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AMAÇ VE KAPSAM

Türk Osteoporoz Dergisi, Türkiye Osteoporoz Derneği'nin süreli yayın organı olup, osteoporoz ve metabolik kemik hastalıkları içerikli, yayın dili Türkçe ve İngilizce olan, bağımsız ve önyargısız hakemlik (peer-review) ilkelerine dayanan uluslararası, periyodik bir dergidir. Türk Osteoporoz Dergisi, Nisan, Ağustos ve Aralık aylarında olmak üzere yılda 3 sayı çıkar.

Türk Osteoporoz Degisi'nin hedefi uluslararası düzeyde nitelikli, sürekli ve osteoporoz konusunda özgün bir periyodik olarak klinik ve bilimsel açıdan en üst düzeyde orijinal araştırmaları yayınlamaktır. Bununla birlikte eğitim ile ilgili temel yenilikleri kapsayan derlemeler, editöryel kısa yazılar, olgu sunumları, orijinal görüntüler ve geniş fiziksel tıp, romatoloji, rehabilitasyon ve jinekoloji kesimlerinin konular hakkındaki deneyimlerini ve eleştirilerini içeren mektuplar ve sosyal konulu yazılar yayınlamaktır.

Osteoporoz ve kemik hastalıklarına ilgi duyan birinci basamak tıp hizmeti veren pratisyen hekim, iç hastalıkları, jinekoloji, romatoloji ve fiziksel tıp ve rehabilitasyon uzmanlarının "bilmesi gerekli olanları" iyice saptayarak; bunları Türk Osteoporoz Dergisi'nde bulmaları için gerekli düzenlemeler yapılacaktır.

Türk Osteoporoz Dergisi, Emerging Sources Citation Index (ESCI), DOAJ, EBSCO Database, Gale/Cengage Learning, CINAHL, Index Copernicus, Embase, Scopus, Proquest, J-Gate Academic Keys, TÜBİTAK/ULAKBİM, Hinari, Oare, Ardi, Goali, Türk Medline Ulusal Atıf İndeksi tarafından indekslenmektedir.

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Derginin açık erişim politikası 'Budapest Open Access Initiative(BOAI) kuralları esas alınarak uygulanmaktadır.

Açık Erişim, "[hakem değerlendirmesinden geçmiş bilimsel literatürün], İnternet aracılığıyla; finansal, yasal ve teknik engeller olmaksızın, serbestçe erişilebilir, okunabilir, indirilebilir, kopyalanabilir, dağıtılabilir, basılabilir, taranabilir, tam metinlere bağlantı verilebilir, dizinlenebilir, yazılıma veri olarak aktarılabilir ve her türlü yasal amaç için kullanılabilir olması"dır. Çoğaltma ve dağıtım üzerindeki tek kısıtlama yetkisi ve bu alandaki tek telif hakkı rolü; kendi çalışmalarının bütünlüğü üzerinde kontrol sahibi olabilmeleri, gerektiği gibi tanınmalarının ve alıntılanmalarının sağlanması için, yazarlara verilmelidir.

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Türk Osteoporoz Dergisi, ülkemizde görev yapan fiziksel tıp ve rehabilitasyon uzmanlarına, akademisyenlerine ve osteoporoz'a ilgi duyan diğer tüm tıp branşlarına mensup uzmanlara ücretsiz olarak dağıtılmaktadır. Derginin tüm sayılarına ücretsiz olarak www.turkosteoporozdergisi.org adresinden tam metin ulaşılabilir. Dergiye abone olmak isteyen kişiler Türkiye Osteoporoz Derneği'ne başvurmalıdır.

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AIMS AND SCOPE

Turkish Journal Of Osteoporosis is the regular publishing organ of the Turkish Osteoporosis Society. This periodical journal covers osteoporosis and metabolic bone diseases subjects. It is a periodic international journal, published in Turkish and English languages and is independent, being based on peer-review principles. The journal is published 3 times per year (April, August and December).

The aim of the journal "Turkish Journal Of Osteoporosis" is to continuously publish original research papers of the highest scientific and clinical values specifically on osteoporosis, on an international level. Additionally, reviews on basic developments in education, editorial short notes, case reports, original views, letters from the fields of physical medicine, rheumatology, rehabilitation, gynaecology containing experiences and comments as well as social subjects are published.

Thing that must be known' subjects for general practitioners giving first line medical service who are interested in osteoporosis and metabolic bone diseases, specialists in internal medicine, gynecology, rheumatology and physiotherapy will be determined It will then be possible to make the necessary adjustments to the journal "Turkish Journal Of Osteoporosis" according to their needs.

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Turkish Journal Of Osteoporosis is sent free to physiotherapy specialists, academicians in our country as well as other specialists in all branches of medicine interested in osteoporosis. All published volumes can be reached full text without fee through the web site www.turkosteoporozdergisi.org. Those who wish to subscribe to the journal should apply to the Turkish Osteoporosis Association.

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YAZARLARA BİLGİ

Türk Osteoporoz Dergisi, Türkiye Osteoporoz Derneği'nin resmi yayın organıdır.
Dergi, osteoporoz, metabolik kemik hastalıkları ve rehabilitasyon alanlarını ilgilendiren tüm konulardaki yazıları yayınlar. Dergide orijinal makalelerin dışında derleme yazıları, orijinal olgu sunumları, editöre mektuplar, bilimsel mektuplar, eğitim yazıları, yeni literatür özetleri ve gelecek kongre/toplantı duyuruları da yayınlanır.
Dergide yayınlanacak yazıların seçimine temel teşkil eden hakem heyeti, dergide belirtilen danışmanlar ve gerekirse yurt içi/dışı otörler arasından seçilir.
Yazılarda Türk Dil Kurumu'nun Türkçe Sözlüğü ve Yazım Kılavuzu temel alınmalıdır. İngilizce yazılan yazılar özellikle desteklenmektedir.
Makaleletin formatı 'Uniform requirements for Manuscripts Submitted to Biomedical Journals' (http.//www.icmje.org) kurallarına göre düzenlenmelidir.
Editör tarafından, etik kurul onayı alınması zorunluluğu olan klinik araştırmalarda onay belgesi talep edilecektir. İnsan üzerinde yapılan deneysel araştırmaların bildirildiği yazıların metnin içerisinde, yazarların bu araştırmanın prosedürünün sorumlu olan etik kurulun insan üzerine deney yapılma etik standartlarına (kurumsal ve ulusal) ve 2013 yılında revize edilen1964 Helsinki Deklarasyonuna uyulduğunu ve hastaların onaylarının alındığını belirtilmelidir. Hayvan üzerinde yapılan deneysel araştırmalarda, yazarlar yapılan prosedürlerin hayvanlar haklarına uygun olduğunu belirtilip (Guide for the care and use of laboratory animals. www.nap.edu/catalog/5140html) ayrıca etik kurulu onayı'nı alınmalıdır.
Yazıların içeriğinden ve kaynakların doğruluğundan yazarlar sorumludur.
Yazarlar, gönderdikleri çalışmanın başka bir dergide yayınlanmadığı ve/veya yayınlanmak üzere incelemede olmadığı konusunda garanti vermelidir. Daha önceki bilimsel toplantılarda 200 kelimeyi geçmeyen özet sunumlarının yayınları, durumu belirtilmek koşulu ile kabul edilebilir.
Tüm yazarların çıkar çatışma olmadığını, bilimsel katkı ve sorumluluklarını bildiren toplu imza ile yayına katılmalıdır.
Tüm yazılar, editör ve ilgili editör yardımcıları ile en az üç danışman hakem tarafından incelenir. Yazarlar, yayına kabul edilen yazılarda, metinde temel değişiklik yapmamak kaydı ile editör ve yardımcılarının düzeltme yapmalarını kabul etmiş olmalıdırlar.

Genel Kurallar

Yazılar sadece "online" olarak kabul edilmektedir. Yazarların makale gönderebilmesi için Journal Agent web sayfasına (www.journalagent.com/osteoporoz) kayıt olup şifre almaları gereklidir. Bu sistem on-line yazı gönderilmesine ve değerlendirilmesine olanak tanımaktadır. Makale gönderimi yapılırken sorumlu yazarın ORCID (Open Researcher ve Contributor ID) numarası belirtilmelidir. http://orcid.org adresinden ücretsiz olarak kayıt oluşturabilir.
Bu sistem ile toplanan makaleler ICMJE-www.icmje.org, Index Medicus (Medline/PubMed) ve Ulakbim-Türk Tıp Dizini kurallarına uygun olarak sisteme alınmakta ve arşivlenmektedir. Yayına kabul edilmeyen yazılar, sanatsal resimler hariç geriye yollanmaz.
Yazının tümünün 5000 kelimeden az olması gerekmektedir. İlk sayfa hariç tüm yazıların sağ üst köşelerinde sayfa numaraları bulunmalıdır. Yazıda, konunun anlaşılmasında gerekli olan sayıda ve içerikte tablo ve şekil bulunmalıdır.
Başlık sayfası, kaynaklar, şekiller ve tablolar ile ilgili kurallar bu dergide basılan tüm yayın türleri için geçerlidir.

