive before the treatment while these positivity rates were 3.3% ($p<0.001$) in Yergason test, 33.3% ($p<0.001$) in Supraspinatus test, 33.3% ($p<0.001$) in Speed test and % 20.0 ($p<0.001$) in Neer test at the end of the treatment ($p<0.001$). In the 3rd month after the treatment, positivity was detected in Hawkins at a rate of 26.7%, Yergason at a rate of 3.3%, Supraspinatus at a rate of 23.3%, Speed at a rate of 33.3% and Neer at a rate of 16.7%. The difference between all these values was found to be statistically significant. Details are presented in Table 4.

Table 2. Changes in patients' VAS scores before, after, 3 months after treatment and statistical significance values

	Before Treatment	End of Treatment	3. Month After Treatment	Before – End of Treatment	Before – 3. Month After Treatment	End of Treatment – 3. Month After Teatment
With movement VAS	7,73±2,49	4,05±2,71	3,00±2,47	< 0,001*	< 0,001*	0,05
At rest VAS	4.00±3.44	2.17±2.48	1.27±2.24	< 0,001*	< 0,001*	0,01
İn the sleep VAS	6.28±3.36	2.57±2.71	1.47±2.58	< 0,001*	< 0,001*	0,02

Table 3. Joint range of motion measurements and statistical evaluation results before, after and 3 months after treatment

	Before Treatment	End of Treatment	3. Month After Treatment	Before – End of Treatment	Before – 3. Month After Treatment	End of Treatment – 3. Month After Teatment
Active İnternal Rotation	56.6±13.8	68.0±5.5	68.0±5.2	<0,001	<0,001	0,87
Passive İnternal Rotation	60.7±12.4	69.2±5.7	68.9±5.9	<0,001	<0,001	0,24
Active External Rotation	52.0±20.7	68.6±23.0	72.9±20.9	<0,001	<0,001	0,053
Passive External Rotation	56.8±20.5	72.3±20.9	76.1±18.6	<0,001	<0,001	0,019
Active Flexion	144.9±31.5	167.0±21.8	168.8±20.0	<0,001	<0,001	0,024
Passive Flexion	152.3±27.5	169.7±18.9	171.7±14.9	<0,001	<0,001	0,024
Active Abduction	121.2±36.8	141.3±31.8	152.6±32.4	0,002	<0,001	0,005
Passive Abduction	129.0±35.0	150.5±34.6	158,9±28,3	<0,001	<0,001	0,047

Table 4. Impingement test positivity rates and statistical evaluation results before, after and 3 months after treatment

	Before Treatment	End of Treatment	3. Month After Treatment	Before – End of Treatment	Before – 3. Month After Treatment	End of Treatment – 3. Month After Teatment
Hawkins	86.7	36.7	26.7	0,001	< 0,001	0,264
Yergason	56.7	3.3	3.3	<0,001	< 0,001	1,00
Supraspinatus	86.7	33.3	23.3	< 0,001	< 0,001	0,184
Speed	96.7	33.3	33.3	< 0,001	< 0,001	1,000
Neer	83.3	20.0	16.7	< 0,001	< 0,001	0,712

Table 5. Mean SF-36 scores and statistical evaluation results before, after and 3 months after treatment

SF-36	Before Treatment	End of Treatment	3. Month After Treatment	Before – End of Treatment	Before – 3. Month After Treatment	End of Treatment – 3. Month After Teatment
General health	58,1	61,7	65,2	0,02	< 0,001	0,02
Physical function	75,1	85,4	89,6	<0,001	< 0,001	0,02
Social function	73,3	83,3	92,0	0,02	0,04	<0,001
Physical role restriction	60,4	79,1	87,0	<0,001	< 0,001	0,02
Emotional role restriction	78,3	78,8	83,8	0,78	0,01	0,005
Mental health	53,5	50,1	49,0	0,01	0,01	0,48
Energy	59,7	56,8	55,2	0,1	0,03	0,28
Pain	46,0	68,0	76,0	<0,001	< 0,001	0,01

The discomfort experienced by the patients due to aching shoulders and its effect on their daily lives were evaluated with SPADI. The mean SPADI-Pain score was observed as 75.3±2.6 before the treatment, 42.7 ±3.7 at the end of the treatment, and 28.2 ± 4.0 at the 3rd month after the treatment. The mean SPADI-Physical function score was detected as 69.4 ± 3.2 before the treatment, 37.9 ± 3.9 at the end of the treatment, and 23.1 ± 4.3 at the 3rd month after the treatment. A statistically significant decrease was found in all scores when before the treatment-end of the treatment, before the treatment-3rd month after the treatment, and end of the treatment-3rd month after the treatment were compared ($p<0.001$ in all evaluations) (Figure 1).

The SDQ was used to evaluate the limitations experienced by the patients in their daily activities due to pain. While the mean score was 83.7 before the treatment, it was 46.6 at the end of the treatment and 34.1 at the 3rd month after the treatment. The difference between all values was found to be statistically significant. (Before the treatment-End of the treatment $p<0.001$, Before the treatment-3rd month after the treatment $p<0.001$, End of the treatment-3rd month after the treatment $p=0.012$). It was evaluated that the improvement continued in the 3rd month follow-up of the patients, and they were better at the 3rd month compared to the end of the treatment (Figure 2).

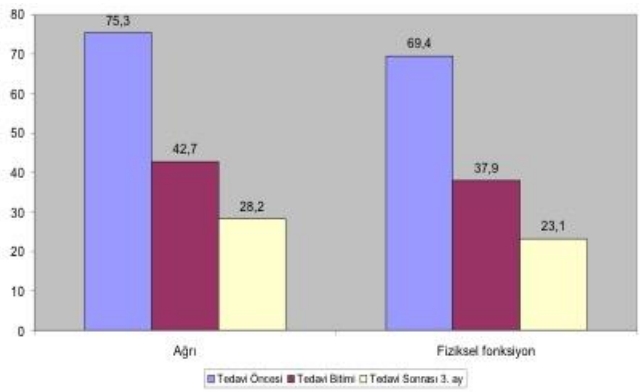

Figure 1. Change in mean SPADI scores before treatment, at the end of treatment, and at 3 months after treatment.

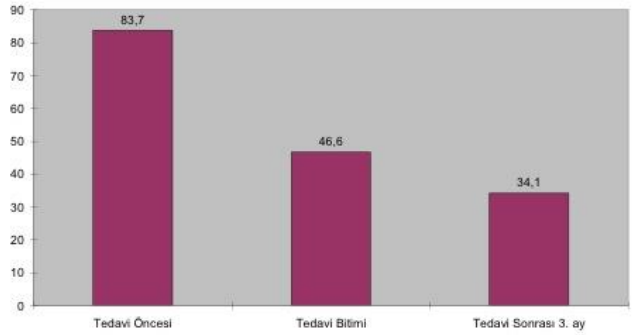

Figure 2. Mean SDQ scores before treatment, at the end of treatment and at 3 months after treatment.

From quality of life subgroups assessed with SF-36, physical function score ($p<0.001$), physical role limitation ($p<0.001$), pain ($p<0.001$), general health ($p=0.02$), social function ($p=0.02$), and mental health ($p= 0.01$) scores were statistically significant at the end of 10 sessions of physical therapy applied to the patients and at the 3rd month after the treatment while there was no significant difference in the energy ($p=0.1$) and emotional role restriction ($p=0.78$) subgroups at the end of the treatment. In the evaluations of these two groups at the 3rd month after the treatment, it was observed that there was a significant increase ($p=0.03$ and $p=0.01$) compared to before the treatment. It was detected that the increase in the quality of life in general was more pronounced in the 3rd month after the treatment. The details are presented in Table 5.

