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Does Migraine Prophylaxis Improve Overactive Bladder Symptoms? Prospective Observational Study

Migren Profilaksisi Aşırı Aktif Mesane Semptomlarını İyileştirir mi? Prospektif Gözlemsel Çalışma

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Abstract

Objective: In this study, we aimed to investigate whether there would be any improvement in symptoms of overactive bladder (OAB) after migraine prophylaxis in patients with chronic migraine (CM) and OAB.

Materials and Methods: The study group consisted of women aged 19 to 64 years diagnosed as CM according to current International Headache Society criteria, and OAB using the OAB-V8 (Overactive Bladder Inquiry Form - V8) and ICIQ-SF (International Consultation on Incontinence Questionnaire Short Form) forms as well as clinical evaluation in the neurology and urology clinics. 63 patients informed and agreed to enter the study were started migraine prophylaxis and evaluated after 6 months for comparison of pre-treatment and post-treatment VPS (visual pain scale), OAB-V8, and the ICIQ-SF scores. Flunarizine, topiramate, venlafaxine and propranolol were used in the treatment of patients.

Results: The mean age of 63 women included in the study was 39.15 ± 8.74 (19-64) years. The mean Body Mass Index (BMI) of the patients was determined as 25.41 ± 3.64 (16.4-35.6) kg/m^2. After migraine prophylaxis, VPS, OAB-V8 and ICIQ-SF scores decreased significantly in the entire patient group ($p<0.05$). Statistically significant changes were found in the values of VPS, OAB-V8 and ICIQ-SF in the topiramate or propranolol treated groups. In the flunarizine group, there was a significant statistical response in the VPS and OAB-V8 scores, while there were no significant changes in the ICIQ-SF and OAB-V8 scores in the venlafaxine-treated group.

Conclusion: The beneficial effect of migraine prophylaxis on OAB symptoms support somewhat shared etiopathogenesis for both disorders. However, the series is small and considering the involvement of multifactorial factors and complex physiopathology for both disorders further studies are necessary to reveal the underlying mechanisms and clinical impacts.

Keywords: Migraine, overactive bladder, incontinence, neurourology, functional urology

Özet

Amaç: Bu çalışmada kronik migren ve komorbid olarak aşırı aktif mesane semptomları olan hastalarda migren profilaksisi sonrası aşırı aktif mesane semptomlarında düzelme olup olmayacağını araştırmayı amaçladık.

Gereçler ve Yöntemler: Çalışma grubu, mevcut Uluslararası Baş Ağrısı Derneği kriterlerine göre kronik migren tanısı alan 19-64 yaş arası kadınlardan oluşmaktaydı. Kronik migrene komorbid olarak aşırı aktif mesanesi olan vakalar çalışmaya dahil edilme kriterlerine göre seçildi. OAB-V8 (Aşırı Aktif Mesane Sorgulama Formu - V8) ve ICIQ-SF (Uluslararası İnkontinans Danışma Anketi Kısa Formu), VAS (vizüel ağrı skala) formları uzman nörolog ve ürolog tarafından değerlendirildi. Bilgilendirilen ve çalışmaya katılmayı kabul eden 63 hastaya migren profilaksisi başlandı. Tedavi başlangıcında ve tedavi sonrası altıncı ayda anketler tekrar uygulandı. Hastaların tedavisinde flunarizin, topiramat, venlafaksin ve propranolol kullanıldı.

Bulgular: Çalışmaya dahil edilen 63 kadının yaş ortalaması 39.15 ± 8.74 (19-64) yıldı. Hastaların ortalama vücut kitle indeksi 25.41 ± 3.64 (16.4-35.6) kg/m^2 olarak belirlendi. Migren profilaksisinden sonra; VAS, OAB ve ICIQ skorları anlamlı olarak azaldı ($p <0.005$). Topiramat veya propranolol ile tedavi edilen gruplarda VAS, OAB-V8 ve ICIQ-SF değerlerinde istatistiksel olarak anlamlı değişiklikler bulundu. Flunarizin grubunda VPS ve OAB-V8 skorlarında anlamlı istatistiksel değişiklikler saptanırken, venlafaksin ile tedavi edilen grupta ICIQ-SF ve OAB-V8 skorlarında anlamlı bir değişiklik tespit edilmedi.