Orijinal Makaleler

1) Başlık Sayfası (Sayfa 1)
Yazı başlığının, yazar(lar)ın bilgilerinin, anahtar kelimelerin ve kısa başlıkların yer aldığı ilk sayfadır.
Türkçe yazılarda, yazının İngilizce başlığı da mutlaka yer almalıdır; yabancı dildeki yayınlarda ise yazının Türkçe başlığı da bulunmalıdır. Türkçe ve İngilizce anahtar sözcükler ve kısa başlık da başlık sayfasında yer almalıdır.
Yazarların isimleri, hangi kurumda çalıştıkları ve açık adresleri belirtilmelidir. Yazışmaların yapılacağı yazarın adresi de ayrıca açık olarak belirtilmelidir. Yazarlarla iletişimde öncelikle e-posta adresi kullanılacağından, yazışmaların yapılacağı yazara ait e-posta adresi belirtilmelidir. Buna ek olarak telefon ve faks numaraları da bildirilmelidir.
Çalışma herhangi bir bilimsel toplantıda önceden bildirilen koşullarda tebliğ edilmiş ya da özeti yayınlanmış ise bu sayfada konu ile ilgili açıklama yapılmalıdır.
Yine bu sayfada, dergiye gönderilen yazı ile ilgili herhangi bir kuruluşun desteği sağlanmışsa belirtilmelidir.
2) Özet (Sayfa 2)
İkinci sayfada yazının Türkçe ve İngilizce özetleri (her biri için en fazla 200 sözcük) ile anahtar sözcükler belirtilmelidir.
Özet bölümü; Amaç, Gereç ve Yöntem, Bulgular, Sonuç şeklinde alt başlıklarla düzenlenir. Derleme, vaka takdimi ve eğitim yazılarında özet bölümü alt başlıklara ayrılmaz. Bunlarda özet bölümü, 200 kelimeyi geçmeyecek şekilde amaçlar, bulgular ve sonuç cümlelerini içermelidir.
Özet bölümünde kaynaklar gösterilmemelidir. Özet bölümünde kısaltmalardan mümkün olduğunca kaçınılmalıdır. Yapılacak kısaltmalar metindekilerden bağımsız olarak ele alınmalıdır.
3) Metin (Özetin uzunluğuna göre Sayfa 3 veya 4'den başlayarak)
Genel Kurallar bölümüne uyunuz.
Metinde ana başlıklar şunlardır: Giriş, Gereç ve Yöntem, Bulgular, Tartışma.
Giriş bölümü çalışmanın mantığı ve konunun geçmişi ile ilgili bilgiler içermelidir. Çalışmanın sonuçları giriş bölümünde tartışılmamalıdır.
Gereç ve yöntem bölümü çalışmanın tekrar edilebilmesi için yeterli ayrıntılar içermelidir. Kullanılan istatistik yöntemler açık olarak belirtilmelidir.
Bulgular bölümü de çalışmanın tekrar edilebilmesine yetecek ayrıntıları içermelidir.
Tartışma bölümünde, elde edilen bulguların doğru ve ayrıntılı bir yorumu verilmelidir. Bu bölümde kullanılacak literatürün, yazarların bulguları ile direkt ilişkili olmasına dikkat edilmelidir.
Teşekkür mümkün olduğunca kısa tutulmalıdır. Çalışma için bir destek verilmişse bu bölümde söz edilmelidir.
Çalışmanın kısıtlılıkları başlığı altında çalışma sürecinde yapılamayanlar ile sınırları ifade edilmeli ve gelecek çalışmalara ilişkin öneriler sunulmalıdır.
Sonuç başlığı altında çalışmadan elde edilen sonuç vurgulanmalıdır.
Metinde fazla kısaltma kullanmaktan kaçınılmalıdır. Tüm kısaltılacak terimler metinde ilk geçtiği yerde parantez içinde belirtilmelidir. Özette ve metinde yapılan kısaltmalar birbirinden bağımsız olarak ele alınmalıdır. Özet bölümünde kısaltması yapılan kelimeler, metinde ilk geçtiği yerde tekrar uzun şekilleri ile yazılıp kısaltılmalıdırlar.
4) Kaynaklar
Kaynakların gerçekliğinden yazarlar sorumludur.
Kaynaklar metinde geçiş sırasına göre numaralandırılmalıdır. Kullanılan kaynaklar metinde parantez içinde belirtilmelidir.
Kişisel görüşmeler, yayınlanmamış veriler ve henüz yayınlanmamış çalışmalar bu bölümde değil, metin içinde şu şekilde verilmelidir: (isim(ler), yayınlanmamış veri, 19..).
Kaynaklar listesi makale metninin sonunda ayrı bir sayfaya yazılmalıdır. Altıdan fazla yazarın yer aldığı kaynaklarda 6. isimden sonraki yazarlar için "et al" ("ve ark") kısaltması kullanılmalıdır. Dergi isimlerinin kısaltmaları Index Medicus'taki stile uygun olarak yapılır. Tüm referanslar Vancouver sistemine göre aşağıdaki şekilde yazılmalıdır.
a) Standart makale:
Intiso D, Santilli V, Grasso MG, Rossi R, Caruso I. Rehabilitation of walking with electromyographic biofeedback in foot-drop after stroke. Stroke 1994;25:1189-92.
b) Kitap:
Getzen TE. Health economics: fundamentals of funds. New York: John Wiley & Sons; 1997.
c) Kitap Bölümü:
Porter RJ, Meldrum BS. Antiepileptic drugs. In: Katzung BG, editor. Basic and clinical pharmacology. 6th ed. Norwalk, CN: Appleton and Lange; 1995. p. 361-80.
Birden fazla editör varsa: editors.
d) Toplantıda sunulan makale:
Bengtsson S, Solheim BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Reinhoff O, editors. MEDINFO 92. Proceedings of the 7th World Congress on Medical Informatics; 1992 Sep 6-10; Geneva, Switzerland. Amsterdam: North-Holland; 1992. p. 1561-5.
e) Elektronik formatta makale:
Morse SS. Factors in the emergence of infectious disease. Emerg Infect Dis [serial online] 1995 1(1):[24 screens]. Available from:s URL:http://www/cdc/gov/ncidoc/ EID/eid.htm. Accessed December 25, 1999.
f) Tez:
Kaplan SI. Post-hospital home health care: the elderly access and utilization (thesis). St. Louis (MO): Washington Univ; 1995.
5) Tablolar-grafikler-şekiller-resimler
Tüm tablolar, grafikler veya şekiller ayrı bir kağıda basılmalıdır. Her birine metinde geçiş sırasına göre numara verilmeli ve kısa birer başlık yazılmalıdır. Kullanılan kısaltmalar alt kısımda mutlaka açıklanmalıdır. Özellikle tablolar metni açıklayıcı ve kolay anlaşılır hale getirme amacı ile hazırlanmalı ve metnin tekrarı olmamalıdır. Başka bir yayından alıntı yapılıyorsa yazılı baskı izni birlikte yollanmalıdır. Fotoğraflar parlak kağıda basılmalıdır. Çizimler profesyonellerce yapılmalı ve gri renkler kullanılmamalıdır.

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3) Editöre Mektuplar:
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5) Eğitim Yazıları:
Bu kategoride otörler osteoporoz, metabolik kemik hastalıkları ve rehabilitasyon konularındaki güncel bilgileri özetlerler.

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Türk Osteoporoz Dergisi

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INSTRUCTIONS TO AUTHORS

The 'Turkish Journal of Osteoporosis' is an official journal of the Turkish Society of Osteoporosis. An additional supplement is also published on the occasion of the National Osteoporosis Congress.
The Journal publishes papers on all aspects of osteoporosis, metabolic bone diseases and its rehabilitation. In addition to original articles, review articles, original case reports, letters to the editor, scientific letters, educational articles, abstracts from new literature and announcements of future congresses and meetings are also published.
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The style for title page, references, figures and tables should be unique for all kind of articles published in this journal.

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This page should include the Turkish and English titles of the manuscript, affiliation of author(s), key words and running titles.
The English title should take place in the title page. Likely, Turkish title should be mentioned for articles in foreign language. Turkish and English key words and running titles should also be included in the title page.
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In the second page, Turkish and English summaries of the manuscript (maximum 200 words for each), and the key words should take place.
The summary consists of the following sections separately: Objective, Materials and Methods, Results, Conclusion. Separate sections are not used in the summaries for the review articles, case reports and educational articles. For these articles, the summaries should not exceed 200 words and briefly present the scope and aims of the study, describe the salient findings and give the conclusions. The references should not be cited in the summary section. As far as possible, use of abbreviations are to be avoided. If any abbreviations are used, they must be taken into consideration independently of the abbreviations used in the text.

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Case reports should present important and unique clinical experience or have educational value. It has to consists of the following parts: Introduction, case, discussion.

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These are preliminary reports presenting new ideas, inventions or findings of scientific interest that do not constitute original research. They aim to determine possible interest to future articles related to this topic. There are no separate sections in the text.

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In this category, authors summarize the present state of knowledge regarding physical medicine, rheumatology and rehabilitation.

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Türk Osteoporoz Dergisi
TURKISH JOURNAL OF OSTEOPOROSIS

Editörden / Editorial

Değerli Meslektaşlarımız,

22-25 Kasım 2018 tarihlerinde Türkiye Osteoporoz Derneği ev sahipliğinde, International Society for Clinical Densitometry ve International Osteoporosis Foundation (IOF) ortak uluslararası kursu yapılmıştır. Kurs sonrasında katılımcılara katılım belgesi verilmiştir. Ancak kursa katılım gösteren meslektaşlarımız arzu ederlerse IOF tarafından yapılacak olan sınava online olarak katılım gösterebilecekler ve uluslararası geçerli bir başarı belgesi alabileceklerdir. Sınavın Türkçe olarak yapılabilmesi için girişimler sürmekte olup, konuyla ilgili duyuru yapılacaktır. Sınav ücreti sınava girmek isteyenler için Türkiye Osteoporoz Derneği tarafından karşılanacaktır.

Osteoporoz, Osteoartrit ve Kas İskelet Sistemi Hastalıkları Dünya Kongresi (WCO-IOF-ESCEO) 4-7 Nisan 2019 tarihleri arasında Paris, Fransa'da gerçekleştirilmiştir. Osteoporoz, osteoartrit ve sarkopeni alanında dünyanın en büyük kongresi olan bu toplantıya 4136 delege katılmış olup, 1416 abstract sunulmuştur. Kongre sırasında derneğimiz adına planlanan bir sempozyum kapsamında "Approach to Osteoporotic Hip Fractures" başlıklı bir panel düzenlenmiş ve kalça kırıkları konusu tüm detaylarıyla katılımcılarla paylaşılmıştır. Ayrıca Palais de Congress- Kongre merkezindeki Ulusal Dernekler Köyü'nde Türkiye Osteoporoz Derneği adına ayrılan bölümde bir yıl içinde düzenlenen aktiviteler sunulmuş ve ülkemizin tanıtımı yapılmıştır.

Türkiye Osteoporoz Derneği olarak siz sevgili meslektaşlarımıza sağlıklı, mutlu ve başarılı bir yıl dileriz.

Sevgi ve saygılarımla

Editör
Prof. Dr. Yeşim Kirazlı

Orijinal Araştırma / Original Investigation

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Fizik Tedavi Programına Alınan Hastaların Tedaviye İlişkin Yararlanma, Tedaviye Uyum, Farkındalık ve Beklenti Düzeyleri

Benefits, Treatment Compliance, Awareness and Expectation Levels Related to Treatment of Patients Taking Physical Therapy Program

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Öz

Amaç: Bu çalışmamızda hastanemizde Fiziksel Tıp ve Rehabilitasyon (FTR) Polikliniği'ne başvurarak FTR programı düzenlenmiş olan hastaların tedavi programı ile ilgili beklentilerini, tedaviye uyumlarını, tedaviden yararlanma durumlarını ve memnuniyet düzeylerini belirlemeyi amaçladık.
Gereç ve Yöntem: FTR programına alınan 18 yaş ve üzeri 500 hasta, çalışmaya dahil edildi. Hastalara, demografik özellikler, fizik tedavi alma öyküsü, beklenti, memnuniyet, ev programına uyum ve fizik tedavi hakkındaki görüşleri ile ilgili 21 sorudan oluşan anket formu verildi. Anket formundaki demografik veriler ile sorulardan 5 ve daha fazlasını yanıtsız bırakan hastaların anketleri çalışmaya dahil edilmedi. Daha önce başka hastanede fizik tedavi deneyimi olanlar, okuma yazma bilmeyenler, nörolojik hastalığı olanlar, eklem kontraktürü olanlar ve kas iskelet sistemi cerrahisi sonrası tedaviye alınan hastalar çalışmaya alınmadı.
Bulgular: Çalışmada 362 hastanın anket formu geçerli sayıldı. Hastaların 263'ü kadın, 99'u erkek olup yaş ortalamaları 55,26±12,07 idi. Hastaların %69,10'u tamamen iyileşme beklentisi içindeydi, %89,75'i beklentilerinin karşılandığını, %88,60'ı tedaviden yararlandığını bildirdi. FTR uygulayıcılarında memnuniyet düzeyi %78,10'du. Hastaların %67,40'ının verilen egzersizleri uyguladığı ve %76,66'ının günlük yaşam önerilerine uyduğu belirlendi. FTR'den yarar gören ve görmeyen hastalar karşılaştırıldığında; sistemik hastalık öyküsü olmayanların, tedavi ile birlikte egzersizlerini yapanların ve günlük aktivite önerilerine uyanların anlamlı derecede daha fazla yarar gördüğü belirlenmiştir (p<0,05).
Sonuç: Hastaların beklenti, farkındalık ve tedaviden memnuniyet durumlarının değerlendirilmesi, sağlık hizmetlerinde kalitenin artırılmasına katkı sağlayacaktır.
Anahtar kelimeler: Fiziksel tıp ve rehabilitasyon, beklenti, farkındalık, memnuniyet

Abstract

Objective: In our study, we aimed to determine the expectations, treatment compliance, benefit status, and satisfaction levels of patients who had applied physical therapy (PT) outpatient clinic in our hospital.
Materials and Methods: Five hundred patients aged 18 years and over who were admitted in the PT program were included in the study. A questionnaire consisting of 21 questions about demographic specifications, PT history, expectation, satisfaction, adaptation to home program, and opinions about PT was given to the patients. The demographic data in the questionnaire form and the questionnaires of the patients who left five or more of the questions unanswered were not included in the study. Patients who had previous experience with PT in another hospital, illiterate, had a neurological disease, joint contracture, and patients treated after musculoskeletal surgery were excluded in the study.
Results: The questionnaire form of 362 patients was accepted as valid. Two hundred sixty-three of the patients were female, 99 were male and the mean age was 55.26±12.07. 69.10% of the patients were in the expectation of complete recovery, 89.75% reported that their expectations were met, and 88.60% reported that they benefited from the treatment. The level of satisfaction from PT practitioners was 78.10%. It was determined that 67.40% of the patients applied the given exercises and 76.66% of the patients complied with their daily life suggestions. When the patients who did and did not benefit from PT were compared; it was found that those did not have a systemic disease history, who did exercises along with the treatment, and who complied daily activity suggestions were benefited significantly higher (p<0.05).
Conclusion: Assessment of patients' expectations, awareness and satisfaction status from treatment will contribute to increasing the quality of health care services.
Keywords: Physical therapy, expectation, awareness, satisfaction

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Giriş

Son yıllarda sağlık hizmeti sunumu giderek hasta merkezli hale gelmiş ve hasta memnuniyeti sağlık hizmeti kalitesinde en önemli bileşen olmuştur. Hasta memnuniyetinin hem fiziksel hem de mental iyilik haline katkıda bulunarak yaşam kalitesini artırdığı bilinmektedir (1,2). Fizik tedavi ve rehabilitasyon da (FTR) herhangi bir hastalık veya hasar sonucu kişide oluşan fonksiyon bozukluğunun yeniden kazandırılması ve yaşam kalitesinin artırılması amacıyla uygulanmakta olan önemli bir sağlık hizmetidir.