DISCUSSION

Shoulder pain is a crucial cause of disability that affects shoulder movements and functions, thus restricting the person in daily life functionally and spiritually. Acute or chronic shoulder pain with intra-articular or extra-articular origin caused by trauma or degenerative process causes limitations in patients and negatively affects daily living activities (3). Therefore, rapid diagnosis and treatment of individuals with shoulder pain will both increase their quality of life and accelerate their return to social life. Conservative approach is primarily recommended in primary shoulder lesions. Rest, ice application, NSAID and analgesic drugs, exercise, physical therapy modalities are used as conservative treatment methods (6,7). In our study, a combination of US, TENS, hot pack, and exercise was applied to the patients with shoulder pain as physical therapy, and a statistically significant improvement was observed in shoulder ROM, functionality, pain and quality of life at the end of the treatment and at the 3rd month follow-up compared to before the treatment. In a study, 413 patients diagnosed with SIS were treated with conservative methods, and successful results were obtained in 67% of them, in parallel with our study. They reported that those who started treatment within one month of symptom onset had a higher chance of success (11). In another study, 62 patients with shoulder pain were treated conservatively with rest, ice application, NSAID treatment, exercise program, physical therapy modalities, mobilization techniques, subacromial injections, and statistically significant improvement was observed in the pain, shoulder ROM and functional status of the patients in comparison of the values of the

patients before and after the treatment (12). In a study investigating the effectiveness of different analgesic currents, two groups of patients with shoulder pain were formed, deep and superficial heat was applied to both groups, in addition, TENS was given to one group and interferential current to the other group, and a decrease in pain intensity and an increase in ROM were noted in both groups after the treatment (13). In another study comparing the effects of conventional US and high-powered US at the pain limit on shoulder pain, ROM and upper extremity functions in patients with frozen shoulder, it was shown that patients benefited from both treatment programs (14). Likewise, in another study comparing extracorporeal shock wave therapy (ESWT) + exercise combination with ultrasound + exercise combination in frozen shoulder patients, it was stated that both treatment methods were beneficial in reducing pain and increasing range of motion and adding a physical therapy program to frozen shoulder treatment would be beneficial (15). In our study, US, TENS, hot pack therapy and exercise therapy were applied to the patients without any interventional procedure, and a significant reduction was achieved in both ROM and pain intensity. At the same time, statistically significant improvement was achieved in all parameters evaluated at the end of the treatment and this improvement was found to continue in the 3rd month controls.

In a study comparing Tenoxicam injection and physical therapy, significant improvement was observed in shoulder ROM and SDQ scores in both groups at the 1st, 2nd and 6th weeks after the treatment compared to before the treatment (16). In our study, a statistically significant decrease was achieved in the ROM and SDQ scores at the end of the treatment, and it was observed that the decrease in the scores continued at the 3rd month controls. It was seen that satisfactory improvement could be achieved with interventional procedures such as PRP (platelet rich plasma), steroid, NSAID injection, etc. in shoulder pain as well as with non-invasive methods. However, randomized comparative studies are needed to determine which method is superior.

Pain often has a negative impact on activities of daily living and quality of life (17,18). Among musculoskeletal pain, shoulder pain has the greatest impact on quality of life and is an independent risk factor for poor quality of life. There is a prevailing opinion that interventions to improve shoulder pain and shoulder complaints are necessary in order to improve the quality of life in healthy middle-aged and elderly people (19). In a study in which 120 patients with shoulder pain were examined, kinesiophobia caused by pain in the shoulder causes the patients to experience limitations in their daily living activities, while the low quality of life brought about by this situation causes patients to fight both physical and psychological factors (20). In our study, it was

determined that there was a significant improvement in the general quality of life, and SPADI and SDQ scores of the patients together with the treatment we applied. In patients with shoulder pain, it may be possible to achieve a serious improvement in the quality of life with conservative treatments without any interventional procedure.

Patients diagnosed with SIS were randomly divided into three groups in a recent study. Group 1 received PRP injection into the subacromial space of the affected shoulder, corticosteroid injection was applied into the subacromial joint space in Group 2, and 10 sessions of physical therapy consisting of TENS, US, and hot pack were applied five times a week in Group 3. An exercise program was applied to all groups. In the treatment of SIS, all three treatment methods were effective in terms of pain, quality of life, and functionality. However, they reported that physical therapy and exercise methods might be the first choice in SIS because they were inexpensive and noninvasive, and the risk of side effects is low compared to others (21). In our study, a significant improvement was observed in the quality of life, joint range of motion, shoulder-specific tests, functionality, and pain in the patients at the end of physical therapy and at the 3-month follow-up.

The lack of a control group and the small number of patients can be considered as the limitations of our study. However, despite the small number of patients, it was shown that statistically significant improvement was achieved in all parameters evaluated with the treatments applied. Moreover, although a significant decrease in pain and an increase in the quality of life of the patients were observed after the treatment, an imaging method that could objectively show the improvement could not be used. Conducting more detailed studies, in which the improvement was also shown by imaging, will help to reveal the results more objectively.

CONCLUSION

All in all, significant improvement was noted in the VAS, SF-36, SPADI, SDQ, ROM and shoulder-specific tests in the patients with shoulder pain during movement, rest, and sleep at the end of the treatment and at the 3rd month controls. Physical therapy combined with exercise is considered as an effective, cost-effective and safe method in patients with shoulder pain. However, there is a need for longer-term, large and comprehensive studies with a larger number of patients.

Ethics Committee Approval: This study was carried out in accordance with the Declaration of Helsinki Principles and was presented as a medical specialization thesis in 2011. Consent form was obtained from all participants

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: D. C, T.U. Design: D. C, T.U. Literature search: D. C, T.U.

Data Collection and Processing: D. C, T.U. Analysis or Interpretation: D. C, T.U. Written by: D. C, T.U.

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RESEARCH ARTICLE

Social Media Addiction and Mindfulness in University Students

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Social Media Addiction and Mindfulness In University Students
Abstract
Objective: This study aimed to investigate any association between social media addiction and mindfulness in university students.
Methods: Students studying at Ordu University participated in our research. For our study, survey questions measuring sociodemographic information, and Social Media Addiction Scale and mindfullness Scale questions were asked to the participants via the online platform.
Results: Of the university students participating in our study, 140 (65.4%) were female and 74 (34.6%) were male. It was observed that 208 (97.2%) of the participants used WhatsApp, 192 used(89.7%) Instagram, 188 (87.9%) used Youtube, 122 (57%) used Twitter and 46 (21.5 %) used Facebook. It was determined that 106 (46.5%) of them spent 60-180 minutes and 70 (32.7%) spent 180 minutes or more on social media during the day. There was a statistically significant difference between the mood regulation mean scores of the university students participating in the study in terms of gender (p=0.014), and the mood regulation score of women was significantly higher than men. It was detected that there was a statistically significant association between the students' mindfulness level score and the social media addiction scale total score, and occupation, mood regulation, repetition and conflict scores.
Conclusion: The mood regulation score of women was significantly higher than that of men. As the level of mindfullness increased, social media addiction decreased.
Key Words: Social media addiction, internet addiction, mindfulness

Üniversite Öğrencilerinde Sosyal Medya Bağımlılığı ve Bilinçli Farkındalık
Özet
Amaç: Araştırma üniversite öğrencilerinde sosyal medya bağımlılığı ile bilinçli farkındalık arasında ilikşki olup olmadığını araştırmak amacıyla yapılmıştır.
Yöntemler: Araştırmamıza Ordu Üniversitesinde okuyan öğrenciler katılmıştır. Çalışmamız için katılımcılara online platform ile sosyodemografik bilgileri ölçen anket soruları ve Sosyal Medya Bağımlılığı Ölçeği ve Bilinçli Farkındalık Ölçeği soruları sorulmuştur.
Bulgular: Çalışmamıza katılan üniversite öğrencilerinin 140'ı (%65,4) kadın ve 74'ü (%34,6) erkekti. Katılımcıların 208'sinin (%97,2) WhatsApp, 192'sinin (%89,7) Instagram, 188'inin (%87,9) Youtube, 122'sinin (%57) Twitter ve 46'sının (%21,5) ise Facebook kullandığı sonucuna varıldı. Gün içinde sosyal medyada genel olarak 106'sının (%46,5) 60-180 dakika ve 70'inin (%32,7) ise 180 dakika ve üzeri kadar vakit geçirdikleri saptandı. Araştırmaya katılan üniversite öğrencilerinin cinsiyetleri bakımından duygu durum düzenleme puan ortalamaları arasında istatistiksel olarak anlamlı fark vardı (p=0,014), kadınların duygu durum düzenleme puanı erkeklere göre anlamlı düzeyde daha yüksekti. Öğrencilerin bilinçli farkındalık düzeyi puanı ile sosyal medya bağımlılığı ölçeği toplam puan, meşguliyet, duygu durum düzenleme, tekrarlama ve çatışma puanları arasında istatistiksel olarak anlamlı bir ilişki olduğu tespit edildi.
Sonuç: Kadınların duygu durum düzenleme puanı erkeklere göre anlamlı düzeyde daha yüksekti. Bilinçli farkındalık düzeyi arttıkça, sosyal medya bağımlılığı azalıyordu.
Anahtar Kelimeler: Sosyal medya bağımlılığı, internet bağımlılığı, bilinçli farkındalık

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INTRODUCTION

The use of social media has increased gradually all over the world with the development of technology. Media such as Facebook, Youtube, Instagram, Twitter are called social media (1). 68% of the adult population in America uses Facebook and 73% uses Youtube (2). In Turkey, it has been determined that there is an active social media use of 53% (3). It is not surprising that the use of the internet and social media has increased due to the quarantine practices, the situation of the pandemic, anxiety and the decrease in socialization with the COVID-19 pandemic. Most people in the world pay too much attention to social media and spend a lot of time on social media. These platforms, which are mostly preferred by adolescents and young adults, have benefits in terms of enabling people to socialize, access information easily and convey their feelings and thoughts to people at that moment. However, there are harmful effects of excessive use. Researchers have suggested that excessive use of the internet may cause mental disorders and loneliness in young people (4,5). It has been shown that women use social media to provide intimacy and meet their relationship needs, and to stay in touch with their friends; on the other hand, men use it to obtain information about others and to obtain social friendships (6). It is claimed that the use of social media meets some of the needs in Maslow's hierarchy of needs (such as gaining appreciation, bonding, security, self-actualization). (7).