Sonuç: Migren profilaksisinin aşırı aktif mesane semptomları üzerindeki yararlı etkisi, her iki hastalık içinde ortak olabilecek etiyopatogenezi desteklemektedir. Ancak, çalışma serimiz küçüktür ve her iki hastalık için de çok faktörlü ve karmaşık fizyopatolojinin katılımı göz önüne alındığında, altta yatan mekanizmaları ve klinik etkileri ortaya çıkarmak için daha geniş kapsamlı çalışmalar gereklidir.

Anahtar kelimeler: migren, aşırı aktif mesane, inkontinans, nöroüroloji, fonksiyonel üroloji

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Introduction

Chronic migraine (CM) is a disease that negatively affects the quality of life of individuals, and it is more common in women, it affects approximately 12% of the general population. Similarly, overactive bladder (OAB), the most common subtype of urinary incontinence, has also an adverse effect on life quality. Unfortunately, most women hardly reveal their complaints, living with the course despite worsening of OAB symptoms. Altman et. al. have documented the association between OAB and various somatic disorders [1]. The comorbidity between CM and OAB was also supported by other studies, however, both disorders have complex multifactorial etiopathogenesis affected by both environmental and genetic factors [2]. Thus, the physiopathological basis of the possible association between CM and OAB remains obscure. Based on the study in which we found an association between CM and OAB; suspecting a common etiopathogenesis behind the comorbidity, we aimed to determine whether migraine prophylaxis would affect the symptom severity of OAB [3]. Thus, we evaluated the changes in OAB symptoms in patients given migraine prophylaxis treatment.

Materials and Methods

The study was a cross-sectional prospective study approved by the Hitit University School of Medicine Ethics Committee (349/06.01.2021) and conducted by STROBE guidelines for reporting observational studies (www.strobestatement.org) and the Declaration of Helsinki. All participants gave informed consent for this study.

This study group consisted of women aged 19 to 64 years diagnosed as CM according to the International Headache Society (IHS) criteria [4]. Patients were evaluated by urology and neurology physicians according to exclusion and inclusion criteria and participated in the study. The exclusion criteria were determined as follows: Urinary tract infection, neurogenic bladder and other etiology that can cause a neurogenic bladder (such as spinal cord injury, peripheral nerve disease), history / diagnosis of interstitial cystitis, lower urinary tract symptoms due to bladder stone and pelvic mass, symptomatic or severe pelvic organ prolapse, vaginal cancers, concomitant diseases that cause fluid shifts, such as congestive heart failure, cirrhosis, and pulmonary edema, use of diuretics and similar medicines, excessive fluid consumption (assessed by at least 3 days of voiding diary).

Questionnaires and Definitions

The individuals participating in the study were evaluated by the neurology and urology physician with a study questionnaire consisting of four parts; (I) Patient demographics; the gender, age, body mass index (BMI) of the participants, (II) Migraine ID test for the diagnosis of CM, which was any headache occurring ≥ 15 days per month for at least 3 months with migraine features on ≥ 8 days every month, headache without excessive drug use and non-attributable to another reason, and the visual pain scale (VPS) scored between 0 and 10 points for qualitative evaluation of migraine pain, (III) OAB-V8 (Overactive Bladder Inquiry Form - V8) [5], (IV) ICIQ-SF (International Consultation on Incontinence Questionnaire Short Form [6].

Accordingly, patients diagnosed as having both CM and OAB were identified and evaluated as reported before [3]. In this study, we aimed to investigate whether there would be any improvement in symptoms of OAB after migraine prophylaxis in patients with CM and OAB, as a follow-up. Patients informed and agreed to enter the study who were started migraine prophylaxis were evaluated after 6 months using the VPS, OAB-V8, and ICIQ-SF forms. Pre-treatment (before prophylaxis) and post-treatment (after prophylaxis) symptoms were compared. There was a total of 63 women patients included in the study. Migraine prophylaxis was made using topiramate (22 patients), venlafaxine (14 patients), propranolol (12 patients), and flunarizine (15 patients), according to doctor and patient preference and related health issues, however, drugs that would affect bladder dynamics and used in the treatment OAB were avoided. Multiple agents were used and randomly selected (if no comorbid condition necessitating the need for a particular preference was present such as depression or epilepsy) to prevent selection bias and specific drug effects. None of the patients included in the study was given any medication for the treatment of OAB as this could certainly affect the results.