Hastaların FTR ile ilgili beklenti ve memnuniyetlerinde; daha önceki tedavi deneyimleri, sosyo-kültürel ve psikolojik durumları, zihinlerindeki kalite algıları, hijyen, teknik alt yapı gibi durumlar, hastalıklarıyla ilgili farkındalık düzeyleri veya tedaviye uyum süreçleri etkili olmaktadır (3).

FTR hizmet kalitesi ve hasta memnuniyetini konu alan birçok çalışma yapılmış, terapistlerin hasta ile iletişim düzeylerinin, hastaların tedavi programı hakkında bilgilendirilmelerinin, yaş, cinsiyet, eğitim düzeyi ve tedavi maliyeti gibi pek çok parametrenin memnuniyet düzeyi için belirleyici olduğu bildirilmiştir (4-7).

FTR'de hasta memnuniyeti ve hizmet kalitesi için herhangi bir evrensel kalite ölçütü bulunmamaktadır. Yapılan çalışmalar daha çok fiziksel koşullar, teknik alt yapı, maliyet, hijyen gibi durumlara odaklanmakta olup hastalıkla ilgili farkındalık düzeylerinin ve hastaların tedaviye uyumunun belirlenmesine yönelik çalışmalar oldukça azdır.

Biz bu çalışmamızda hastanemizde FTR polikliniğine başvurarak FTR programı düzenlenmiş olan hastaların tedavi programı ile ilgili beklentilerini, tedaviye uyumlarını, tedaviden yararlanma durumlarını ve memnuniyet düzeylerini belirlemeyi amaçladık.

Gereç ve Yöntem

Hastanemizin FTR polikliniğinde FTR programı düzenlenerek, Ocak 2015 - Haziran 2015 tarihleri arasında fizik tedavi ünitesinde tedaviye alınan 18 yaş ve üzeri 500 hasta, kendilerinden onam alınarak çalışmaya dahil edildi. Hastalara; demografik özellikler (5 soru), fizik tedavi alma öyküsü (5 soru), beklenti (2 soru), memnuniyet (2 soru), ev programına uyum (5 soru) ve fizik tedavi hakkındaki görüşleri (2 soru) ile ilgili 21 sorudan oluşan anket formu verildi. Hastalardan anket formunu kendilerinin cevaplamaları istendi. Anket formundaki demografik veriler ile sorulardan 5 ve daha fazlasını yanıtsız bırakanların anketi geçersiz sayıldı. Daha önce başka hastanede fizik tedavi deneyimi olanlar, okuma yazma bilmeyenler, nörolojik hastalığı olanlar, eklem kontraktürü olanlar ve kas iskelet sistemi cerrahisi sonrası tedaviye alınan hastalar çalışmaya alınmadı. Anket formu tarafımızca oluşturulmuş olup herhangi bir geçerlilik ve güvenilirlik testine tabi tutulmamıştır. Ancak anket sorularının hazırlaması konusunda uzman desteğine başvurulmuştur. Bu çalışma için etik kurul onayı Antalya Eğitim ve Araştırma Hastanesi Klinik Araştırmalar Etik Kurulu'ndan alınmıştır (2014-031). Bu çalışmada 2013 yılında revize edilen 1964 Helsinki Deklarasyonu'nda bildirilen etik kurallara uyulmuştur. Hastalara sonuçlarının bilimsel amaçla kullanılacağı belirtilerek onamları alınmıştır.

İstatistiksel Analiz

Çalışmada istatistiksel analizler SPSS 22.0 paket programıyla yapılmıştır. Ölçümle elde edilen verilerden normal dağılıma uyanlar Student's t-testi, normal dağılıma uymayanlar Mann-Whitney U testiyle değerlendirilmiştir. Sayımla elde edilen veriler için ise ki-kare testi kullanılmıştır. Sonuçların istatistiksel anlamlılığı $p<0,05$ düzeyinde değerlendirilmiştir.

Bulgular

Beş yüz hastaya verilen anket formlarından 362'si geçerli sayılarak çalışmaya dahil edildi. Hastaların 263'ü kadın, 99'u erkek olup yaş ortalamaları 55,26±12,07 idi. Hastaların demografik ve fizik tedavi özgeçmişine ilişkin özellikleri Tablo 1'de gösterilmiştir.

Bu çalışmada hastaların %69,10'unun tamamen iyileşme beklentisi içinde olduğu, %89,75'inin de tedaviden beklentilerinin karşılandığı saptanmış olup tedaviden yararlanma

Tablo 1. Hastaların demografik ve fizik tedavi özgeçmişine ilişkin özellikleri

n=362	**n (%)**
Yaş	Ort: 55,26±12,07 (min-maks:18-84, med:57)
Cinsiyet	
Kadın	263 (72,65)
Erkek	99 (27,35)
Öğrenim durumu	
İlköğretim	236 (65,20)
Ortaöğretim	85 (23,50)
Yüksek öğretim	41 (11,30)
Meslek	
Çalışan	77 (21,30)
Çalışmayan	285 (78,70)
Özgeçmiş	
Sistemik hastalık var	205 (56,60)
Sistemik hastalık yok	157 (43,40)
FTR alma öyküsü	
Var	272 (75,56)
Yok	88 (24,44)
FTR bölgesi	
Omurga	201 (44,48)
Diğer	161 (55,52)
FTR seans sayısı	
10 Seans	81 (22,40)
>10 Seans	281 (77,60)
FTR şekli	
Ayaktan	266 (73,89)
Yatarak	94 (26,11)
FTR tercih	
Ayaktan	179 (49,45)
Yatarak	183 (50,55)

FTR: Fiziksel Tıp ve Rehabilitasyon min: Minimum, maks: Maksimum, med: Medyan

oranı da %88,60'tır. FTR uygulayıcılarından memnuniyet düzeyi %78,10'dur. Hastaların %67,40'ının verilen egzersizleri uyguladığı ve %76,66'ının günlük yaşam önerilerine uyduğu belirlenmiştir. Hastalarımızın anket sorularına vermiş oldukları yanıtlar ve oranları Tablo 2'de ayrıntılı olarak verilmiştir.

Çalışmamızda hastanemizde uygulanan FTR'den yarar gören ve görmeyen hastalar karşılaştırıldığında; sistemik hastalık öyküsü olmayanlar, tedavi ile birlikte egzersizlerini yapanlar, egzersizleri kendilerine bizzat öğretilenler ve günlük yaşam aktiviteleri önerilerine uyanlar anlamlı derecede daha fazla yarar görmüşlerdir. Her iki grubun karşılaştırılmasına ilişkin veriler Tablo 3'te gösterilmiştir.

Tartışma

Kas iskelet sistemi hastalıkları bireylerin yaşam kalitesini olumsuz etkileyen ve bazen iş gücü kaybına yol açan önemli bir sağlık sorunudur. FTR, herhangi bir hastalık veya hasar sonucu kişide

Tablo 2. Hastalarımızın anket sorularına vermiş oldukları yanıtlar ve oranları

n=362	Soruyu Yanıtlayan Hasta n (%)
Fizik tedaviden beklentiniz nedir?	n=362
Tamamen iyileşmek	250 (69,10)
Rahatlayıp günlük işleri yapabilmek	112 (30,90)
Fizik tedavi beklentinizi karşıladı mı?	n=361
Evet karşıladı	324 (89,75)
Hayır karşılamadı	37 (10,25)
Fizik tedaviden yarar gördünüz mü?	n=362
Evet yararlandım	321 (88,67)
Hayır yararlanmadım	41 (11,33)
Uygulayıcıdan memnun kaldınız mı?	n=360
Evet memnun kaldım	28 (78,10)
Hayır memnun kalmadım	79 (21,90)
Fizik tedavi ile birlikte egzersiz uyguladınız mı?	n=362
Evet	244 (67,40)
Hayır	118 (32,60)
Egzersiz uygulaması tarif edildi mi?	n=357
Evet tarif edildi	274 (76,75)
Hayır broşüre bakarak yaptım	83 (23,25)
Egzersizin yararlı olduğunu düşünüyor musunuz?	n=332
Evet	230 (69,28)
Hayır	102 (30,72)
Günlük yaşam önerilerine uyabildiniz mi?	n=347
Evet	266 (76,66)
Hayır	81 (23,34)
Fizik tedavi olurken istirahat edebildiniz mi?	n=362
Evet istirahat ettim	87 (24,03)
Hayır aktif çalıştım	275 (75,97)
Fizik tedavi olmadan iyileşmek mümkün mü?	n=353
Evet mümkün	64 (18,10)
Hayır mümkün değil	289 (81,90)
Fizik tedavinin zararları var mıdır?	n=340
Hiçbir zararı yoktur	185 (54,40)
Bazı durumlarda zarar verebilir	155 (45,60)

Tablo 3. Fizik tedaviden yarar gören ve yarar görmeyen hastaların demografik/klinik özelliklerinin ve anket verilerinin karşılaştırılması

n=362	Fizik tedaviden yarar gören hasta n (%)	Fizik tedaviden yarar görmeyen hasta n (%)	p
Yaş	319	41	
(Ortalama)	55,22±12,37	55,34±9,76	0,794
Cinsiyet			
Kadın	231 (71,96)	32 (78,05)	0,462
Erkek	90 (28,04)	9 (21,95)	
Öğrenim durumu			
İlköğretim	207 (64,89)	27 (65,85)	0,052
Ortaöğretim	72 (22,57)	13 (31,71)	
Üniversite	40 (12,54)	1 (2,44)	
Çalışma durumu			
Çalışmıyor	68 (21,32)	9 (21,95)	0,203
Çalışıyor	251 (78,68)	32 (78,05)	
Sistemik hastalık öyküsü			
Var	172 (53,92)	31 (75,61)	0,008
Yok	147 (46,08)	10 (24,39)	
Fizik tedavi seans sayısı			
≤10 Seans	70 (21,94)	10 (24,39)	0,484
>10 Seans	249 (78,06)	31 (75,61)	
Fizik tedavi şekli	n=8317		
Ayaktan	236 (74,45)	29 (70,73)	0,558
Yatarak	81 (25,55)	12 (29,27)	
Fizik tedaviden beklentiniz nedir?			
Tamamen iyileşmek	220 (68,97)	29 (70,73)	
Rahatlayıp günlük işlerimi yapabilmek	99 (31,03)	12 (29,27)	0,867
Fizik Tedavi beklentinizi karşıladı mı?			
Evet karşıladı	303 (94,98)	21 (51,22)	
Hayır karşılamadı	16 (5,02)	20 (48,78)	0,000
Uygulayıcıdan memnun kaldınız mı?	n=317		
Evet memnun kaldım	256 (80,76)	25 (60,98)	
Hayır memnun kalmadım	61 (19,24)	16 (39,02)	0,004
Fizik tedavi ile birlikte egzersiz uyguladınız mı?	222 (69,59)	21 (51,22)	
Evet	97 (30,41)	20 (48,78)	0,027
Hayır			
Egzersiz uygulaması tarif edildi mi?	n=316	n=39	
Evet tarif edildi	247 (78,16)	26 (66,67)	
Hayır broşüre bakarak yaptım	69 (21,84)	13 (33,33)	0,049
Günlük yaşam önerilerine uyabildiniz mi?	n=307	n=38	
Evet	243 (79,15)	23 (60,53)	
Hayır	64 (20,85)	15 (39,47)	0,005
Fizik tedavi olurken istirahat edebildiniz mi?	74 (23,20)	13 (31,71)	
Evet istirahat ettim	245 (76,80)	28 (68,29)	0,359
Hayır aktif çalıştım			
Fizik tedavi olmadan iyileşmek mümkün mü?	n=312	n=40	
Evet mümkün	56 (17,95)	8 (20)	
Hayır mümkün değil	256 (82,05)	32 (80)	0,859
Fizik tedavinin zararları var mıdır?	n=301	n=38	
Hiçbir zararı yoktur	164 (54,49)	20 (52,63)	
Bazı durumlarda zarar verebilir	137 (45,51)	18 (47,37)	0,926

Tablodaki tüm kategorik verilerin karşılaştırmasında ki-kare testi kullanılmıştır

oluşan fonksiyon bozukluğunun yeniden kazandırılması ve yaşam kalitesinin artırılması amacıyla uygulanan yöntemler kompleksidir. FTR programı her hastanın özel gereksinimlerine göre belirlenir ve uygulanır.