Mindfulness is a state of consciousness in which the person is focused on the present, open to innovation, and aware of multiple perspectives (8). Mindfulness therapy is used in many mental disorders, including behavioral addiction (9). Li and Hao showed that the effect of alexithymia on smartphone addiction decreased with high mindfulness level (10). Mindfulness enables people to be alert and objectively aware of the moment and helps them to get rid of automatic and negative stimuli (11). Studies have shown that mindfulness contributes to reducing the negative effects of internet addiction (12). While internet and social media addiction provides escape from the moment and the person is not aware of the level of use, mindfulness is a state of consciousness in which the person is aware of the moment and situations. From this point of view, it makes us think that people with a high level of mindfulness are more controlled in terms of addiction and directing their behaviors. In our study, we aimed to determine the level of social media addiction in university students and to investigate the level of mindfulness and the degree of social media addiction.

METHODS

Participants

University students studying in different departments at Ordu University participated in the research. Sample selection was not made in the study, and volunteers who filled out and approved the online questionnaire were included in the study. A total of 213 students, 140 (65.7%) female and 73 (34.3%) male, participated in our study. Study data were collected online during the month of July 2021.

Our study was approved by Ordu University Clinical Research Ethics Committee with the decision number 151 on June 17, 2021.

Data Collection Tools

For our study, survey questions measuring sociodemographic information were prepared for the participants on survey monkey. Moreover, Social Media Addiction Scale and Mindfulness Scale questions were asked to the participants with the survey monkey application.

Social Media Addiction Scale: The scale was developed by Tutgun-Ünal and Deniz (13). The scale consists of 41 items and 4 sub-dimensions (Occupation, Mood Regulation, Repetition, Conflict). The highest score that can be obtained from the scale is 205, and the lowest score is 41. As the score from the scale increases, the level of social media addiction also increases.

Mindfulness Scale: The scale developed by Brown and Ryan in 2003 consists of fifteen items and gives a single total score (14). It is a 6-point Likert type scale. The higher the score, the higher the mindfulness.

Statistical analysis

Descriptive statistics were presented as mean ± standard deviation or median, minimum and maximum, depending on the distribution for continuous (numerical) variables, in summarizing the data obtained from the study. Categorical variables were summarized as numbers and percentages. Normality of numeric variables was checked with the Shapiro-Wilk, Kolmogorov-Smirnov and Anderson-Darling tests.

The Mann Whitney U test was used in the comparison of two independent groups, when the numerical variables did not show normal distribution.

Kruskall-Wallis H test was used in the comparisons of more than two independent groups when the numerical variables did not show normal distribution. Differences between groups in non-parametric tests were evaluated with the Dwass-Steel-Critchlow-Fligner test.

The association between the scores of the non-normally distributed scales was analyzed using Spearman's rho correlation coefficient.

RESULTS

Of the university students with a mean age of 22.3 ± 4.2 years, 140 (65.4%) were female and 74 (34.6%) were male. While 200 (93.9%) of the students were single, 13 (6.1%) of them were married. On the other hand, it was observed that 58 (27.1%) students had applied to psychiatry before, 15 (7.0%) used psychiatric drugs, and 49 (23.0%) had individuals with mental illness in their families.

When the social media tools used by the students were analyzed, it was observed that 208 (97.2%) of them used WhatsApp, 192 used (89.7%) Instagram, 188 (87.9%) used Youtube, 122 (57%) used Twitter and 46 (21.5%) used Facebook. It was determined that 106 (46.5%) spent 60-180 minutes and 70 (32.7%) spent 180 minutes or more on social media during the day (as presented in Table 1).

Table 1. Descriptive statistics of demographic, psychiatric and social media use related information

Age (years)		22.3 ± 4.2
Gender	Female	140 (65.4)
	Male	74 (34.6)
Marital status	Married	13 (6.1)
	Single	200 (93.9)
Have you applied to psychiatry before?	Yes	58 (27.1)
	No	156 (72.9)
Do you use psychiatric medication?	Yes	15 (7)
	No	199 (93)
Does anyone in your family have a mental illness? *(Mother, father, siblings, aunt, uncle, uncle)*	Yes	49 (23)
	No	164 (77)
Which social media platforms do you use?		
Facebook, *yes*		46 (21.5)
Instagram, *yes*		192 (89.7)
Twitter, *yes*		122 (57)
Youtube, *yes*		188 (87.9)
WhatsApp, *yes*		208 (97.2)
Diğer, *yes*		33 (15.4)
How much time do you spend on social media during the day?	5-60 minutes	38 (17.8)
	60-180 minutes	106 (49.5)
	180 minutes and more	70 (32.7)

In Table 2, there was a statistically significant difference between the mean mood regulation scores of the university students participating in the study with respect to gender (p=0.014), and the mood regulation score of women was significantly higher than that of men.

In terms of marital status of the students, the differences between the social media addiction scale total score, and repetition and conflict sub-dimension score averages were statistically significant (p=0.007, p=0.012, p<0.001 and p=0.003, respectively); according to this, the social media addiction scale total score, and repetition and conflict mean scores of the single students were significantly higher than the married ones. On the other hand, it was determined that there was no statistically significant difference between the mood regulation mean scores with respect to the marital status of the students (p=0.241).

Table 2. Comparison of Social Media Addiction Scale Total Score, and Mood Regulation, Occupation, Repetition and Conflict scores in terms of demography, psychiatry and social media use.

	Social Media Addiction Scale (SMAS)	*p*	Occupation	*p*	Mood Regulation	*p*	Repetition	*p*	Conflict	*p*
Gender										
Female	93 [43 – 169]	0.270 *	36 [14 – 58]	0.343*	13 [5 – 25]	**0.014 ***	12 [5 – 25]	0.265*	31.5 [19 – 79]	0.667 *
Male	90 [45 – 159]		33 [14 – 53]		11 [5 – 23]		11 [5 – 25]		31.5 [19 – 76]	
Marital Status										
Married	65 [43 – 133]	**0.007 ***	27 [14 – 43]	**0.012***	10 [5 – 23]	0.241 *	6 [5 – 15]	**<0.001 ***	21 [19 – 64]	**0.003 ***
Single	92.5 [45 – 169]		35 [14 – 58]		12 [5 – 25]		12 [5 – 25]		32.5 [19 – 79]	
Have you applied to psychiatry before?										
Yes	99 [43 – 169]	**0.041 ***	37.5 [14 – 58]	**0.023***	13.5 [5 – 25]	0.076 *	13 [5 – 25]	0.153*	36 [19 – 79]	0.148 *
No	89 [45 – 163]		33 [14 – 55]		12 [5 – 25]		11 [5 – 25]		31 [19 – 77]	
Do you use psychiatric medication?										
Yes	123 [73 – 162]	**0.006 ***	45 [29 – 52]	**0.003***	14 [9 – 23]	0.107 *	16 [8 – 20]	**0.027***	46 [21 – 79]	**0.010 ***
No	91 [43 – 169]		34 [14 – 58]		12 [5 – 25]		11 [5 – 25]		31 [19 – 77]	
Does anyone in your family have a mental illness? *(Mother, father, siblings, aunt, uncle, uncle)*										
Yes	106 [50 – 169]	**0.008 ***	40 [16 – 58]	**0.014***	14 [6 – 25]	**0.011 ***	14 [5 – 25]	**0.035***	34 [19 – 77]	**0.032 ***
No	89 [43 – 162]		33.5 [14 – 55]		12 [5 – 25]		11 [5 – 25]		31 [19 – 79]	
Facebook										
Yes	88 [45 – 162]	0.290 *	32 [14 – 49]	0.296*	12 [5 – 25]	0.845 *	11 [5 – 20]	0.432*	28.5 [19 – 79]	0.309 *
No	92.5 [43 – 169]		35 [14 – 58]		12 [5 – 25]		12 [5 – 25]		32.5 [19 – 77]	
Instagram										
Yes	92 [45 – 167]	0.126 *	35 [14 – 58]	**0.041***	12 [5 – 25]	0.160 *	11.5 [5 – 25]	0.379*	32 [19 – 79]	0.155 *
No	81 [43 – 169]		31 [14 – 50]		11 [5 – 24]		11.5 [5 – 25]		28 [19 – 72]	
Twitter										
Yes	96.5 [45 – 163]	0.068 *	37 [14 – 55]	**0.017***	13 [5 – 25]	**0.028 ***	12 [5 – 24]	0.703*	32.5 [19 – 79]	0.284 *
No	89 [43 – 169]		32 [14 – 58]		11.5 [5 – 25]		11 [5 – 25]		31 [19 – 73]	
Youtube										
Yes	93 [45 – 169]	0.061 *	35 [14 – 58]	0.137*	12 [5 – 25]	0.237 *	12 [5 – 25]	0.164*	32 [19 – 79]	**0.039 ***
No	75.5 [43 – 161]		30 [14 – 49]		12 [5 – 24]		10 [5 – 20]		25 [19 – 73]	
WhatsApp										
Yes	91 [43 – 169]	0.217 *	34 [14 – 58]	0.254*	12 [5 – 25]	0.180 *	11 [5 – 25]	0.380*	31 [19 – 79]	0.293 *
No	109 [58 – 161]		40 [21 – 48]		15 [9 – 24]		14 [7 – 20]		37 [21 – 73]	
Other										
Yes	99 [45 – 151]	0.316 *	35 [14 – 53]	0.738*	13 [5 – 23]	0.673 *	12 [5 – 22]	0.522*	38 [19 – 69]	0.100 *
No	89 [43 – 169]		34 [14 – 58]		12 [5 – 25]		11 [5 – 25]		31 [19 – 79]	
How much time do you spend on social media during the day?										
5-60 minutes	66.5 [43 – 133]	**<0.001 ****	25.5 [14 – 43]	**<0.001 ****	8.5 [5 – 17]	**<0.001 ****	8 [5 – 18]	**<0.001 ****	23.5 [19 – 64]	**<0.001 ****
60-180 minutes	88 [48 – 161]		33 [16 – 53]		12 [5 – 24]		11 [5 – 23]		29.5 [19 – 73]	
180 minutes and more	111 [50 – 169]		42 [16 – 58]		16 [5 – 25]		13 [5 – 25]		40.5 [19 – 79]	