Statistical Analysis

Statistical analyses were performed using SPSS (Version 22.0, SPSS Inc., Chicago, IL, USA Hitit University Licensed) package program. The mean age of 63 women included in the study was 39.25 ± 9.21 (19-64) years. The mean BMI of the patients was determined as 25.29 ± 3.61 (16.4-33.3) kg/m^2. Our analyses were performed with the SPSS 22.0 program and were studied at a 95% confidence level. In our analysis, parametric dependent groups t-test and ANOVA test were used. The Analysis of the pre-and post-treatment in the group separation and the whole group was analyzed by the dependent group's t-test.

Results

In the topiramate group; the VPS score change is significant ($p<0.05$). While the mean before the treatment was 6.77, it decreased to 3.91 with a decrease of 2.86 points after treatment. OAB score change is significant ($p<0.05$). While the average was 15.23 before treatment, it decreased to 10.55 with a decrease of 4.68 points after treatment. ICIQ-SF score change is significant ($p<0.05$). While the average was 5.95 before treatment, it decreased to 4.45 with a decrease of 1.50 points after treatment.

In the venlafaxine group; the change in VPS score is significant ($p<0.05$). While the average was 6.64 before treatment, it decreased to 4.50 with a decrease of 2.14 points after treatment. The change in OAB-V8 and ICIQ-SF scores is not significant ($p>0.05$).

In the propranolol group; the change in VPS score is significant ($p<0.05$). While the average was 7.00 before treatment, it decreased to 3.25 with a decrease of 3.75 points after treatment. OAB-V8 score change is significant ($p<0.05$). While the average was 15.58 before treatment, it decreased to 9.42 with a decrease of 6.17 points after treatment. ICIQ-SF score change is significant ($p<0.05$). While the average was 7.33 before the treatment, it decreased to 4.42 with a decrease of 2.92 points after treatment.

Table 1. Investigation of pre-and post-treatment variation in the whole group and between drug groups

Group		Mean	SD	Change	t	p
Topiramate	Pre. T. VPS.	6,77	0,97	2,86	5,016	**,000***
	Post. T. VPS.	3,91	2,16			
	Pre. T. OABS	15,23	7,46	4,68	4,092	**,001***
	Post. T. OABS	10,55	5,27			
	Pre. T. ICIQS	5,95	3,68	1,50	2,925	**,008***
	Post. T. ICIQS	4,45	3,05			
Venlafaxine	Pre. T. VPS	6,64	1,08	2,14	3,944	**,002***
	Post. T. VPS	4,50	2,10			
	Pre. T. OABS	13,86	6,68	3,50	2,147	,051
	Post. T. OABS	10,36	5,14			
	Pre. T. ICIQS	6,00	3,14	1,36	2,032	,063
	Post. T. ICIQS	4,64	2,87			
Propranolol	Pre. T. VPS	7,00	1,41	3,75	7,156	**,000***
	Post. T. VPS	3,25	1,82			
	Pre. T. OABS	15,58	5,21	6,17	5,679	**,000***
	Post. T. OABS	9,42	5,33			
	Pre. T. ICIQS	7,33	2,19	2,92	4,037	**,002***
	Post. T. ICIQS	4,42	1,83			
Flunarizine	Pre. T. VPS	6,27	1,10	1,53	3,617	**,003***
	Post. T. VPS	4,73	1,44			
	Pre. T. OABS	14,73	7,87	3,40	2,241	**,042***
	Post. T. OABS	11,33	6,01			
	Pre. T. ICIQS	5,93	4,38	1,47	1,798	,094
	Post. T. ICIQS	4,47	4,03			
Total	Pre. T. VPS	6,67	1,12	2,56	8,991	**,000***
	Post. T. VPS	4,11	1,96			
	Pre. T. OABS	14,87	6,88	4,40	6,489	**,000***
	Post. T. OABS	10,48	5,34			
	Pre. T. ICIQS	6,22	3,48	1,73	5,200	**,000***
	Post. T. ICIQS	4,49	3,03			

Pre-T VPS: Pre-treatment vısual pain scale; Post-T VAS: Post-treatment vısual analog scale; Pre-T OABS: Pre-treatment Overactive Bladder Inquiry Form Score; Post-T OABS: Post-treatment Overactive Bladder Inquiry Form Score; Pre-T ICIQS: Pre-treatment International Consultation on Incontinence Questionnaire Score; Post-T ICIQS: Post-treatment International Consultation on Incontinence Questionnaire Score

In the flunarizine group; the change in VPS score is significant ($p<0.05$). While the average was 6.27 before treatment, it decreased to 4.73 with a decrease of 1.53 points after treatment. OAB-V8 score change is significant ($p<0.05$). While the average was 14.73 before treatment, it decreased to 11.33 with a decrease of 3.40 points after treatment. ICIQ-SF score change is not significant ($p>0.05$).