FTR bölümlerinde ayaktan veya yatırılarak tedavi edilen hastaların memnuniyet düzeylerini belirlemek amacıyla iletişim, teknik yeterlilik, uygulayıcının kişilik özellikleri, erişilebilirlik, maliyet, fiziki koşullar gibi etmenler değerlendirilmiştir (3,6,8-11). Biz bu çalışmamızda hastalarımızın FTR'ye ilişkin beklenti, farkındalık, memnuniyet ve ev programına uyum durumuna odaklandık.

Hastalarımızın tedaviden yararlanma oranı %88,60'tı ve %89,75'i beklentisinin karşılandığını ifade etti. Anketimizde rahatlayıp günlük işlerini yapabilmeyi hedefleyen hastalar, hastalıklarından tamamen kurtulmayı hedefleyen hastalardan daha çok yarar görmüşlerdir. Tedavi için gerçekçi bir hedef belirleme tedaviden yarar görme durumunu ve memnuniyeti artırmaktadır.

Hastalarımızı tedaviden yarar gören ve yarar görmeyen hastalar olarak iki gruba ayırdığımızda, her iki hasta grubu yaş ortalaması, cinsiyet, öğrenim durumu ve çalışma durumu açısından benzerdi.

Çalışmamızda sistemik hastalık öyküsü olan hastaların tedaviden yararlanma oranı daha düşük bulundu. Osteoartritli hastalarda sistemik komorbid hastalıkların varlığında yaşam kalitesinin önemli ölçüde olumsuz etkilendiği, ağrı skorlarının daha yüksek olduğu ve fiziksel işlev bozukluğu ile yorgunluk düzeyinin artığı bildirilmiştir (12-14). Weiner ve ark. (15), bel ağrısı sıklığı ve ağrı şiddeti ile performansa dayalı fiziksel işlev arasındaki ilişkiyi saptamak amacıyla yaptıkları çalışmada yaşlılarda fiziksel fonksiyonun ağrı şiddeti ve komorbiditelerle ilişkili olduğunu saptamışlardır. Çalışmalarda elde edilen bulgular göz önüne alındığında eşlik eden sistemik hastalığı olanlarda, genel durum bozukluğu ve sistemik hastalığa bağlı komplikasyonların daha sık olması nedeniyle fonksiyonel kapasitenin azalmasına bağlı olarak fiziksel fonksiyonun daha fazla bozulduğu, ağrının arttığı ve hastaların bu sebeple tedaviden daha az yararlanmış oldukları söylenebilir.

Hastanemizde fizik tedavi uygulaması genellikle 10 seans ve üzerinde yapılmaktadır. Çalışmamızda 10 seans veya 10 seanstan fazla tedavi görenler arasında anlamlı fark saptamadık. Casserley-Feeney ve ark. (4), kas iskelet sistemi ağrısında uygulanan 8 seanslık fizik tedavinin ağrıda önemli ölçüde azalma sağladığını bildirmişlerdir. Ökmen ve ark. (16) ise, 15 seans fizik tedavinin, kronik bel ağrısında ağrı ve sakatlık üzerinde 10 seans fizik tedavi uygulamasından daha etkili olduğunu bildirmişlerdir. Aktif çalışma hayatında, hastaların fizik tedaviden daha çok yararlanması ve işe dönüşlerinin daha erken olabilmesi için FTR'nin yanı sıra davranışsal eğitim de önemlidir. Çünkü iş yaşamına erken dönüşün dizabiliteyi azalttığı bilinmektedir (17). Çalışmamızda tedavi süresince aktif çalışma hayatına devam edenler ile çalışmayıp istirahat edenlerin tedaviden yararlanma düzeyi benzerdi. Günlük yaşam aktiviteleri için eğitilmiş olmaları hastaların istirahat etmemelerine rağmen FTR'den yararlanmalarına katkı sağlamış olabilir.

FTR'de uygulayıcıların hasta ile olan iletişiminin önemi birçok çalışmada vurgulanmış, bunun hasta memnuniyetinin temel belirleyicilerinden birisi olduğu bildirilmiştir (18,19). Bizim çalışmamızda fizyoterapistten memnuniyet düzeyi %78,10'du ve fizyoterapistten memnun olanların %91,10'u tedaviden yarar görmüştü. Hastalarımızda fizyoterapistlerden memnuniyet oranının yüksek olması, hastayla iyi iletişim kurabilme becerilerinin yüksek olduğunun göstergesidir.

Hastanın azalmış ya da olumsuz etkilenmiş olan fonksiyonel durumunun korunması için tedavinin terapötik egzersizlerle desteklenmesinin fonksiyonel iyileşmeyi artırdığına, maluliyeti ve psikolojik zorlanmayı azalttığına dair çalışmalar mevcuttur (20-23). Egzersiz programından yararlanmanın en önemli unsuru egzersizi tekniğine uygun olarak yeterli düzeyde yapabiliyor olmaktır. Ay ve ark. (24,25), egzersiz için eğitim sunumunun osteoartritli hastalarda tedavinin etkinliğini daha fazla artırdığını bildirmişlerdir. Biz de bu çalışmada literatürle uyumlu şekilde fizik tedaviyle birlikte egzersiz yapanların tedaviden yararlanma oranlarını, yapmayanlara göre belirgin düzeyde daha yüksek saptadık.

Literatürde hastaların hastalıkları ile ilgili olarak şikayetlerini arttırıcı veya azaltıcı durumlar hakkında verilen bilişsel-davranışçı eğitimin fonksiyonel durumu iyileştirme ve ağrıyı azaltmada etkili olduğu bildirilmiştir (26,27). Çalışmamızda, günlük yaşam aktiviteleri için kendilerine anlatılan önerilere uyanların, şikayetlerini artırıcı pozisyon ve aktiviteler konusunda bilinçli davranmayı öğrenmiş olmaları ve dolayısıyla kendilerini daha iyi koruyabilmeleri nedeniyle tedaviden yararlanma düzeylerinin daha fazla olduğunu düşünmekteyiz.

Hastalarımızın fizik tedavi olmadan iyileşmenin mümkün olduğu ya da olmadığı konusundaki düşünceleri, fizik tedaviden yarar görme konusunda güçlü bir inanç taşıdıklarını göstermektedir. İyileşme durumunu tamamen fizik tedaviye atfetmemekle birlikte, onlar için fizik tedavinin yakınmalarından kurtulmakta iyi ve güçlü bir seçenek olduğu aşikardır. Çalışmamızda fizik tedavinin hiçbir durumda zararı olmadığını düşünenler ile bazı durumlarda zararlı olabileceğini düşünenler arasında yararlanma açısından anlamlı fark saptamadık. Fizik tedavi olmadan iyileşemeyeceğini ya da tedavisi için tek seçeneğinin fizik tedavi olduğunu düşünen hastaların oranının azımsanamayacak oranda yüksek olması, bu konuda hasta bilinçlendirmesini gerekli kılmaktadır.

Çalışmaya alınan hasta sayısının nispeten az olması, ankette tedaviye ilişkin sorularla birlikte fiziki koşulların değerlendirilmemiş olması, anket formunun ilgili profesyoneller tarafından değil de tarafımızca hazırlanmış olması ve geçerlilik ve güvenirliliğinin yapılmamış olması çalışmamızın kısıtlılığıdır. Ülkemizde memnuniyet anket çalışmaları çoğunlukla fiziki koşullara odaklanmışken bizim anketimizin, sağlıkta FTR hizmetinin daha önce araştırılmamış olan tedavi kısmına odaklanmış olması çalışmamızın güçlü yönüdür.

Sonuç

Çalışmamızda hastanemizde FTR programına alınan hastaların tedaviden beklenti ve yararlanma ile uygulayıcıdan memnuniyet oranlarının oldukça yüksek oluğunu gördük (%89,75, %88,60, %78,10). Sağlık hizmeti sunumunun daha fazla hasta merkezli hale geldiği ve hasta memnuniyetinin sağlık hizmeti kalitesinde en önemli bileşen olduğu göz önüne alındığında tedaviden yararlanmış olma durumunun hasta memnuniyetine çok büyük katkı sağlayacağı aşikardır. Sağlıkta hizmet kalitesinin belirlenmesinde daha çok fiziksel koşullar, teknik alt yapı, maliyet, hijyen gibi durumlara odaklanılması bir yönüyle eksik kalacaktır. Hastaların kaliteli hizmet almanın yanında hastalıklarıyla ilgili beklenti, farkındalık ve tedaviden memnuniyet durumlarının değerlendirilmesi, fizik tedaviden daha çok yararlanma konusunda etkili olacaktır. Ayrıca hastaların tedaviye uyumunun ve hastalıkları konusunda eğitilmelerinin hem tedaviye hem de hizmet kalitesine önemli katkılar sağlayacağı düşüncesindeyiz.

Etik

Etik Kurul Onayı: Antalya Eğitim ve Araştırma Hastanesi Klinik Araştırmalar Etik Kurulu'ndan onay alınmıştır (2014).

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Beslenme ve Diyetetik ve Fizyoterapi ile Rehabilitasyon Bölümlerinde Eğitim Gören Öğrencilerin Osteoporoz Bilgi Düzeyinin İncelenmesi ve Karşılaştırılması

Examination and Comparison of Osteoporosis Knowledge Level of Students Studying in Nutrition and Dietetics and Physiotherapy and Rehabilitation Departments

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Öz

Amaç: Kemik kırılganlığında artış ile sonuçlanan osteoporozun önlenmesi için risk faktörlerinin bilinmesi ve kontrol altına alınması önemlidir. Sağlık çalışanlarının risk altındaki bireyleri saptaması ve bilgilendirmesi bireyleri osteoporozdan koruma açısından gereklidir. Çalışmamızda sağlık bilimlerinin farklı alanlarındaki öğrencilerin osteoporoz bilgi düzeylerini incelemeyi ve karşılaştırmayı amaçladık.

Gereç ve Yöntem: Bu çalışma İstanbul Arel Üniversitesi Fizyoterapi ve Rehabilitasyon (FTR), Beslenme ve Diyetetik Bölümlerinde öğrenim gören 19-46 yaş arası 259 öğrenci ile yapılmıştır. Osteoporoz bilgi düzeylerini tespit etmek amacıyla revize 2011-osteoporoz bilgi testi kullanılmıştır.

Bulgular: Öğrencilerin yaşları ortalaması 21,59±2,4'tü. FTR ve beslenme bölümleri arasında osteoporoz bilgi düzeyleri toplam skorları açısından anlamlı fark bulunmadı ancak FTR bölümü öğrencilerinin egzersiz alt grubu ortalamaları istatistiksel olarak anlamlı düzeyde yüksek bulundu (p<0,05). Birinci sınıfta okuyan öğrencilerin toplam skor, egzersiz ve beslenme alt skorlarının 2., 3., 4. sınıflarındaki öğrencilerden daha düşük olduğu görüldü.

Sonuç: Sağlık eğitimi alan öğrencilerde ilerleyen sınıflarda osteoporoz konusunda bilgi düzeyleri yükselmektedir. Eğitimin içeriğine göre bilgi düzeyleri değişebilmektedir.

Anahtar kelimeler: Osteoporoz, öğrenci, bilgi düzeyi, farkındalık

Abstract

Objective: It is important to know and control the risk factors for the prevention of osteoporosis, which results in increased bone fragility. It is necessary for health professionals to identify and inform individuals at risk for the protection of them from osteoporosis. In this study, we aimed to examine and compare the knowledge levels of osteoporosis among students in different fields of health sciences.

Materials and Methods: This study was carried out with 259 students aged between 19 and 46 who are studying at İstanbul Arel University Physiotherapy and Rehabilitation (PTR) and Nutrition and Dietetics Departments. The revised 2011-osteoporosis knowledge test was used to determine their knowledge levels of osteoporosis.

Results: The average age of the students was 21.59±2.4. There was no statistically significant difference between the PTR and Nutrition departments in terms of a total score of osteoporosis knowledge level, but the mean of the exercise subgroups of PTR students was found to be statistically significantly higher (p<0.05). It was observed that the total score, exercise, and nutrition subscores of the students in the first grade were lower than those in the 2nd, 3rd, and 4th grades.

Conclusion: The health education students' knowledge level about osteoporosis is increasing according to their educational level. The level of knowledge can change concerning to the content of education.