Descriptive statistics were given as median, minimum and maximum depending on the distribution for numerical variables, and as number (%) for categorical variables. *. The Mann-Whitney U test was used. **. Kruskall Wallis H test was used.

While there was a statistically significant difference between the social media addiction scale total score and the occupation sub-dimension mean scores of the university students participating in the study in terms of having applied to psychiatry before (Table 2; p=0.041 and p=0.023, respectively), there was no statistically significant difference between mood regulation, repetition and conflict mean scores (Table 2; p>0.05 for each). Accordingly, the social media addiction scale total score and the occupation sub-dimension mean scores of the students who applied to psychiatry were significantly higher.

Table 3. Comparison of Mindfulness Level scores in terms of demography, psychiatry and social media use

	Mindfulness Level	*p*
Gender		
Female	57 [14 – 79]	0.490*
Male	57.5 [18 – 83]	
Marital Status		
Married	57 [37 – 78]	0.644*
Single	57 [14 – 83]	
Have you applied to psychiatry before?		
Yes	56.5 [14 – 81]	0.228*
No	57.5 [14 – 83]	
Do you use psychiatric medication?		
Yes	57 [20 – 76]	0.602*
No	57 [14 – 83]	
Does anyone in your family have a mental illness? *(Mother, father, siblings, aunt, uncle, uncle)*		
Yes	50 [14 – 76]	**0.001***
No	58 [18 – 83]	
Facebook		
Yes	60 [20 – 83]	0.460*
No	56.5 [14 – 83]	
Instagram		
Yes	57 [14 – 83]	0.781*
No	57 [26 – 78]	
Twitter		
Yes	56 [14 – 83]	0.059*
No	58.5 [14 – 83]	
Youtube		
Yes	57 [14 – 83]	0.851*
No	56 [31 – 78]	
WhatsApp		
Yes	57.5 [14 – 83]	0.434*
No	52.5 [31 – 75]	
Other		
Yes	58 [20 – 75]	0.775*
No	57 [14 – 83]	
How much time do you spend on social media during the day?		
5-60 minutes	61 [36 – 78]	0.063**
60-180 minutes	58 [18 – 81]	
180 minutes and more	55.5 [14 – 83]	

Descriptive statistics were given as median, minimum and maximum depending on the distribution for numerical variables, and as number (%) for categorical variables. *. The Mann-Whitney U test was used. **. Kruskall Wallis H test was used.

It was determined that there was a statistically significant difference between the social media addiction scale total score, and occupation, repetition and conflict score medians in terms of the psychiatric drug use status of the students (p=0.006, p=0.003, p=0.027 and p=0.010, respectively). Accordingly, the mean scores of social media addiction scale, occupation, repetition and conflict scores of students using psychiatric drugs were significantly higher. On the other hand, there was no statistically significant difference between the mood regulation mean scores with respect to the psychiatric drug use status of the students (p=0.107).

The differences between the social media addiction scale total score, and mood regulation, occupation, repetition and conflict mean scores were statistically significant in terms of having a family member with a mental illness (p<0.05 for each). Accordingly, the social media addiction

scale total score, and mood regulation, occupation, repetition and conflict mean scores of students with a family history of mental illness were significantly higher.

The differences between the mean scores of the students' occupation in terms of using Instagram and Twitter were statistically significant (p=0.041 and p=0.17, respectively). Accordingly, the average of occupation scores of students using Instagram and Twitter were significantly higher than those who do not. Similarly, it was observed that there was a statistically significant difference between the mood regulation score medians with respect to Twitter usage status of the students (p=0.028). Accordingly, the mood regulation score median of the students using Twitter was significantly higher. Again, the difference between the medians of conflict scores was statistically significant in terms of the students' Youtube usage status (p=0.039). Accordingly, the conflict score median of the students who used Youtube was significantly higher than the students who did not use YouTube.

Table 4. Correlation between Mindfulness Level score and Social Media Addiction Scale Total Score, and Mood Regulation, Occupation, Repetition and Conflict scores.

	Mindfulness level	
	r	**p**
Social Media Addiction Scale (SMAS)	-0.486	**<0.001**
Occupation	-0.363	**<0.001**
Mood Regulation	-0.312	**<0.001**
Repetition	-0.365	**<0.001**
Conflict	-0.529	**<0.001**

Spearman's rho correlation coefficient was used.

The differences between the social media addiction scale total score, and mood regulation, occupation, repetition and conflict mean scores were statistically significant according to the level of time spent by the students on social media during the day (p<0.05 for each). Accordingly, the social media addiction scale total score, and mood regulation, occupation, repetition and conflict mean scores of the students who spent 180
minutes or more during the day were significantly higher than the students who spent 5-60 minutes and 60-180 minutes. At the same time, the social media addiction scale total score, and mood regulation, occupation, repetition and conflict mean scores of the students who spent 60-18 minutes on social media were significantly higher than the students who spent 5-60 minutes on social mediaIn Table 3, there was a statistically significant difference between the mean scores of the mindfulness level in terms of having a mental illness in the family of the students participating in the study (p=0.001). Accordingly, the mean scores of the mindfulness level of the students who did not have a mental illness in their family were significantly higher than those of the students with a family history of mental illness. On the other hand, it was observed that there was no statistically

significant difference between the mean scores of mindfulness level in terms of gender, marital status, previous application to psychiatry, using psychiatric drugs, social media tools used and time spent on social media during the day ($p>0.05$ for each).

In Table 4, it was determined that there was a statistically significant association between the mindfulness level scores of the students participating in the study and the social media addiction scale total score, and occupation, mood regulation, repetition and conflict scores ($p<0.001$ for each). It was detected that there was a weak correlation between the scores of occupation, mood regulation and repetition while there was a moderate association between the level of mindfulness and the total score of the social media addiction scale and conflict scores

DISCUSSION

In this study, it was aimed to evaluate social media addiction in university students and to examine its association with mindfulness. Of the university students participating in the study, 65.4% (140) were female and 34.6% (74) were male. It was determined that students mostly use Whatsapp (97.2%), Instagram (89.7%) and Youtube (87.9%) among social media tools. It was observed that 46.5% of the students spend 1-3 hours on social media while 32.7% of them spent 3 hours or more.

It was detected in our study that there was no significant difference between the genders in terms of social media addiction. Moreover, our study result was like the study results of Elhai et al. and Guney and Taştepe with respect to no difference according to gender (15,16).

When the association between social media subscales and gender was evaluated, mood regulation subscale scores in women were found to be significantly higher than in men. This result is not surprising because it is thought that women are more

dependent on social media for social communication purposes (19). Moreover, some studies report that women use social media more than men and are addicted (17,18). The result of our study is similar to the literature in this respect. This can be explained by the fact that women feel the need to establish more social relationships in order to improve their emotional state and use social media more for this purpose.

When the results of our study were evaluated, it was found that social media addiction levels were higher in students who had a previous diagnosis of psychiatric disorders, had a family history of mental disorders, and used psychiatric drugs. Studies have shown that social media addiction is associated with depression, anxiety, and social phobia (20, 21, 22). It is not surprising that people with mental disorders are more prone to social media use. For example, a person with social anxiety may prefer to communicate with social media rather than face-to-face communication as it will reduce their anxiety. In our study, which

mental disorders were associated with this was not investigated.