In the whole patient group; the change in VPS score is significant ($p<0.05$). While the average was 6.67 before treatment, it decreased to 4.11 with a decrease of 2.56 points after treatment. OAB-V8 score change is significant ($p<0.05$). While the average was 14.87 before treatment, it decreased to 10.48 with a decrease of 4.40 points after treatment. ICIQ-SF score change is significant ($p<0.05$). While the average was 6.22 before treatment, it decreased to 4.49 with a decrease of 1.73 points after treatment.

ANOVA test was used to examine the pre-and post-treatment questionnaires in terms of drug groups. There were no significant differences between the drug groups in terms of VAS, OAB-V8, and ICIQ-SF measurements before and after treatment ($p>0.05$). Table 1 summarized the investigation of pre-and post-treatment variation in the whole group and between drug groups.

Discussion

Migraine is a lifespan neurological disorder. Migraine involves recurrent, severe head pain and associated various symptoms while attacks evolve over different phases with specific neural mechanisms and symptoms. In some patients, migraine can develop into a chronic form and adversely affect a person's social life. The mechanisms behind the chronic migraine remain detailed and unknown, genetic, epigenetic factors, inflammatory processes, environmental triggering, and central sensitization might play an important role [7].

Preventive therapy for migraine aims to decrease headache frequency and severity for a better quality of life and progression to CM for episodic patients. There are many agents used for migraine prophylaxis with individual benefits and drawbacks affecting the selection. Beta-blockers; metoprolol, and propranolol are beneficial in hypertensive while the antidepressants like amitriptyline and venlafaxine are preferred in patients with depression or anxiety disorders, and insomnia. Anticonvulsants; valproate acid and topiramate can be used. Especially in women of childbearing age or patients with Raynaud's phenomenon calcium channel blockers, verapamil, and flunarizine might be prescribed. Among other agents are calcitonin gene-related peptide antagonists like erenumab, and galcanezumab [8].

OAB is a condition defined as urinary urgency, usually accompanied by frequent urination and nocturia, with or without urgency urinary incontinence, in the absence of urinary tract infection or other obvious pathology [9]. Urinary incontinence, like a migraine, negatively affects the psychological health and quality of life of women [10]. Unfortunately, few people seek help for this symptom because of embarrassment and stigma [11]. Urinary incontinence accompanying CM will worsen both the quality of life and stigmatization. Both CM and OAB are common in women over the age of 40 and their prevalence will increase over the years due to increasing awareness [12,13].

The comorbidity between CM and OAB will also be supported by comprehensive studies. Both disorders have common factors underlying the relationship in etiopathogenesis, as well as their complex multifactorial etiopathogenesis that remains unclear.

When we examined the literature, we encountered publications that could explain similar etiopathogenesis. Activation of the trigeminovascular system results in the release of vasoactive neuropeptides particularly calcitonin gene-related peptide (CGRP) that induce vasodilation and neurogenic inflammation in leptomeningeal and extracranial vessels causing acute migraine pain. Repeated peripheral activation might sensitize central pain pathways, transforming episodic migraine into a chronic condition in predisposed patients. Similarly, women with OAB have increased density of suburothelial nerve fibers that are immune-reactive for CGRP supporting that increased, aberrant sensory afferent activity might be a factor in OAB pathophysiology [14,15].

Botulinum toxin A treatment is effective in both OAB and CM [16]. Botulinum toxin A has been shown to reduce increased CGRP levels in CM patients [17] and to inhibit CGRP release in the bladder of experimental animals [18]. Finally, central brain structures implicated in OAB and CM pathophysiology, such as the prefrontal cortex, hypothalamus, or periaqueductal grey nuclei are common [19]. The association between CM and OAB based on shared pathophysiological mechanisms should be supported by further epidemiological studies. In clinical practice, CM as well as OAB patients could be warned about possible comorbidity. In this study, we aimed to determine whether migraine prophylaxis would affect the symptom severity of OAB, and to our knowledge, this is the first study. Based on our previous "Clinical Reflection of OAB Migraine Comorbidity: Prospective Cross-sectional study" data, we compared the VPS scores and OAB symptom scores of CM patients with OAB after six months of prophylactic migraine treatment and found that patients had a regression in both VPS, ICIQ-SF scores and OAB symptoms.