Keywords: Osteoporosis, student, knowledge level, awareness

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Giriş

Osteoporoz; düşük kemik kütlesi, kemik dokusunun mikro mimarisinin bozulması ile karakterize ve kemik kırılganlığında artış ile sonuçlanan sistemik bir metabolik kemik hastalığı olarak tanımlanır (1). Dünya çapında 200 milyondan fazla kişinin osteoporoz olduğu tahmin edilmektedir (2). Tüm dünyada ortalama yaşam süresinin uzamasıyla birlikte insanların ileri yaşta sahip oldukları kronik hastalıklar önem kazanmıştır (3). Osteoporozun giderek bir halk sağlığı problemine dönüşmesinin başlıca nedeni, osteoporoza sekonder gelişen frajilite kırıklarına bağlı olarak ortaya çıkan morbidite, mortalite artışı ve ekonomik kayıplardır (4). Toplum sağlığı ve artan tedavi maliyetlerinin etkisi ile tüm dünyada osteoporozun tedavisinden çok, önlenmesi yönündeki çalışmalar ağırlık kazanmıştır (3). Osteoporozun önlenmesi için risk faktörlerinin bilinmesi ve kontrol altına alınması önemlidir. Postmenapozal kadınlarda; yaşlanma, düşük beden kitle indeksi, geçirilmiş frajilite kırığı, ciddi immobilite, sedanter yaşam tarzı ve glukokortikoid kullanımıdır. Diğer önemli risk faktörleri; sigara, aşırı alkol ve kafein kullanımı, romatoid artrit, ailede (annede) kırık (kalça) öyküsü, erken menapoz (<45 yaş), geç menarş, nulliparite, diyette düşük kalsiyum alımı, vitamin D azlığı, antikoagülanlar, kemoterapi, kronik fosfat bağlayıcı antiasitler ve tiroid hormon tedavisidir (4). Menapoz dönemindeki kadınların osteoporoz ile ilişkili risk faktörlerini belirlemek ve sonuçları kadın sağlığını geliştirmek için kullanmak sağlık profesyonellerinin önemli sorumluluklarındandır (4). Osteoporozlu bireyler ile çalışan sağlık çalışanlarının bu hastalığın nasıl önleneceği ve tedavi edileceği konusunda etkin bilgi sahibi olmaları önemlidir (5). Biz de çalışmamızda sağlık bilimlerinin farklı alanlarındaki öğrencilerin osteoporoz bilgi düzeylerini saptamayı ve karşılaştırmayı amaçladık.

Gereç ve Yöntem

Çalışmaya İstanbul Arel Üniversitesi Fizyoterapi ve Rehabilitasyon (FTR), Beslenme ve Diyetetik (BD) bölümlerinde eğitim gören 19-46 yaş arası 259 öğrenci cinsiyet ayrımı yapılmaksızın dahil edildi. Öğrencilere çalışma hakkında ön bilgi verilerek öğrencilerin gönüllülük ilkesine göre katılımı sağlandı. Gönüllü olmayan öğrenciler çalışma kapsamına alınmadı.

Katılımcıların yaş ve cinsiyetini içeren demografik verileri kaydedildi ve osteoporoz bilgi düzeylerini tespit etmek amacıyla revize 2011-osteoporoz bilgi testini (OBT) doldurmaları istendi.

OBT, ilk olarak 1991'de Kim ve ark. (6) tarafından geliştirilmiştir. Osteoporoz hakkında bilgi düzeyini ölçmeyi amaçlayan 24 soru içeren çoktan seçmeli bir ankettir. Ankette egzersiz yapma ve aktivite düzeyi, osteoporozdan korunmak için uygulanan diyetle ilgili sorular yer alır. Türkçe geçerlilik ve güvenilirlik çalışması Kılıç ve Erci (7) tarafından yapılmıştır. OBT 2011 yılında risk faktörlerini sorgulayan 8 soru ilavesiyle revize edilmiştir (8). Bir-on bir arasındaki sorular osteoporoz risk faktörlerini sorgular ve cevaplar "Kemik erimesi olma ihtimali yüksektir", "Kemik erimesi olma ihtimali düşüktür", "Kemik erimesi gelişmesi ile ilgisi yoktur" ve "Bilmiyorum" seçeneklerinden biri işaretlenerek verilir. "Kemik erimesi gelişmesi ile ilgisi yoktur" ve "Bilmiyorum" cevapları yanlış olarak değerlendirilip 0 puan verilir, "Kemik erimesi olma ihtimali yüksektir" veya "Kemik erimesi olma ihtimali düşüktür" cevapları doğru kabul edilir ve 1 puan verilir. Diğer sorular 4 seçmeli cevap içerir ve doğru cevap işaretlenince 1 puan verilir. Revize-OBT'nin 2 alt grubu vardır: Beslenme alt grubu 26 soru içerir (1-11 ve 18-32), egzersiz alt grubu 20 soru içerir (1-17 ve 30-32). Bu iki alt grubun 14 sorusu ortaktır (1-11 ve 30-32). Toplam skorda bu durum göz önünde bulundurulur ve toplam skor 0-32 arasında bulunur (8). Revize-OBT'nin Türkçe geçerlilik güvenilirlik çalışması Şimşir ve ark. (8) tarafından yapılmıştır.

İstatistiksel Analiz

Çalışmada elde edilen bulgular değerlendirilirken, istatistiksel analizler için IBM SPSS Statistics 22 (IBM SPSS, Türkiye) programı kullanıldı. Çalışma verileri değerlendirilirken parametrelerin normal dağılıma uygunluğu Shapiro Wilks testi ile değerlendirildi. Tanımlayıcı istatistiksel metodların (ortalama, standart sapma, frekans) yanı sıra niceliksel verilerin karşılaştırılmasında normal dağılım gösteren parametrelerin gruplar arası karşılaştırmalarında one-way ANOVA testi ve farklılığa neden olan grubun tespitinde Tamhane's T2 testi kullanıldı. Normal dağılım gösteren parametrelerin iki grup arası karşılaştırmalarında Student's t-test kullanıldı. Anlamlılık $p<0,05$ düzeyinde değerlendirildi.

Bulgular

Çalışma Mayıs-Ekim 2017 tarihleri arasında yaşları 19 ile 46 arasında değişmekte olan, 61'i (%23,6) erkek ve 198'i (%76,4) kadın olmak üzere toplam 259 öğrenci ile yapılmıştır. Öğrencilerin yaşları ortalaması 21,59±2,4'dür. Çalışma 59'u (%22,8) FTR öğrencisi ve 200'ü (%77,2) BD öğrencisi olmak üzere iki bölümde incelenmiştir. Öğrencilerin 65'i (%25,1) 1.sınıf, 54'ü (%20,8) 2.sınıf, 99'u (%38,2) 3.sınıf ve 41'i (%15,8) 4.sınıf öğrencisidir.

FTR ve BD bölümleri arasında beslenme alt grubu ve toplam skor ortalamaları açısından istatistiksel olarak anlamlı bir farklılık bulunmamaktadır ($p>0,05$). FTR bölümünün egzersiz alt grubu ortalamaları, BD bölümünden istatistiksel olarak anlamlı düzeyde yüksek bulunmuştur ($p<0,05$) (Tablo 1).

FTR ve BD bölümünde; erkekler ve kadınlar arasında beslenme alt grubu, egzersiz alt grubu ve toplam skor ortalamaları açısından istatistiksel olarak anlamlı bir farklılık bulunmamaktadır ($p>0,05$) (Tablo 2).

BD bölümünde; sınıflar arasında beslenme, egzersiz alt grupları ve toplam skor ortalamaları açısından istatistiksel olarak anlamlı farklılık bulunmaktadır ($p<0,05$). Farklılığın tespiti için yapılan ikili karşılaştırmalar sonucunda; 1.sınıfların beslenme alt grubu ortalamaları, 2.sınıf, 3.sınıf ve 4. sınıflardan istatistiksel olarak anlamlı düzeyde düşük bulunmuştur ($p<0,05$). Diğer sınıflar arasında beslenme alt grubu ortalamaları açısından istatistiksel olarak anlamlı bir farklılık bulunmamaktadır ($p>0,05$) (Tablo 3).

Tartışma

Literatürde toplumun çeşitli kesimlerinde osteoporoz bilgi düzeyini değerlendiren çalışmalar mevcuttur (3,9-14). Bizim çalışmamızda BD bölümü öğrencileri ile FTR bölümü öğrencileri arasında genel osteoporoz bilgi düzeyi açısından anlamlı fark saptanmamıştır. Ancak BD bölümünde, üst sınıflarda okuyan öğrencilerin 1. sınıflara göre bilgi düzeyi anlamlı olarak daha yüksekti. Sağlık eğitiminin, osteoporoz bilgi düzeyi üzerine etkisi beklenen bir sonuçtur. Literatürde toplumun çeşitli kesimlerini içeren, osteoporoz bilgi düzeyi ile ilgili yapılan çalışmalar incelendiğinde çalışmamızın sonuçlarıyla benzer bir şekilde eğitim düzeyi ile osteoporoz bilgi düzeyinin korele olduğu görüldü (3,9-11). Özellikle osteoporozlu bireyler ile çalışanlarda, osteoporoz bilgi düzeylerinin daha yüksek olması beklenmektedir. Primer sağlık bakımı sağlayan hemşirelerin ve ebelerin osteoporoz bilgi düzeylerini değerlendiren Yağmur (15) yaptığı çalışmada, osteoporoz bilgi düzeyleri orta düzeyde bulunmuştur. Çalışmaya katılanların %65,9'u sağlık eğitimleri sırasında osteoporozla ilgili bilgi almadıklarını ifade etmişlerdir. Literatürde sağlık eğitimi almakta olan hemşirelik öğrencilerinin osteoporoz bilgi düzeyleri ve davranışlarının incelendiği birçok çalışma bulunmaktadır. Bu çalışmalarda birbirinden farklı anket ve değerlendirme yöntemleri kullanılmış olup hemşirelik öğrencilerinin osteoporoz bilgi düzeylerinin genel olarak yeterli olmadığı saptanmıştır (6,16). Öğrencilerin kendi içinde sınıflar arası farklılıkları değerlendirildiğinde bizim çalışmamızla benzer bir şekilde üst sınıflarda okuyan öğrencilerin daha yüksek bilgi düzeyine sahip olduğu görülmüştür (6).

Tıp fakültesi öğrencilerinin osteoporoz bilgi düzeylerini inceleyen Eyigör ve ark. (17) yaptığı çalışmada, öğrencilerin çoğunluğunun osteoporoz tanımını bilmekle birlikte osteoporozun komplikasyonları ve osteoporozdan korunma yöntemleri konusundaki bilgilerinin yetersiz olduğu bildirilmiştir. Sri Lanka ve Pakistan'da kadın tıp öğrencileri ile yapılan osteoporoz tanı ve tedavi yöntemleri, risk faktörleri, osteoporozu önleme yöntemleri ilgili bilgi düzeylerini inceleyen çalışmalarda; öğrencilerin önemli

Tablo 1. Bölümler arasında beslenme alt grubu, egzersiz alt grubu ve toplam skor puanlarının değerlendirilmesi

	Bölüm		p
	FTR	BD	
	Ort ± SS	Ort ± SS	
Beslenme alt grubu	14,31±4,5	14,92±4,25	0,336
Egzersiz alt grubu	12,49±4,1	11,04±3,22	0,005*
Toplam skor	17,31±5,4	17,36±4,72	0,945

*p<0,05, Ort ± SS: Ortalama ± standart sapma, FTR: Fizyoterapi ve rehabilitasyon, BD: Beslenme ve diyetetik,

Tablo 2. Bölümlerde erkekler ve kadınlar arasında beslenme alt grubu, egzersiz alt grubu ve toplam skor puanlarının değerlendirilmesi

Bölüm		Cinsiyet		p
		Erkek	Kadın	
		Ort ± SS	Ort ± SS	
FTR	Beslenme alt grubu	14,06±4,86	14,67±3,97	0,613
	Egzersiz alt grubu	12,17±4,33	12,96±3,79	0,474
	Toplam skor	17,06±5,71	17,67±5,02	0,674
BD	Beslenme alt grubu	14,73±5,36	14,95±4,07	0,844
	Egzersiz alt grubu	10,42±3,84	11,13±3,12	**0,296**
	Toplam skor	16,96±6,15	17,41±4,49	**0,650**

FTR: Fizyoterapi ve rehabilitasyon, BD: Beslenme ve diyetetik, Ort ± SS: Ortalama ± standart sapma
Student's t-test p<0,05

Tablo 3. Beslenme ve diyetetik bölümünde sınıflar arasında beslenme alt grubu, egzersiz alt grubu ve toplam skor puanlarının değerlendirilmesi

Sınıf	Beslenme alt grubu	Egzersiz alt grubu	Toplam skor
	Ort ± SS	Ort ± SS	Ort ± SS
1. sınıf	11,97±4,03	9,37±3,28	13,98±4,5
2. sınıf	16,79±3,78	11,77±3,02	19,38±4,28
3. sınıf	15,3±3,81	11,55±3,41	17,95±4,21
4. sınıf	16,92±2,7	12,29±1,78	19,61±2,66
p	**0,000***	**0,000***	**0,000***

Ort ± SS: Ortalama ± standart sapma
*p<0,05

bir kısmının zayıf bilgi düzeyine sahip olduğu saptanmış, çok az öğrencinin osteoporozdan korunmaya yönelik beslenme ve egzersiz davranışları sergiledikleri görülmüştür (18,19). Ghaffari ve ark. (20) tarafından İran'da yapılan bir çalışmada ise medikal bilim öğrencilerinin yalnız %19' unun osteoporoz bilgi düzeyleri yüksek olarak bulunmuştur Bayındır Çevik ve ark. (21) Türkiye'de yaptığı çalışmada da benzer bir şekilde, sağlık eğitimi alan kız öğrencilerin osteoporoz riski farkındalık düzeyleri orta düzeyde sonuçlanmıştır.