When our results in which we investigated social media addiction and mindfulness were evaluated, it has been shown that students with high levels of mindfulness have lower social media addictions. There is a difference between the groups in terms of all subscales. Mindfulness is rooted in Buddhism meditation and means a clear awareness of the moment (23, 24). In a recent study, it was concluded that social media addiction is less in people with a high level of mindfulness, in line with our study (25). Some studies show that mindfulness-based therapies work in the treatment of behavioral addictions (26). Mindfulness has been shown to increase metacognitive alertness and help people develop positive coping mechanisms (27). For this reason, it can be thought that young people with a high level of mindfulness have better coping mechanisms with stress and therefore are not prone to developing addiction.

CONCLUSION

According to these evaluations, it can be thought that increasing the level of mindfulness among young people and informing them in this field will be beneficial for students in terms of preventing the development of social media addiction. According to these evaluations, it can be thought that increasing the level of mindfulness among young people and informing them in this field will be beneficial for students in terms of preventing the development of social media addiction.

Limitations

Our study has some limitations. Since it is an internet-based study, only the scores obtained from the scales were taken into account and a detailed psychiatric evaluation could not be made. Moreover, the small number of scales applied to the participants can be considered among the limitations.

Ethics Committee Approval: Ethics committee approval dated 17.06.2021 and numbered 151 was obtained before starting the research.

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ODU TIP DERGİSİ/ODU MEDICAL JOURNAL (ODU MED J) **August 2022;9(2):67-72**

RESEARCH ARTICLE

The Free Radical Scavenging Activity of *Crithmum maritimum L.* from the Blacksea Cost

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Abstract
Objective: There is a great deal of research on nutraceuticals and natural compounds obtained by plant extraction to promote health and reduce disease risk. *Crithmum maritimum L.* (*C. maritimum*) from Apiaceae family, also known as the sea fennel, is edible halophyte. This halophyte, made of pickles and consumed among the population, has a high secondary metabolite content. The purpose of this study is to evaluate the free radical scavenging activity of the leaves of *C. maritimum.*
Methods: Aerial parts of *C. maritimum* were collected from the shores of Giresun in May 2018. The leaves of the plant were washed respectively with fresh water and then with distilled water. After they were dried at room temperature in the dark, dried aerial parts were grounded. Ethanol and methanol extracts were prepared of the *C. maritimum* by using soxhlet and evaporator. Then extracts were lyophilized. To determine of free radical scavenging activity, DPPH (1,1-diphenyl-2-picrylhydrazyl) method was applied as spectrophotometrically.
Results: The results were compared with the other standard antioxidants (butylated hydroxytoluene and α-tocopherol). Ethanol and methanol extracts of *C. maritimum* has high radical scavenging activity.
Conclusion: *C. maritimum* leaves, which are known as sea fennel consumed as food, can also be considered as functional food due to its high radical scavenging effect.
Key Words: *Crithmum maritimum L.*, free radical scavenger activity, extract.

***Crithmum maritimum L.*'nin Karadeniz Kıyılarından Serbest Radikal Temizleme Faaliyet**
Özet
Amaç: Sağlığı geliştirmek ve hastalık riskini azaltmak için bitki ekstraksiyonu ile elde edilen nutrasötikler ve doğal bileşikler hakkında çok sayıda araştırma bulunmaktadır. Deniz rezene olarak da bilinen Apiaceae familyasından *Crithmum maritimum L.* (*C. maritimum*) yenilebilir halofittir. Turşudan yapılan ve halk arasında tüketilen bu halofit, yüksek sekonder metabolit içeriğine sahiptir. Bu çalışmanın amacı, *C. maritimum*'un yapraklarının serbest radikal süpürücü aktivitesini değerlendirmektir.
Yöntem: *C. maritimum*'un hava kısımları Mayıs 2018'de Giresun kıyılarından toplanmıştır. Bitkinin yaprakları sırasıyla tatlı su ve daha sonra distile su ile yıkanmıştır. Karanlıkta oda sıcaklığında kurutulduktan sonra kuruyan hava kısımları topraklanmıştır. *C. maritimum*'dan soxhlet ve evaporatör kullanılarak etanol ve metanol ekstreleri hazırlandı. Daha sonra ekstraktlar liyofilize edildi. Serbest radikal süpürme aktivitesini belirlemek için spektrofotometrik olarak DPPH (1,1-difenil-2-pikrilhidrazil) yöntemi uygulandı.
Bulgu: Sonuçlar diğer standart antioksidanlar (bütillenmiş hidroksitoluen ve α-tokoferol) ile karşılaştırıldı. *C. maritimum*'un etanol ve metanol özleri yüksek radikal süpürücü aktiviteye sahiptir.
Sonuç: Gıda olarak tüketilen deniz rezene olarak bilinen *C. maritimum* yaprakları, yüksek radikal süpürücü etkisi nedeniyle fonksiyonel gıda olarak da değerlendirilebilir.
Anahtar Kelimeler: *Crithmum maritimum L.*, serbest radikal süpürücü aktivite, özüt

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INTRODUCTION

There is a great deal of research on nutraceuticals and natural compounds obtained by plant extraction to promote health and reduce disease risk. Natural products such as polyphenols from aromatic plants are important sources in the food and pharmaceutical industries due to their biological activities. Halophytes are among the plants containing bioactive molecules in terms of medicinal and nutritional use (1–3).

Crithmum maritimum L., known as sea fennel, is an aromatic plant belonging to the Apiaceae family and is the only species of the Crithmum genus. Facultative and perennial halophytic plants are widely distributed along the Mediterranean and Atlantic coasts (3). The tops of this plant are edible and can be consumed fresh in brine. In addition, the leaves of *C. maritimum* are rich in macro and micronutrients, vitamins, polyunsaturated fatty acids and beneficial secondary metabolites (4).

Reactive oxygen species (ROS) are formed both as outcome of metabolism and by exogenous agents in cells. The resulting ROS can also cause oxidative damage to various biomolecules in cells, starting from DNA in the cell nucleus, leading to cancer, neurodegenerative diseases and inflammation etc. Different amounts of flavonoids found in plant content are powerful chain-breaking antioxidants. Many studies show that flavonoids have the scavenging activity of free radicals (5,6).

The primary purpose of this research is to evaluate the free radical scavenging activity of ethanol and methanol extracts of the edible plant *C. maritimum* collected from Black Sea coast, Giresun.

METHODS

Plant Materials

Aerial parts of *C. maritimum* were collected from the shores of Giresun in May 2018 (picture 1). The leaves of the plant were washed with fresh water and distilled water, respectively. They were dried at room temperature in the dark place in two days, and then dried aerial parts were grounded by grinder. Ethanol and methanol extracts of the *C. maritimum* were prepared by using soxhlet by adding 250 ml of ethanol and methanol to the grounded material for 5 hours. The alcohol part was separated by cooling back in 337 mbar vacuum at 40 ℃ 100 rpm in the evaporator device, and 175 mbar vacuum at 40 ℃ 100 rpm for ethanol. The remaining pellet part was lyophilized for 24 hours at -80 ℃ in the lyophilizer device. (6).

***Radical scavenging assay* (*DPPH assay*)**

DPPH (1,1-diphenyl-2-picrylhydrazyl) technique applied with spectrophotometer was chosen to detect of free radical scavenging activity of ethanol and methanol extracts of *C. maritimum* as spectrophotometrically (7). In summary, 0.1 mg/ml DPPH solution was prepared in ethanol. One ml of solution was added to 3 ml of extract in ethanol or methanol at various concentrations (6.25, 12.5, 25 and 50 µg/ml). The resulting mixture was left to incubate for 30 minutes at room temperature after shaking. Afterwards, absorbance

at 517 nm was read in a spectrophotometer (UV–VIS Shimadzu). The reference standard compounds (butylated hydroxyanisole (BHA) and alpha-tocopherol) were processed. Assays were repeated triplicate.

The percentage of DPPH radical scavenging measured in plant extracts was obtained by the following equation

% DPPH scavenging= [($A_{c(0)}$517-$A_{A(t)}$517) ÷ $A_{c(0)}$517] X 100

$A_{c(0)}$517 shows the control absorbance at t = 0 minute

$AA_{(t)}$517 shows the extract absorbance at t = 30 minute

Fihure 1. Sea fennels were photographed from the shores of Giresun.