Migraine and OAB are two diseases that both affect the quality of life and psychosocial health. Getting relief, the migraine pain might provide better tolerance and struggle for OAB symptoms. Thus, a psychological benefit and better self-esteem might be responsible for the beneficial effect of migraine prophylaxis on OAB symptoms. It is important not only to feel healthy but also to get rid of the psychological stress of CM and/or OAB symptoms. However, symptoms of OAB hurt the quality of life as these patients are required to identify toilet locations before leaving home and avoid collective activities. Thus, the physical and psychosocial problems of OAB might be hardly bearable in some patients themselves. Similarly, migraine attacks also cause a person to stay away from social activities.

Similar lifestyle changes are recommended in the treatment of migraine and OAB. Lifestyle changes are advised in both disease processes and found to be beneficial but usually insufficient. For OAB, adequate and appropriate fluid intake is advised. Insufficient fluid intake or fluid restriction may play a role in the development of urgency, frequent urination, and urinary tract infections by increasing urine concentration, irritating the bladder mucosa, and reducing the functional capacity of the bladder [19,20]. Studies have shown that the removal of artificial sweeteners and food such as highly spicy foods, citrus fruits, and tomato-containing products from the diet can play a role in the treatment of incontinence [21]. It is recommended to use similar dietary restrictions in migraine patients to reduce the frequency of attacks. As stated, before none of the patients included in the study was given any medication for the treatment of OAB, such as muscarinic receptor antagonists, beta-3 agonists, and desmopressin as this could certainly affect the results. Also, conservative measures specific to OAB were neglected such as timed voiding, special dietary habits (like avoidance of caffeine), and so on. Sleep adjustment, adequate fluid intake, diet, and weight control in necessary patients were recommended for migraine patients. Similar measures might be beneficial for OAB symptoms. Adequate and appropriate fluid intake serves as a quick washout of irritants from the bladder and produces diluted urine [19,20]. Nuotio et al., in their population-based study involving 1059 women and men between the ages of 60 and 89, found a relationship between smoking and urinary urgency, but it was not confirmed by others [22-24]. As studies have shown the relationship between smoking and migraine, cessation of smoking should be recommended in comorbid patients [25]. Nevertheless, lifestyle and dietary adjustments can help manage both migraine and OAB symptoms and quality of life improvement. We have recommended the above-mentioned lifestyle recommendations in addition to prophylactic treatment in CM, thus the regression in OAB symptoms might be partially

influenced. In OAB clinical spectrum conservative measures are usually insufficient in most of the patients, thus attributing the benefit solely to lifestyle changes is not logical.

OAB results in a decrease in the quality of life and an increase in both sensory and affective qualities of pain [26]. The severity of pain is increased in parallel with the severity of symptoms in OAB patients. This result, independent of the effect of OAB on emotional state, supports the hypothesis that central sensitization predisposes to pain syndromes in the pathophysiology of OAB. According to these results, it can be emphasized that patients with OAB may be predisposed to pain syndromes as well as lower urinary tract symptoms and that clinicians should consider this during the evaluation of patients [27].

A study in the literature found that about 30% of OAB patients were accompanied by depression, and these patients complained of more severe OAB symptoms [28]. Some of the agents used in migraine prophylaxis are antidepressants and serve dual benefits, especially in these cases. Tricyclic antidepressants are competitive antagonists of muscarinic acetylcholine receptors, the predominant class of acetylcholine receptors in the brain. However, these agents also block muscarinic receptors in other sites of the body producing symptoms such as blurred vision, dry mouth, and urinary retention. Antidepressants particularly amitriptyline are used in migraine prophylaxis and avoided in this study because of marked anticholinergic properties that are beneficial for OAB patients. Topiramate is an antiepileptic and carbonic anhydrase inhibitor used to treat chronic migraines and does not affect the bladder. Antidepressants, venlafaxine is a serotonin-norepinephrine reuptake inhibitor and receptor data state anticholinergic effects are minimal. However anticholinergic side effects including dry mouth and constipation might be encountered. It is not expected to be beneficial for symptoms of OAB in its therapeutic range. Flunarizine is a calcium antagonist and does not affect the bladder. As stated before drugs that would affect bladder dynamics and be used in the treatment of OAB were excluded and multiple agents were used and randomly selected to prevent selection bias and specific drug effects. None of the patients included in the study was given any medication for the treatment of OAB as this could certainly affect the results. Although the small number of cases in our study is considered a limitation, statistically we obtained significant results in all drug subgroups. We could not obtain statistically significant results in OAB-V8 and ICIQ-SF in the venlafaxine group and ICIQS total scores in the flunarizine group. We think that we will shed light on studies aimed at etiopathogenesis with extensive studies involving more cases.