Biz çalışmamızda osteoporoz bilgi düzeyinde, bölümler arası belirgin fark saptanmamıştır. Giangregorio ve ark. (22) 2016 yılında yayınladığı frajilite kırığı olan hastalara bakım yapan sağlık profesyonellerinin OBT ile değerlendirdiği çalışmada diyetisyenlerin eczacılardan, eczacıların da fizyoterapist ve hemşirelerden daha yüksek osteoporoz bilgi düzeyine sahip olduğu gösterilmiştir. Sonucun bizim çalışmamızla uyumsuz olmasının sebebi, örneklem büyüklüğü olabilir. Sağlık hizmetleri programlarında okuyan öğrencilerin osteoporoz bilgisini değerlendiren bir başka çalışmada; hemşirelik, eczacılık, fizyoterapi, beslenme bölümü öğrencilerine OBT ile değerlendirilmiş ve çalışmamızla benzer bir şekilde üst sınıflarda okuyan öğrencilerin bilgi düzeyi alt sınıflarda okuyan öğrencilerden yüksek bulunmuştur. Bölümler arası karşılaştırmada alt sınıflarda okuyan eczacılık öğrencilerinin bilgi düzeyi 1. sınıf FTR öğrencileri hariç diğer tüm gruplardan anlamlı olarak düşük olduğu saptanmıştır (5). Elnaem ve ark. (23) yaptığı başka bir çalışmada ise son sınıf tıp, eczacılık, FTR ve beslenme bölümü öğrencilerinin osteoporoz bilgi düzeylerinin OBT ile değerlendirildiği başka bir çalışmada toplam skor ve beslenme skoru beslenme ve FTR bölümü öğrencilerinde daha yüksek bulunmuştur.

Çalışmamızda OBT egzersiz alt grubu skorlarında FTR öğrencilerinin farkındalığının BD öğrencilerinden anlamlı olarak daha yüksek olduğu saptandı. FTR öğrencilerinin egzersiz konusunda daha eğitimli olmaları sebebiyle bu beklenen bir sonuçtur. Beslenme alt grubu skorlarında ise gruplar arasında anlamlı farklılık saptanmadı.

Çalışmanın Kısıtlılıkları

Çalışmamızın majör kısıtlılığı katılımcı sayısıdır. Daha yüksek katılımcı ile sağlık alanındaki daha farklı bölümlerde okuyan öğrencilerin bilgi düzeyleri araştırılabilir.

Sonuç

Sağlık eğitimi alan öğrencilerde ilerleyen sınıflarda osteoporoz konusunda bilgi düzeyinin daha yüksek olduğu saptandı. Toplumda osteoporoz farkındalığının gelişmesinde eğitimli sağlık çalışanlarının önemli payı vardır. Sağlık eğitimi alan öğrencilerin osteoporoz bilgi düzeylerini gözden geçirmek ve artırmaya yönelik girişimlerde bulunmak yaşlanan toplumda ciddi morbidite ve mortaliteye sebep olan osteoporozun önlenmesinde önemli bir adım olacaktır.

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The Effects of Sugammadex on Vitamin D Levels in Rabbits Under General Anesthesia

Genel Anestezi Altındaki Tavşanlarda Sugammadeksin D Vitamini Düzeylerine Etkileri

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Abstract

Objective: Sugammadex is a widely used anesthetic agent for reversing of the non-depolarizing block. It reduces blood levels of steroid compounds by encapsulation. The aim of this study was to investigate the effect of sugammadex on the blood levels of vitamin D levels, which has a steroid structure.

Materials and Methods: A total of 15 adult male New Zealand white rabbits weighing 2-2.5 kg were randomized into three groups according to decurarization: Group S [sugammadex (16 mg/kg), n=5], group N [neostigmine (0.05 mg/kg), n=5], group C (control group, n=5). Vitamin D levels from venous blood were measured at baseline, 20 minutes and 24 hours after general anesthesia.

Results: Mean ± SD vitamin D levels before anesthesia, 20 minutes and 24 hours after anesthesia were 4.42±0.60 ng/mL, 4.93±0.72 ng/mL, and 4.66±0.94 ng/mL for group S, 4.92±0.45 ng/mL, 5.02±0.41 ng/mL, and 5.41±0.56 ng/mL for group N, and 5.15±0.82 ng/mL, 4.57±1.10 ng/mL, and 5.21±1.05 ng/mL for group C, respectively. There were no significant differences in the mean vitamin D levels between the groups at baseline, 20 minutes, and 24 hours.

Conclusion: Contrary to expectations, it was found that sugammadex did not have a statistically significant effect on blood levels of vitamin D.

Keywords: Vitamin D, general anesthesia, steroids, sugammadex

Öz

Amaç: Sugammadeks non-depolarizan bloğun geri döndürülmesi için yaygın kullanılan bir anestezik ajandır. Enkapsülasyon yoluyla steroid bileşiklerin kan düzeylerini azaltır. Bu çalışma, sugammadeksin steroid yapılı olan D vitamininin kan düzeyleri üzerine etkisini araştırmak amacıyla yapıldı.

Gereç ve Yöntem: 2-2,5 kg ağırlığında toplam 15 yetişkin erkek Yeni Zelanda ırkı beyaz tavşan, dekürarizasyona göre randomize olarak üç gruba ayrıldı: Grup S [sugammadeks (16 mg/kg), n=5], grup N [neostigmin (0,05 mg/kg), n=5], grup K (kontrol grubu, n=5). D vitamini düzeyleri; bazal, genel anestezi sonrası 20. dakika ve genel anestezi sonrası 24. saatte venöz kandan ölçüldü.

Bulgular: Anestezi öncesi, anestezi sonrası 20. dakika ve 24. saatte ortalama ± SS D vitamini seviyeleri sırasıyla; grup S için 4,42±0,60 ng/mL, 4,93±0,72 ng/mL ve 4,66±0,94 ng/mL, grup N için 4,92±0,45 ng/mL, 5,02±0,41 ng/mL ve 5,41±0,56 ng/mL ve grup C için 5,15±0,82 ng/mL, 4,57±1,10 ng/mL, 5,21±1,05 ng/mL idi. Gruplar arasında ortalama D vitamini düzeylerinde bazal, 20. dakika ve 24. saatte anlamlı fark yoktu.

Sonuç: Beklenenin aksine, sugammadeksin D vitamini kan düzeyleri üzerinde istatistiksel olarak anlamlı bir etkisi olmadı.

Anahtar kelimeler: D Vitamini, genel anestezi, steroidler, sugammadeks

Introduction

Vitamin D are related to calcium-phosphorus metabolism and bone mineralization (1). In recent years, vitamin D deficiency has been linked to many chronic diseases including various cancers, cardiovascular diseases, metabolic syndrome, infections, and autoimmune diseases (2-4). Therefore, it is very important to reveal the factors affecting vitamin D. Can an anesthetic drug be medication that reduces vitamin D levels?

Today's medical advances have made significant progress in increasing the reliability of anesthetics and the overall quality of anesthesia. Therefore, there have been significant increases in the number of surgical procedures. Turkey's health ministry datas showed that the number of surgical procedures is seen as closer to 5 million per year (5).

Muscle relaxant drugs significantly contribute to the reduction of the medications used in anesthesia. With the widespread

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use of muscle relaxants, the need for agents to antagonize the effects of medium and long-acting muscle relaxant agents in clinical use has increased (6). Representing an alternative to traditional decurarization provided by cholinesterase inhibitors, sugammadex is a widely used cyclodextrin analog. It has been shown to achieve a fast and safe elimination of the non-depolarizing block (7). Sugammadex is a modified γ-cyclodextrin drug used to antagonize the effect of steroid-based non-depolarizing muscle relaxants such as rocuronium and vecuronium. It binds to the circulating steroid muscle relaxants (encapsulation), forms a complex, and is excreted in the urine without metabolizing (8). Despite this advantages, sugammadex can causes side effects on some steroid drugs. Studies showed that sugammadex may interact with toremifene (selective estrogen receptor modulator) and some antibiotics (flucloxacillin, fusidic acid). It can also bind and interact with oral contraceptive drugs taken on the same day (9,10). It reduces both the activity of sugammadex and the efficacy of steroid drugs, so it can lead to undesirable effects.

In recent studies, the effects of sugammadex on endogenous steroid hormones and hormone-like substances are also investigated (11,12). Vitamin D is one of the fat-soluble vitamins from a group of sterols that are hormone and hormone precursors, which can be synthesized endogenously in the appropriate biological environment. But there is no study on the effects of sugammadex on steroid-based vitamin D.

This study aimed to investigate the possible effects of sugammadex on blood vitamin D levels.

Materials and Methods

Trial Design

A randomized-controlled, animal study was planned. Ethical approval of the study was obtained from the local ethics board of the Çanakkale Onsekiz Mart University Ethical Board of Animal Studies (IRB number 2017/42962, date 27/11/2017). The study reporting was done following the CONSORT guidelines (13,14).

Participants

In this study, 15 adult male New Zealand White rabbits weighing 2-2.5 kg were used. All rabbits were examined before the study clinically for the behavioral, respiratory, and cardiovascular systems and no issues were detected.

Study Settings

The experiments were carried out at the Çanakkale Onsekiz Mart University Experimental Research Center during December 2017. All experiments were performed between 09:00-17:00 hours. All rabbits were housed in appropriate plastic cages in an animal room maintained at a standard humidity (45%-50%) and temperature 21±2 °C with 12 hours light and 12 hours darkness, and were fed with standard food (Bil-Yem Ltd. Co., Ankara, Turkey) and water ad libitum. The experiment was started after one week of acclimatization.

Interventions

The rabbits have fasted for 8 hours before the intervention. After randomization, the animals received the following interventions: Group S [sugammadex (16 mg/kg), n=5], group N [neostigmine (0.05 mg/kg), n=5], and group C [0.9% saline (0.05 mL/kg), n=5]

The rabbits receiving general anesthesia were given 10 mg/kg intramuscular ketamine for premedication. electrocardiogram and arterial blood pressure monitoring were performed to the experimental animals during general anesthesia. The mean arterial pressure (59-91 mmHg) and heart rates (137-246/min) of all experimental animals were within physiological limits.

After 20 minutes, vascular access was made with a 22-24 G branule from the ear vein. Two cc blood samples were taken from each rabbit to measure vitamin D levels. Group S and group N were given intravenous (IV) propofol 2 mg/kg, fentanyl 1 mcg/kg, and rocuronium 0.6 mg/kg for general anesthesia. Then, V-gel® Rabbit (V-gel® Rabbit R-3 Docsinnovent ® Ltd. London, UK) was placed in all experimental animals to ensure airway safety, and the animals were placed on the anesthesia machine (Anesthesia Machine w/O2 Flush Model M3000PK Parkland Scientific Lab and Research Equipment. Florida, USA) and inhaled manually. The anesthesia was maintained with 50% oxygen, 50% air mixture and 1 minimum alveolar concentration isoflurane.