RESULTS

DPPH method was used in this study to measure the ROS elimination of antioxidants. DPPH radical scavenging activity of ethanol extract was found to be between 30 µg/ml - 85 µg/ml at different concentrations (6.25-50 µg/ml). The DPPH radical scavenging activity of the methanol extract is between 46 µg/ml - 85 µg/ml/ Methanol extract of *C. maritimum* has shown more % inhibition of DPPH than ethanol extract of *C. maritimum*. The methanol extract of *C. maritimum* showed greater inhibition of DPPH than the ethanol extract of *C. maritimum*. Inhibition values of methanol extract are closer to alpha tocopherol and BHT inhibition values. The percent inhibition of DPPH by extracts at a dose of 50 µg/ml reached the inhibition level of BHT and alpha tocopherol (Figure 2).

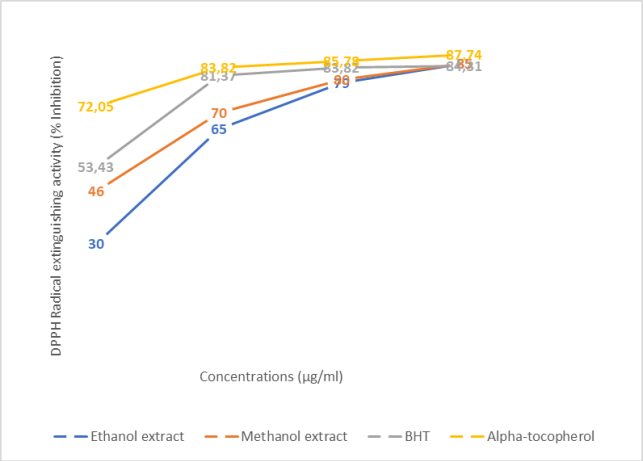

Figure 2. DPPH Radical extinguishing activity (% inhibition) of the ethanol and methanol extracts of *C. maritimum* comparing to the standart antioxidants (BHT and alpha tocopherol).

DISCUSSION

In recent years, studies have been published showing that extracts and bioactive molecules obtained from plants protect human health and

fight against some diseases such as cancer (8). In addition, some plants, which are used in the cuisine of some cultures and known locally but not consumed by everyone, gained a gastronomic potential after the discovery of their remarkable properties in terms of human health. New recipes for such plants have also been produced and consumption demand has also increased. Some components obtained from aromatic plants are also important for the pharmaceutical industries.

Phenolic compounds formed in plants are known as secondary metabolites with promising properties for human health. The favourable effects of these molecules are antioxidant effects such as scavenging free radicals associated with donating hydrogen atoms or electrons or chelating metal cations. These phenolic compounds have a very important role in cell protection. Secondary compounds produced in response to environmental stresses such as drought, excessive UV light and salinity play an active role in cell protection. When we compare the results with other standard antioxidants (butylated hydroxytoluene and α-tocopherol), *C. maritimum* has high radical scavenging activity.

Sea fennel is rich in various chemical compounds. Among the essential oils it contains, there are compounds such as limonene, -pinene, sabinene, p-cimene, -terpinene, -myrcene, thymol (9).

There are different studies similar to the presented study. In the study of Jallali et al., it was reported that the essential oils of the *C. maritimum* species have antibacterial and antioxidant effects (10). In another study, it was aimed to include bioactive compounds extracted from lyophilized *C. maritimum* into ultrasound-assisted sunflower oil (BAE) to improve its biological value and oxidative stability, and it was reported that the oil-transferring bioactive compounds had a high antioxidant effect (11). It has also been reported that *C. maritimum* ethyl acetate extracts have anti-growth effects on hepatocarcinoma cells (12). In a study conducted with the hydro ethanolic extract of *C. maritimum L.* leaves collected from the Sainte Anne du Portzic region of France, many polyphenol contents were determined, and it was reported that it showed a high antioxidant effect by applying methods that determined the radical scavenging effect, including DPPH (13).

CONCLUSION

In conclusion, it is suggested that *C. maritimum*, known as sea fennel, a halophytic plant, is a food consumed with pleasure, as well as being a beneficial functional food for human health as a strong antioxidant due to its radical scavenging effect.

Ethics Committee Approval: Because the study was in vitro, no ethics committee is required.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: A.C, F.U, I.R. Design: A.C, F.U, I.R. Literature search: A.C, F.U, I.R. Data Collection and Processing: A.C, F.U,

I.R. Analysis or Interpretation: A.C, F.U, I.R. Written by: A.C, F.U, I.R.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study hasn't received no financial support.

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ODU TIP DERGİSİ/ODU MEDİCAL JOURNAL (ODU MED J)

August 2021;9(2):73-77

CASE REPORT

Acute Abducens Nerve Palsy after COVID-19 in a Patient with Diabetes Mellitus

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Abstract
Sars-Cov-2 infection, which mostly affects the respiratory tract, can also impact the nervous system. It is one among the virus's neurological symptoms, along with anosmia, agusia, headache, dizziness, and decreased awareness. Occlusive vascular disorders, Miller Fisher Syndrome and cranial nerve palsy are more common due to coronavirus disease-19 (COVID-19). Microvascular peripheral nerve injury is the most common cause of abducens nerve palsy, which recovers spontaneously over time. One of the most common risk factors for microvascular ischemic 6th nerve palsy is diabetes mellitus (DM). The presence of COVD-19 and diabetes is associated with a higher risk of thromboembolic events. We present the abducens nerve palsy that developed after coronavirus disease (COVID-19) in a DM patient without any other diabetes-related complications.
Key Words: COVID-19, diabetes mellitus, nerve palsy

Diabetes Mellitus Olan Bir Hastada COVID-19 Sonrası Akut Abducen Sinir Felci
Özet
Çoğunlukla solunum yollarını etkileyen Sars-Cov-2 enfeksiyonu nörolojik tutuluma da neden olabilir. Anosmi, agusia, baş ağrısı, baş dönmesi ve azalmış farkındalık ile birlikte virüsün nörolojik semptomlarından biridir. Koronavirüs hastalığına (COVİD-19) bağlı olarak Miller Fisher Sendromu, kraniyal sinir felci ve tıkayıcı damar hastalıkları giderek daha fazla bildirilmektedir. Abdusens sinir felci çoğunlukla mikrovasküler periferik sinir hasarından kaynaklanır ve zamanla kendiliğinden düzelir. Diabetes mellitus (DM), mikrovasküler iskemik 6. sinir felci için en yaygın risk faktörlerinden biridir. COVİD-19 ve diyabetin varlığı, daha yüksek tromboembolik olay riski ile ilişkili olabilir. Diyabete bağlı herhangi bir komplikasyonu olmayan bir DM hastasında koronavirüs hastalığı (COVID-19) sonrası gelişen abdusens sinir felcini sunuyoruz.
Anahtar Kelimeler: COVID-19, diabetes mellitus, sinir felci

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INTRODUCTION

Sars-Cov-2 infection, which mostly affects the respiratory tract, can potentially induce neurological complications. It is one among the virus's neurological symptoms, along with anosmia, agusia, headache, dizziness, and decreased awareness. In addition, cranial nerve palsy, occlusive vascular diseases and Miller Fisher Syndrome characterized by the acute onset

of external ophthalmoplegia, ataxia, loss of tendon reflexes are increasingly reported (1-3). Multiple skleroz, tumors, vasculopathies and inflammatory diseases are among the causes of abducens nerve palsy. (4). Microvascular ischemia is an important cause of ocular motor neuropathies. Diabetes mellitus (DM) is also a common cause of microvascular ischemia (5).

We present the abducens nerve palsy that developed after coronavirus disease (COVID-19) in a DM patient without any other diabetes-related complications.

CASE

Figure 1. Limitation of outward gaze was observed in the left eye on motility examination

A 55-year-old female patient presented with the complaint of diplopia. The patient who presented with anosmia, fatigue and respiratory symptoms 15 days ago had a positive nasal swab for Sars-cov-2 polymerase chain reaction. The patient used oral favipiravir for 5 days. Diplopia presented one week after the patient's respiratory symptoms had improved. In his ophthalmologic examination, best corrected vision was 10/10 in both eyes, and the intraocular pressure was 14 mmHg on the right and 16 mmHg on the left. There was no afferent pupillary defect. Anterior segment and fundus were normal in the examination with slit lamp. Eye movements were evaluated. There was limited outward gaze in the left eye (Figure 1). Left abducens palsy was considered. Neurological examination was normal. He had diabetes mellitus for 20 years and was using 1 g metformin and insulin aspart subcutaneously. However, no signs of diabetic retinopathy were found in fundus examination. He had no other additional disease. Blood pressure and hemodynamic values were within normal limits (Bp = 120/80 mmHg, heart rate = 72 ppm, SpO2 = 98%, respiratory rate = 20 bpm). Complete blood count was within normal limits. Sedimentation was 38, HbA1c was 11.4, fasting blood sugar was 240. Magnetic resonance angiography (MRA) and magnetic resonance imaging (MRI) revealed no abnormalities (Figure 2).