Conclusion

The association between migraine and OAB was confirmed and supported by the favorable effect of CM prophylaxis on OAB symptoms in this study. The beneficial effect of migraine prophylaxis on OAB symptoms supports somewhat shared etiopathogenesis for both disorders. However, the series is small, and considering the involvement of multifactorial factors and complex physiopathology for both disorders further studies are necessary to reveal the underlying mechanisms and clinical impacts.

Ethics Committee Approval: The study was a cross-sectional prospective study approved by the Hitit University School of Medicine Ethics Committee (ethics committee approval date and number: 06.01.2021/349).
Informed Consent: An informed consent was obtained from all the patients.
Publication: The results of the study were not published in full or in part in form of abstracts.
Peer-review: Externally peer-reviewed.
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References

[1] Altman D, Iliadou AN, Lundholm C, Milsom I, Pedersen NL. Somatic Comorbidity in Women with Overactive Bladder Syndrome. J Urol. 2016;196(2):473-7. https://doi.org/10.1016/j.juro.2016.02.076

[2] Ramos ML, García-Cabo C, Leira R, Domínguez C, Pozo-Rosich P, Vila C, et al. Comorbidity between idiopathic overactive bladder and chronic migraine. Cephalalgia. 2018;38(3):581-4. https://doi.org/10.1177/0333102417690127

[3] Başer A. Eliaçık S. Baykam MM, Uysal Tan F. Clinical Manifestations of Overactive Bladder With Migraine as a Comorbidity: A Prospective Cross-Sectional Study. Int Neurourol J. 2020;24(4):375-81. https://doi.org/10.5213/inj.2040186.093

[4] Headache Classification Committee of the International Headache Society (IHS). The International Classification of Headache Disorders, 3rd edition. Cephalalgia. 2018;38:1-211. https://doi.org/10.1177/0333102417738202

[5] Tarcan T, Mangır N, Özgür MÖ, Akbal C. OAB-V8 Overactive bladder inquiry form validation study. Urology Bulletin. 2012;21:113-6. https://www.urolojibulteni.org

[6] Çetinel B, Özkan B, Can G. ICIQ-SF Turkish Version Validation Study. Turk J Urol. 2004:30(3);332-8. https://urologyresearchandpractice.org/

[7] Goadsby PJ, Holland PR, Martins-Oliveira M, Hoffman J, Schankin C, Akerman S. Pathophysiology of migraine: a disorder of sensory processing. Physiol Rev. 2017;97(2):553-622. https://doi.org/10.1152/physrev.00034.2015

[8] Pescador Ruschel M.A, De Jesus O. Migraine Headache; In: StatPearls Publishing: Treasure Island, FL, USA, Bookshelf ID: NBK560787, Last Update: February 13, 2023. https://www.ncbi.nlm.nih.gov/books/NBK560787/

[9] Abrams P, Andersson KE, Birder L, Brubaker L, Cardozo C, Chapple C, et al. Fourth International Consultation on Incontinence Recommendations of the International Scientific Committee: Evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. Neurourol Urodyn. 2010;29(1):213-40. https://doi.org/10.1002/nau.20870

[10] Wyman JF, Harkins SW, Choi SC, Taylor JR, Fantl JA. The psychosocial impact of urinary incontinence in women. Obstet Gynecol. 1987;70(3 Pt 1):378-81. https://pubmed.ncbi.nlm.nih.gov/3627585/

[11] Shaw C. A review of the psychosocial predictors of help-seeking behavior and impact on quality of life in people with urinary incontinence. J Clin Nurs. 2001;10(1):15-24. https://doi.org/10.1046/j.1365-2702.2001.00443.x