The experimental animals were manually ventilated by the same anesthesiologist at a pressure of about 15 cm H_2O (about 10 mL/kg) and a rate of 40/minute ensuring appropriate respiration for rabbit physiology. To secure sufficient oxygenation, blood gases were checked the 10^{th} minute of the procedure and 20 minutes after the removal of the V-gel® Rabbit removal) using the Radiometer ABL 800 device. The analyzed blood gases were within the physiological limits.

Twenty minutes after induction of anesthesia, group S received 16 mg/kg IV sugammadex, group N received 0.05 mg/kg IV Neostigmine plus 0.01 mg/kg atropine, and Group C received IV 0.05 mL/kg 0.9% saline. After sufficient spontaneous breathing was observed, the V-gel® Rabbit was removed, and the animals were allowed to rest for 20 minutes. Then, 2 cc blood samples were taken from all rabbits for a repeat vitamin D analysis. After 24 hours, the last sample of 2 cc blood was taken from all animals.

Outcomes

The main outcome of the study was blood vitamin D levels. Blood vitamin D levels were measured from all rabbits before anesthesia, 20 minutes after anesthesia, and 24 hours after anesthesia. Blood samples were collected into vacuumed gel tubes. The samples were incubated at room temperature for 30 minutes and then centrifuged at 4000 rpm for 10 minutes. The 25(OH) D3 levels were quantified using commercial kits (cat. no: 201-09-3871, Sunred biological technology, Shangai, China) based on the quantitative sandwich Enzyme-Linked Immuno Sorbent Assay (ELISA) method. The results were analyzed with the ELX 808 IU model ELISA reader.

Sample Size

Sample size calculation was based on the mean differences in vitamin D levels between the three groups. A post hoc sample size calculation demonstrated that 15 cases produce a power of 83% in comparing the three means with an alpha error of 5% and an effect size of 0.95 (15).

Randomization

The 15 rabbits were randomly divided into 3 groups. Randomization was done by giving the rabbits sequential numbers and randomly assigning to groups using a random numbers table. The groups were; group S - Sugammadex group (n=5), group N - neostigmine group (n=5), and group C - control group (n=5) (Figure 1).

Blinding

Data were collected by an independent researcher who was not part of the study. Postoperative scoring of the masks was done by a nursing staff member who was unaware of the grouping.

Statistical Analysis

Data were presented as the mean ± standard deviation for numerical variables and n (%) for categorical variables. Normal distribution of the numerical variables was checked with the Shapiro-Wilk test (statistic; p for Vitamin D levels at baseline, 20 minutes, and 24 hours, 0.959; 0.709, 0.962; 0.753; and 0.923; 0.241, respectively). The one-way ANOVA and repeated measures ANOVA tests were used to compare changes in Vitamin D levels over time. The value of $p<0.05$ was considered significant.

Results

Participant Flow

Results for a total of 15 rabbits were analyzed (Figure 1).

Losses and Exclusions

All randomized rabbits could proceed to the end of the experiment; no rabbits were excluded (Figure 1).

Recruitment

The rabbits were supplied by the Experimental Research Center of the Çanakkale Onsekiz Mart University (Turkey).

Baseline Data

Mean weight of the rabbits was 2.39±0.23 kg. There were no differences in the weights of the rabbits between groups ($p>0.05$).

Outcomes and Estimation

The mean blood Vitamin D levels of the 15 rabbits at baseline was 4.80±0.65 ng/mL. There were no significant differences in the mean Vitamin D levels between the three groups at baseline, 20 minutes, or 24 hours (Table 1).

Also, there was no significant change in the mean Vitamin D levels of the groups over time, neither was an interaction between measurement time and groups (tests of within-subject effects F=0.859, p=0.437, tests of between-subjects effects F=1.887, p=0.197, Figure 2).

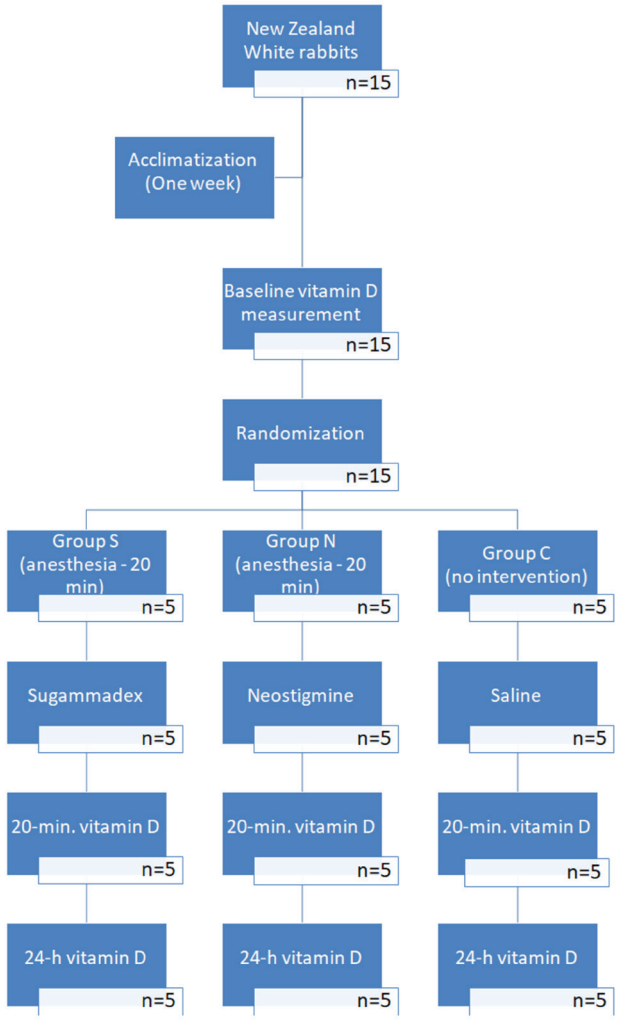

Figure 1. Experiment flow diagram

Table 1. Comparison of the mean Vitamin D levels between the groups

	Sugammadex		Neostigmine		Control	
	Mean ± SD	**F, p**	**Mean ± SD**	**F, p**	**Mean ± SD**	**F, p**
Baseline	4.42±0.60	1.692, 0.229	4.92±0.45	0.449, 0.649	5.15±0.82	0.996, 0.398
20-min.	4.93±0.72	-	5.02±0.41	-	4.57±1.10	-
24-h	4.66±0.94	-	5.41±0.56	-	5.21±1.05	-

SD: Standard deviation

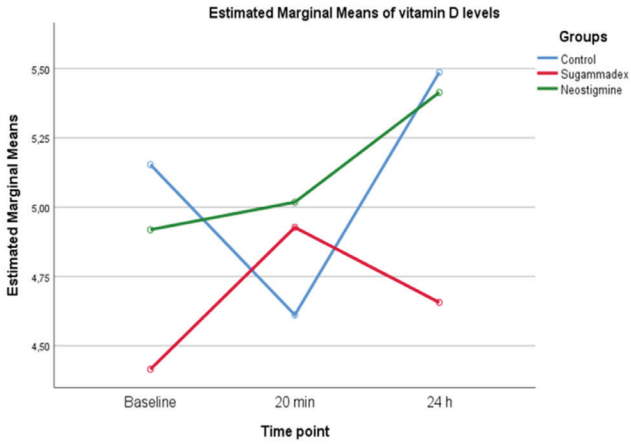

Figure 2. Changes of the mean Vitamin D levels between the groups overtime

Discussion

Study Limitations

Although in this trial we had randomly selected animals with possibly similar confounding factors, we did not check for other variables which could influence the results. Also, we had a low sample size, and we did not check for different doses of sugammadex.

Generalizability

There was no statistically significant difference in the vitamin D levels of rabbits who received sugammadex compared to those who received neostigmine or saline.

Interpretation

According to the prospectus information, it is stated that sugammadex may interact with toremifene (selective estrogen receptor modulator) and some antibiotics (flucloxacillin, fusidic acid). It can also bind and interact with oral contraceptive drugs taken on the same day (9). Since sugammadex acts by encapsulating steroid neuromuscular blockers, the effect of other molecules, hormones, and drugs on the plasma levels of the steroidal structure has been investigated before (16,17).

Ozdemirkan (11) investigated the effects of sugammadex on the levels of stress hormones in the postoperative period. Serum cortisol, insulin, aldosterone, and glucose levels were examined. It has been found that stress response to surgery has occurred in patients using both neostigmine and sugammadex, and the use of sugammadex does not affect this stress response and the levels of stress hormones. However, Ozer et al. (16) demonstrated an earlier reversal of neuromuscular block by sugammadex in patients receiving steroids, and particularly dexamethasone, claiming a potential interaction between sugammadex and steroids. On the other hand, Gulec et al. (18) evaluated dexamethasone's effects on the reversal time of sugammadex in children undergoing tonsillectomy and demonstrated that dexamethasone did not interfere with the reversal time of sugammadex. Similarly, in another study, the administration of dexamethasone to anesthetized patients did not delay neuromuscular block reversal by sugammadex (19). In another paper, it was suggested that sugammadex is not associated with adverse effects on steroid hormones progesterone and cortisol, while it may lead to a temporary increase in aldosterone and testosterone (12).

As seen in the literature, there are different results on the effects of sugammadex on endogenous steroids. Different anesthetic methods may have different effects on the hormonal autonomic responses, and various plasma concentrations of anesthetic medications may cause differences in endocrine responses. Therefore, it may be difficult to evaluate the hormonal response caused by anesthesia and surgery and to compare study results. Vitamin D is a steroid-structured molecule, so sugammadex may interact it. We want to investigate the possible effects of sugammadex on blood vitamin D levels.

In contrast with what expected, it was found that sugammadex has no effects on blood levels of vitamin D. There were no significant differences in the mean Vitamin D levels between the three groups at baseline, 20 minutes, or 24 hours. There may be two possible causes. The first one is that endogenous steroids and steroid drugs have a low affinity when binding to sugammadex because they do not contain quaternary ammonium ions such as steroid drugs (rocuronium, vecuronium). The steroid structure of the hormones in the plasma to bind to specific protein carriers have also been shown to be another reason for low affinity (20). In their review of the interaction of sugammadex with other molecules with the isothermal titration microcalorimetry method, Zhang (21) investigated the tendency of sugammadex to complex with steroid and non-steroidal compounds such as cortisone, atropine, and verapamil. They reported that the inclination of sugammadex to complex with these compounds was clinically insignificant and that this tendency was about 120-700 times less than the tendency to complex with rocuronium. They stated that sugammadex may form a complex with molecules of steroid structure, but with a very low affinity. As an explanation for the lack of statistically significant effect of sugammadex on the vitamin D levels, it was claimed that due to the high affinity of sugammadex for rocuronium, even if it binds to steroid molecules, the ratio may not be not enough to reach a significance level.

The other possible cause may be related to the structure of vitamin D. Although vitamin D is known as a steroid, vitamin D is produced from the cyclopentanoferon ring, and some reports are suggesting that it is not considered steroid hormone because of its four-ring structure and it has a secosteroid structure (22). Therefore, it may be considered that sugammadex actually does not have vitamin D binding properties.

Conclusion

In conclusion, clinicians prefer drugs that can turn down the unwanted side effects of neuromuscular blocking medications without serious side effects. Although sugammadex has been

recently introduced, it has been suggested that it is superior to other neuromuscular blocking antagonists concerning its effect velocity and low side effect potential. Although there are many publications in the literature about sugammadex drug interactions and clinical effects, there is no study in the literature on the impacts of sugammadex on vitamin D levels. As to our knowledge, this is the first research in this field. Further clinical studies are needed to prove our conclusions.

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Ethics

Ethics Committee Approval: The study were approved by the Çanakkale Onsekiz Mart University Experimental Research Application and Research Center with approval of Local Animal Experimentation Ethics Committee. (protocol number: 1421)
Informed Consent: It was taken.
Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: T.H., H.B.A., Concept: H.B.A., Design: T.H., H.B.A., Data Collection or Processing: T.H., H.B.A., Analysis or Interpretation T.H., H.B.A., Literature Search: T.H., Writing T.H., H.B.A.

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

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Evaluation of Osteoporosis Awareness in Chronic Obstructive Pulmonary Disease Patients

Kronik Obstrüktif Akciğer Hastalığı Hastalarında Osteoporoz Farkındalığının Değerlendirilmesi

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Abstract

Objective: Osteoporosis is a significant health problem that affects the quality of life negatively and places a serious burden on the national economy. The risk of osteoporosis in chronic obstructive pulmonary disease (COPD) patients is increased compared to the normal population; however, the knowledge level of the COPD patients related to osteoporosis has not been clearly known. The aim of our study was to investigate the awareness and knowledge level of COPD patients about osteoporosis.