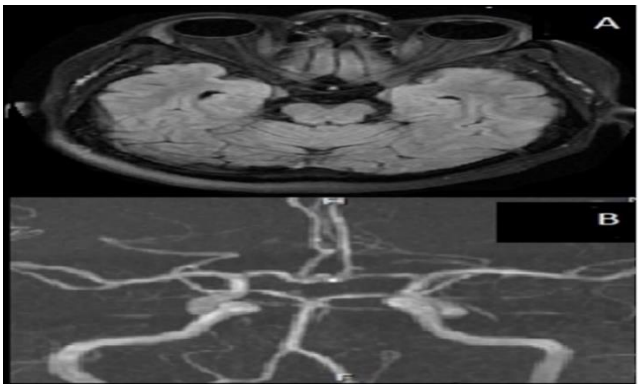

Figure 2. Cranial magnetic resonance imaging (A) and magnetic resonance angiography (B) image is normal

Monocular occlusion was recommended to the patient to alleviate diplopia and follow-up was

planned. After 3 months, diplopia and limitation of gaze were completely resolved. Written informed consent for the images and patient information were obtained from the patient herself for publication

DISCUSSION

Abducens nerve palsy is an important cause of diplopia and is the most common isolated ocular nerve palsy. Trauma, vascular disease, tumor, aneurysm, infection, and inflammatory illnesses can all be the cause of abducens nerve palsy. The incidence of abducens nerve palsy is thought to rise with age, according to recent data from a country's insurance database, and its causes are primarily thought to be vascular (56.6%), idiopathic (27.2%), neoplastic (5.6%) or traumatic (4.9%). It is known that it is frequently caused by microvascular diseases. Diabetes is the most common disease among these diseases. In addition, thromboembolic events have been associated with COVİD-19 infection. COVID-19 causes microvascular ischemia by causing vascular thrombus. In the early stages of infection with COVID-19, fibrinogen and D-dimer/fibrin(ogen) degradation products are markedly elevated. This is linked to frequent venous thromboembolic episodes and systemic hypercoagulability (10). The coexistence of COVİD-19 and diabetes appears with an increased incidence of thromboembolic events. We present a case of abducens nerve palsy in a 55-year-old diabetic patient who recently had COVİD-19.

COVİD-19 can progress with neuroophthalmological findings by causing central nervous system involvement along with respiratory tract involvement. Systemic problems such as post viral inflammatory syndrome, cardiovascular disease, and uncontrolled hypertension are involved in the pathogenesis of neuroophthalmological symptoms. Hematological spread and viral invasion can also lead to neuroophthalmologic symptoms. Abducens palsy, oculomotor nerve palsy, Miller-Fisher Syndrome are previously reported cases (1,2,4,6)

Microvascular peripheral nerve injury is the most common cause of abducens nerve palsy, which recovers spontaneously over time. The most common risk factors for microvascular ischemic 6th nerve palsy are diabetes and arterial hypertension. Other risk factors have also been identified, including hyperlipidemia, coronary artery disease, and left ventricular hypertrophy (5). The most significant risk factor in our case was uncontrolled diabetes. The HbA1c level was 11.4%, but no evidence of end-organ damage was found.

In a study including 66 patients who developed cranial neuropathy, microvascular ischemic etiology was revealed in 57 patients. Microvascular ischemic ophthalmoplegia is characterized by sudden onset, transient pain and

absence of other neurological findings (7). Similar findings were also present in this case. In our case, complete blood count and sedimentation were performed to exclude temporal arteritis. Complete blood count was normal. The sedimentation height was thought to be related to COVİD-19.

Sars-cov-2 infection can cause neuroophthalmologic symptoms ranging from gaze palsy to severe vision loss and cerebrovascular attacks. Visual loss due to central retinal artery occlusion and occipital infarcts have been reported (6). Brouwer et al. reported the possible etiology of stroke in COVİD-19. They suggested that a coagulation system activation, embolism and inflammatory response occurs that can lead to cerebral infarction (8). In our case, imaging methods were used to determine the etiology. Cranial magnetic resonance imaging (MRI) was normal, ruling out other causes. In similar case reports, it has been shown that MRI may be normal in isolated 6th nerve palsy with vascular risk factors (9).

CONCLUSION

In the presence of risk factors such as diabetes, Sars-cov-2 infection can lead to ischemic cranial neuropathies. The abducens nerve palsy following COVD-19 in a diabetic patient without diabetic retinopathy or end organ damage was presented in this research. Although Sars-cov-2 infection is a significant risk factor for microvascular ischemia consequences on its own, when combined with other risk factors, it can lead to more serious clinical difficulties.

Ethics Committee Approval: The consent form was filled out in participant.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: HBK, Design: HBK, BE, Literature search: HBK, Data Collection and Processing: HBK, Analysis or Interpretation: HBK, BE Written by: HBK

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study hasn't received no financial support.

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ODU TIP DERGİSİ/ODU MEDİCAL JOURNAL (ODU MED J) **August 2022;9(2):78-82**

RESEARCH ARTICLE

Case Report: Cervical Synovial Cyst

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Abstract
Cervical synovial cysts are unusual extradural lesions that can cause radiculopathy or spinal cord compression. This case report presents a patient with a cervical synovial cyst and discusses the clinical, radiological, and surgical features of these rare lesions.
A 77-year-old male patient presented with a history of progressive gait disturbance, imbalance, and back pain. Cervical magnetic resonance imaging revealed a spherical, extradural lesion adjacent to the C4-C5 facet joints. The radiology department reported an 11-mm synovial cyst obliterating the subarachnoid space and indenting from the right posterolateral. Laminectomy was performed, and an extradural cystic mass originating from the degenerated facet joint was detected at C4-5, compressing the medulla at that level. Since the lesion was adherent to the cord, first the integrity of the lesion wall was disrupted, and then the lesion was excised. The postoperative period was uneventful, and the patient's neurological condition rapidly improved.
It is important to include synovial cysts in the differential diagnosis of any extradural spinal lesions considering that these cysts have important implications for surgical management.
Key Words: Cervical spine, faset joint, juxta cyst, synovial cyst

Olgu Sunumu: Servikal Sinovyal Kist
Özet
Servikal sinovyal kistler, radikülopati veya omurilik kompresyonuna neden olabilen sıra dışı ekstradural lezyonlardır. Bu yazının amacı bir servikal sinovyal kist olgusunu tanımlamak ve bu nadir lezyonların klinik, radyolojik ve cerrahi özelliklerini tartışmaktır.
77 yaşında erkek hasta, ilerleyici yürüme bozukluğu, dengesizlik ve sırt ağrısı öyküsü ile başvurdu. Servikal manyetik rezonans görüntüleme, C4-C5 faset eklemlerine bitişik küresel, ekstradural bir lezyon saptadık.Subaraknoid boşluk oblitere eden ve sağ posterolateralden indentasyon gösteren 11 mm lik synavial cist olduğu radyoloji bölümü tarafından rapor edildi. Bir laminektomi yapıldı ve C4-6'5da dejenere faset ekleminden kaynaklanan ekstradural kistik bir kitle tespit edildi. O seviyede medullayı sıkıştırıyordu. Lezyon korda yapışık olduğu için duvarı bozularak eksize edildi.Postoperatif dönem sorunsuz geçti ve hastanın nörolojik durumu hızla düzeldi.
Herhangi bir ekstradural spinal lezyon için ayırıcı tanıda sinovyal kistlerin dahil edilmesi önemlidir, çünkü bu kistlerin cerrahi tedavi için önemli etkileri vardır.
Anahtar Kelimeler: Servikal omurga, juxta faset kisti, sinovyal kist.

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INTRODUCTION

Synovial cysts are common, especially in the wrist and hand (6). The localization of synovial cysts in the spine is relatively rare, and cervical synovial cysts are even rarer. With the increasing use of magnetic resonance imaging, the diagnosis of synovial cysts has increased. Symptoms may include pain, radiculopathy, or myelopathy. This is

the author's first case of cervical synovial cyst. The patient was a 77-year-old man with a symptomatic synovial cyst at the C4-5 level.

CASE

The patient first presented to the emergency department with the complaints of back pain, imbalance, and gait disturbance for three to four days. No pathology was detected on diffusion magnetic resonance imaging (MRI), and therefore the patient was referred to the neurology outpatient clinic. In the examination performed in that clinic, a 4/5 loss of strength was detected in the grip of the right hand in the upper extremity. Deep tendon reflexes were determined to be hypoactive in the upper extremity and brisk in the lower extremity and ataxic gait was observed. The results of the cerebellar tests were normal, and the muscle strength in the lower extremity was complete. No abnormal electrophysiological finding was obtained from electromyography. Based on these physical examination findings, the possibility of a cervical pathology was considered, and cervical MRI was taken. On MRI, the appearance of the entity was consistent with a synovial cyst in the facet joint at the C4-5 level, and therefore the patient was referred to our clinic for consultation (Figure 1).