[12] Castillo J, Muñoz P, Guitera V, Pascual J. Kaplan Award 1998. Epidemiology of chronic daily headache in the general population. Headache. 1999;39(3):190-96. https://doi.org/10.1046/j.1526-4610.1999.3903190.x

[13] Stewart WF, Van Rooyen JB, Cundiff GW, Abrams P, Herzog AR, Corey R, et al. Prevalence and burden of overactive bladder in the United States. World J Urol. 2003;20(6):327-36. https://doi.org/10.1007/s00345-002-0301-4

[14] Iljazi A, Ashina H, Zhuang ZA, Lopez CL, Snellman J, Ashina M, et al. Hypersensitivity to calcitonin gene-related peptide in chronic migraine. Cephalalgia. 2020;41(6):701-10. https://doi.org/10.1177/0333102420981666

[15] Fowler CJ, Griffiths D, de Groat WC. The neuronal control of micturition. Nat Rev Neurosci. 2008;9(6):453-66. https://doi.org/10.1038/nrn2401

[16] Chermansky CJ, Chancellor MB. Use of botulinum toxin in urologic disorders. Urology. 2016;91:21-32. https://doi.org/10.1016/j.urology.2015.12.049

[17] Cernuda-Morollón E, Ramón C, Martínez-Camblor P, Serrano-Pertierra E, Larrosa D, Pascual J. OnabotulinumtoxinA decreases interictal CGRP plasma levels in patients with chronic migraine. Pain. 2015;156(5):820-4. https://doi.org/10.1097/j.pain.0000000000000119

[18] Rapp DE, Turk KW, Bales GT, Cook SP. Botulinum toxin type a inhibits calcitonin gene-related peptide from isolated rat bladder. J Urol. 2006;175(3 Pt 1):1138-42. https://doi.org/10.1016/S0022-5347(05)00322-8

[19] Beetz R. Mild dehydration: a risk factor of urinary tract infection? Eur J Clin Nutr. 2003:57Suppl 2:S52-8. https://doi.org/10.1038/sj.ejcn.1601902

[20] Dowd TT, Campbell JM, Jones JA. Fluid intake and urinary incontinence in older community-dwelling women. J Community Health Nurs. 1996;13(3);179-86. https://doi.org/10.1207/s15327655jchn1303_5

[21] Newman DK, Wein AJ. Managing and treating urinary incontinence. Health Professions Press, Baltimore, USA 2002.

[22] Nuotio M, Jylhä M, Koivisto AM, Tammela TL. Association of smoking with urgency in older people. Eur Urol. 2001;40;206-12. https://doi.org/10.1159/000049774

[23] Tampakoudis P, Tantanassis T, Grimbizis G, Papaletsos M, Mantalenakis S. Cigarette smoking and urinary incontinence in women-a new calculative method of estimating the exposure to smoke. Eur J Obstet Gynecol Reprod Biol. 1995;63(1);27-30. https://doi.org/10.1016/0301-2115(95)02212-p

[24] Brown JS, Seeley DG, Fong J, Black DM, Ensrud KE, Grady D. Urinary incontinence in older women: who is at risk? Study of Osteoporotic Fractures Research Group. Obstet Gynecol. 1996;87(5 Pt 1);715-21. https://doi.org/10.1016/0029-7844(96)00013-0

[25] Tietjen G. E, Maly E.F. Migraine and Ischemic Stroke in Women. A Narrative Review. Headache. 2020;60(5):843-63. https://doi.org/10.1111/head.13796

[26] Tüfekçi B, Comparison of Pain Characteristics of Women With And Without Overactive Bladder Diagnosis, Başkent University Institute of Health Sciences, Physiotherapy and Rehabilitation Program, Master's Thesis, Ankara 2019.

[27] Leo RJ, Singh J. Migraine headache and bipolar disorder comorbidity: a systematic review of the literature and clinical implications. Scand J Pain. 2016;11:136-45. https://doi.org/10.1016/j.sjpain.2015.12.002

[28] Lai HH, Shen B, Rawal A, Vetter J. The relationship between depression and overactive bladder/urinary incontinence symptoms in the clinical OAB population. BMC Urol. 2016;16(1):60. https://doi.org/10.1186/s12894-016-0179-x