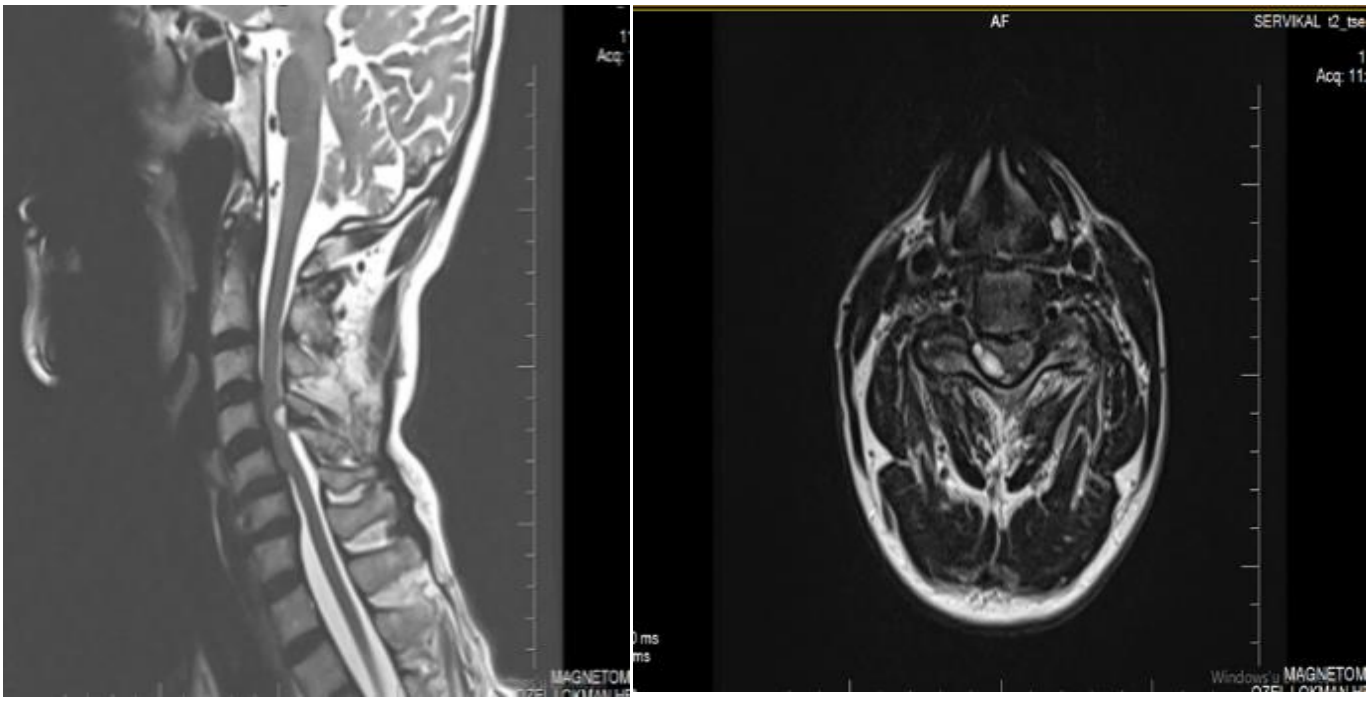

Figure 1. Preoperative MRI

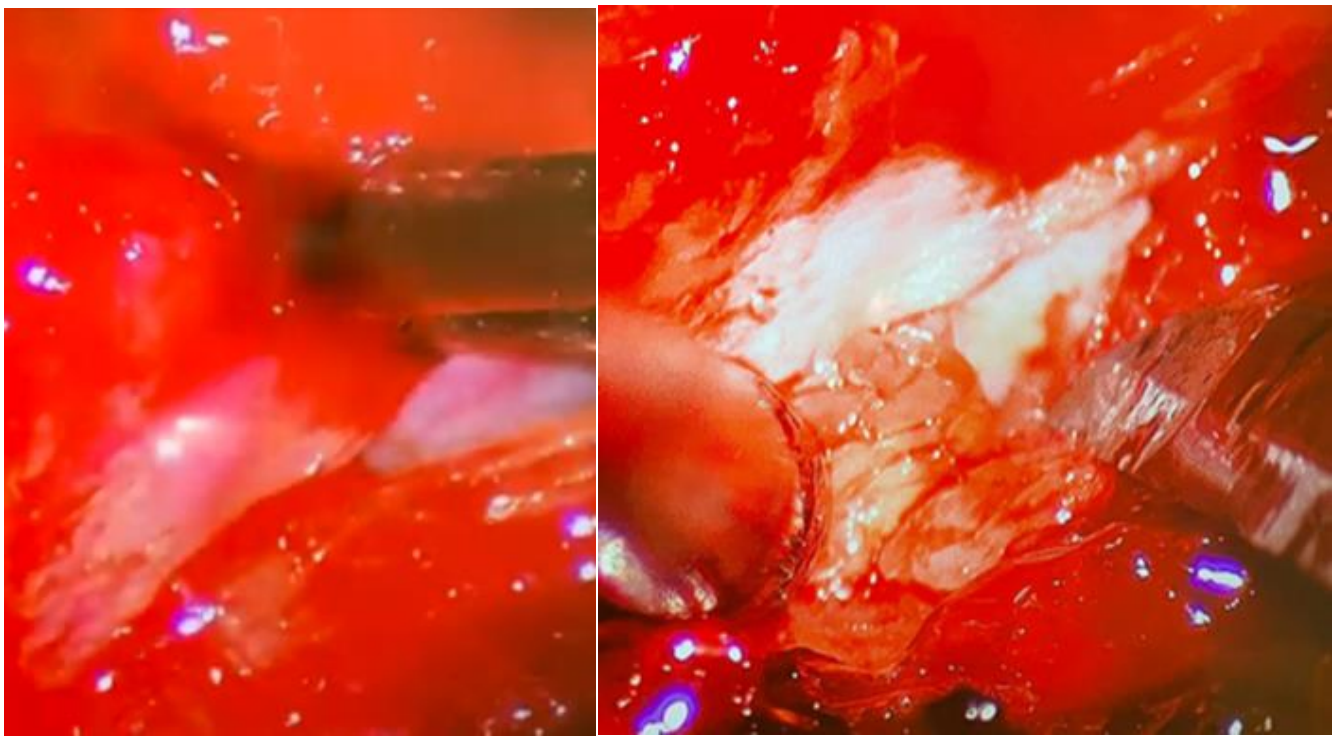

Figure 2 . Intraoperative image

After the preoperative consultations and examinations were completed, the patient underwent surgery at the by the Neurosurgery Clinic of Lokman Hekim University. During the operation, a skin incision between C3 and C7 was made, the cervical lamina was reached, the distance was confirmed under scopi and C4-5 right laminectomy was performed. Since the lesion was adhered to the cord, it could not be separated (Figure 2). The cyst wall was cut with a scalpel no. 15, and a gray, thick, viscous fluid was drained. The wall of the cyst was completely opened. The cord became visible from the lower part. The operation was terminated after observing that the cord was decompressed. Postoperatively, there was a prominent decrease in the patient's complaints and improvement in his gait, and he was discharged from the hospital two days after the operation.

DISCUSSION

Synovial cysts are most common in the wrists and hands but are rarer in the spine. Since they were first described by Von Gruker in 1880, more than 200 cases of lumbar degenerative synovial cysts have been reported in the literature (5). However, the natural course and mechanism of the formation of intraspinal synovial cysts are not yet fully understood. Evidence indicates the presence of degenerative processes that produce hyperplasia and fluid exudation in the facet joint, resulting in the formation of a cyst. In most cases, cysts tend to enlarge (4). Only 28 cervical synovial cysts have been described in the literature (2). Two-thirds of reported cases are at the C1-2 level, which is usually associated with rheumatoid arthritis. The

remaining described cysts are mostly at the cervicothoracic junction. The mean age of patients with intraspinal cysts has been reported to be 60.8 years. Symptoms include pain, radiculopathy, or myelopathy (3). Most reported cases have been treated surgically. One case report described the spontaneous resolution of a cervical synovial cyst (1). There are cases of computer tomography-guided percutaneous aspiration/injection attempts reported in the lumbar spine but not in the cervical spine (7). We did not find any reports on cyst recurrence after surgical resection in the literature.

In our research, the prevalence of visual disability was 82.8 per ten thousand, the prevalence of low vision was 71.0 per ten thousand, and the prevalence of blindness was 11.8 per ten thousand, and it was found that these rates increased with age.

The first five causes of visual disability are respectively; cataract, age-related macular degeneration, genetic-hereditary causes, refractive error, and accidents and, cataract is the most important cause of blindness and low vision.

It has been revealed that most of the causes of visual disability are preventable and treatable causes. To prevent or reduce visual disability, field scans and early diagnosis and treatment services must be extended.

For cataract treatment (surgery), resources should be increased, and services should be provided specially to underdeveloped regions.

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