Materials and Methods: The patients diagnosed with COPD who admitted to the outpatient clinic of chest diseases between April 2018 and December 2018 were included in the study. The demographic data of the patients were recorded. Whether they have information about osteoporosis and if they know, the sources of information, whether they applied to a physician for this issue, and their knowledge level about the risk factors of osteoporosis were questioned and recorded.

Results: A total of 122 patients, of whom 111 were male, were included in the study. 54.9% of the patients had knowledge about osteoporosis. It was found that they were informed mostly from people around them (28.7%), physicians (23%), and press (3.3%). Even though more than half of the patients had known osteoporosis, only 6.6% knew that COPD was a risk factor, and 0.8% were informed by the chest physician about osteoporosis and referred to the relevant physician.

Conclusion: The knowledge level of COPD patients about osteoporosis was determined to be insufficient. All physicians, especially chest physicians, should give due consideration to this subject and education should be emphasized through the press.

Keywords: Osteoporosis, COPD, awareness

Öz

Amaç: Osteoporoz yaşam kalitesini olumsuz yönde etkileyen ve ülke ekonomisine ciddi yükler getiren önemli bir sağlık problemidir. Kronik obstrüktif akciğer hastalığı (KOAH) hastalarında osteoporoz riski normal popülasyona göre artmıştır ancak KOAH hastalarının osteoporozla ilgili bilgileri net olarak bilinmemektedir. Çalışmamızın amacı KOAH hastalarının osteoporoz hakkındaki farkındalığını ve bilgi düzeylerini araştırmaktır.

Gereç ve Yöntem: Çalışmaya Nisan 2018 - Aralık 2018 tarihleri arasında göğüs hastalıkları polikliniğe başvuran KOAH tanılı hastalar alındı. Hastaların demografik verileri kaydedildi. Osteoporoz hakkında bilgileri olup olmadığı, biliyorlarsa bilgi kaynakları, bunun için herhangi bir hekime gidip gitmedikleri ve osteoporozun risk faktörleri hakkındaki bilgileri sorgulanarak kaydedildi.

Bulgular: Çalışmaya 111'i erkek toplam 122 hasta alındı. Hastaların %54,9'nun kemik erimesi hakkında bilgisi vardı. Bilgiyi en çok çevreden (%28,7), daha sonra ise doktordan (%23) ve basından (%3,3) aldığı tespit edildi. Hastaların yarısından fazlası kemik erimesini bilmesine rağmen sadece %6,6'sı KOAH'nin bir risk faktörü olduğunu biliyordu ve %0,8'i göğüs hastalıkları hekimi tarafından osteoporoz açısından bilgilendirilip ilgili hekime yönlendirilmişti.

Sonuç: KOAH hastalarının osteoporoz ile ilgili bilgi düzeylerinin yeterli olmadığı tespit edildi. Başta göğüs hastalıkları hekimi olmak üzere tüm hekimlerin konuya gereken önemi vermesi ve basın yayın aracılığı ile eğitimlere ağırlık verilmesi gerekmektedir.

Anahtar kelimeler: Osteoporoz, KOAH, farkındalık

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Introduction

Chronic obstructive pulmonary disease (COPD) is a heterogeneous disorder characterized by persistent airway obstruction, having systemic effects, and associated with many comorbidities (1,2). Osteoporosis is one of the comorbidities seen in COPD patients (3). The incidence of osteoporosis is increased in COPD patients due to causes such as systemic inflammation, oral and inhaled corticosteroid use, low body mass index, smoking, inactivity, and malnutrition (3-8). Conducted studies have shown that the incidence of osteoporosis increased 1.5-2-fold in COPD patients (9-12). Even though the incidence of osteoporosis is increased in COPD, most of these patients are not investigated and necessary treatment is not initiated (13,14). Hip fractures which develop after osteoporosis disable mobilization of COPD patients, and vertebral compression fractures, by leading to kyphosis, cause reduction of pulmonary capacity in patients already with limited respiratory reserve and the symptoms being more prominent (15). This situation brings a serious burden to the economy of the country, together with increasing the morbidity and mortality rates of patients. When treatment costs for osteoporosis and subsequent fractures are considered, studies on prevention of the disease rather than its treatment have been gaining importance (16). Therefore, osteoporosis should be identified early, and various precautions should be taken for its prevention. The first of such measures is early identification of the risk groups and initiation of both the preventive and therapeutic management. The occurrence or progression of the disease can be prevented if the identified populations at risk are educated and necessary precautions are taken before bone loss develops. The awareness and knowledge level of the risk group should be identified for educational purposes. For this reason, in our study, we aimed to evaluate the knowledge level of COPD patients, who are individuals at risk for osteoporosis, about this disorder.

Materials and Methods

The study was designed as a prospective cross-sectional study and was approved by Aydın Adnan Menderes University Ethical Committee, Aydın, Turkey (no: 2018/1356). All participants signed informed consent forms. The patients who had presented to the Outpatient Clinics of Chest Diseases and who had been diagnosed with COPD according to the GOLD criteria (17) in Aydın Adnan Menderes University Medical Faculty between April 2018 and December 2018 were included in the study. The inclusion criteria were to be diagnosed with COPD for at least the last two years and to accept to participate in the study. The demographic data of the patients such as age, gender, height, body weight, educational status, and smoking history were recorded. It was questioned whether the patient had knowledge of osteoporosis, and if informed, what was its source, and in case the source was a physician, which physician the source was. It was also questioned whether the patient had presented to a physician due to osteoporosis, together with the conducted investigations. Regarding osteoporosis, risk factors such as aging, female gender, menopause, genetic factors, inadequate calcium intake, insufficient exposure to sunlight, lack of exercise, smoking, caffeine-containing beverages, and thyroid disorders were questioned and the knowledge of the patients on these was identified. Moreover, the patients were questioned for a history of balance problems, falls, and fractures.

Statistical Analysis

All statistical analyses were done using SPSS 17.0 for Windows (SPSS Inc., Chicago, IL, USA). Quantitative variables are expressed as mean ± standard deviation, and qualitative variables are given as frequency and percentage. The relationship between the knowledge level and the educational level was evaluated by Kendall correlation analysis. $P<0.05$ was considered significant.

Results

A total of 122 COPD patients with the mean age of 66.64±8.08 years, of whom 111 (91%) were male and 11 (9%) were female, were included in the study. Of all patients, 12 (9.8%) were stage 1, 68 (55.7%) stage 2, 27 (22.1%) stage 3, and 15 (12.3%) stage 4 COPD patients. Eighty-seven (73%) patients were ex-smokers whereas 28 (23%) were currently smoking. Five (4.1%) patients had no smoking history; however, these patients had a history of biomass exposure. The average annual cigarette consumption rate of the patients was 44.61±40.47 packs. The demographic data of the patients were shown in Table 1.

When the patients were asked what the term of osteoporosis meant, 114 (93.7%) patients expressed that they had not heard it before. When the question was asked again as what bone thinning was, 67 (54.9%) patients expressed that they had heard about it previously whereas 55 (45.1%) expressed that they had never heard about it. It was determined that the knowledge level increased with increasing educational level ($r=0.329$, $p<0.001$). When the source of information was asked to the patients who were aware of osteoporosis, 35 (28.7%) patients said that they had learned it from the people around them, 28 (23%) patients from a physician, and 4 (3.3%) patients from the press. Among the patients who said that they had learned from a physician, 21 (17.2%) patients expressed the physician as the physical therapy and rehabilitation specialist, 6 (4.9%) from the family physician, and only one patient (0.8%) stated that the information source was a pulmonologist. Even though 54.9% of the patients were aware of osteoporosis and 23% of these patients had learned it from a physician, only 14 (11.5%) patients had presented to a physician for investigation of the disorder.

When the knowledge level of the patients about the risk factors leading to osteoporosis was assessed, it was determined that 8 (6.6%) patients knew that COPD was a risk factor whereas 18 (14.8%) patients were aware of smoking as a risk factor, and 16 (13.1%) patients knew that used drugs were risk factors.

Table 1. The demographic data of the patients	
Age (years)	66.64±8.08
BMI (kg/m²)	25.39±4.33
Gender n (%) Female Male	 11 (9) 111 (91)
Occupation n (%) Housewife Employee Retired	 3 (2.5) 21 (17.2) 98 (80.3)
Educational status n (%) Illiterate Primary school Middle school High school University	 9 (7.4) 85 (69.6) 10 (8.2) 9 (7.4) 9 (7.4)
Place of residence n (%) Urban area Rural area	 53 (43.4) 69 (56.6)
History of osteoporosis in the family (spouse or mother) n (%)	25 (20.5)
Smoking status n (%) Non-smoker Ex-smoker Currently smoking	 5 (4.1) 89 (72.9) 28 (23)
Cigarette (pack-year)	44.61±40.47
Stage n (%) 1 2 3 4	 12 (9.8) 68 (55.7) 27 (22.1) 15 (12.3)
BMI: Body mass index	

Table 2. The knowledge level of the patients			
Risk factor	**Yes n (%)**	**No n (%)**	**I don't know n (%)**
Aging	48 (39.3)	2 (1.6)	72 (59)
Female gender	34 (27.9)	3 (2.5)	85 (69.7)
Inadequate calcium intake	42 (34.4)	3 (2.5)	77 (63.1)
Menopause	27 (22.1)	5 (4.1)	90 (73.8)
Lack of exercise	31 (25.4)	6 (4.9)	85 (69.7)
Genetics	12 (9.8)	13 (10.7)	97 (79.5)
Insufficient exposure to sunlight	18 (14.8)	13 (10.7)	91 (74.6)
Caffeine (tea&coffee)	8 (6.6)	10 (8.2)	104 (85.2)
Smoking	18 (14.8)	6 (4.9)	98 (80.3)
Drugs	16 (13.1)	6 (4.9)	100 (82)
COPD disease	8 (6.6)	6 (4.9)	108 (88.5)
Thyroid disease	3 (2.5)	11 (9)	108 (88.5)
COPD: Chronic obstructive pulmonary disease			

The knowledge status of the patients regarding risk factors was given in Table 2. When the patients were asked whether they had used corticosteroids, which might have been posing a risk regarding osteoporosis, 28 (23%) patients expressed that they had used corticosteroids whereas 94 (77%) were not aware of whether they had used or not. When the drugs used by the patients were investigated through the healthcare recording system, it was determined that 26 (21.3%) patients had used systemic corticosteroids in the last year, and 76 (62.3%) patients were currently using inhaled corticosteroids. When the patients were asked whether they had information on corticosteroids, it was determined that 107 (87.7%) patients did not have any relevant information. In our study, it was determined that 59 (48.4%) patients had encountered imbalance, 36 (29.5%) falls, and 11 (9%) fractures. Of these fractures, six were related to the forearm, three to the hip, and two to the vertebra regions.

Discussion

Chronic diseases and their complications have increased with increasing life expectancy. Financial resources spent on such disorders have been increasing with each passing day. According to the health policies regarding chronic disorders, it is important to identify populations at risk and to take primary preventive measures (18). The most important primary preventive measure is education. The awareness and the knowledge level of the group at risk should be known to provide such education. Identification of more commonly used information sources will participate in informing the patients correctly by allocating more resources and time to those sections.

In the conducted studies about awareness of osteoporosis, the awareness rate varies between 44% and 89% (19-21). The reason for the discrepancies among the rates found in the studies is that the knowledge levels of the individuals are affected by numerous factors such as gender, educational background, and the place of inhabitance. For example, in the study conducted by Özişler et al. (22), a high awareness rate of 88% was found; however, when the participants of that study were considered, it was observed that the number of women was very high (women/men ratio was 5). In the conducted studies, the awareness of osteoporosis was found to be less in men when compared to women (23,24). In our study, the rate of osteoporosis awareness was found as 54.9%. Unlike other studies on awareness, the number of males was higher due to the increased presence of COPD in men. Studies on osteoporosis have usually been conducted by questioning female-weighted populations (22). We consider that one of the reasons for the lower awareness rate in our study had originated from the lower education level in our study population. Only 14.8% of our patients had graduated from high school or university, and we determined that the rate of osteoporosis awareness increased with increasing educational level ($r=0.329$, $p<0.001$). A direct relationship between educational status and awareness of osteoporosis was determined in other conducted studies also

(19,25).

When the sources of information related to osteoporosis were questioned, it was determined that 23% had heard from a physician, 28.7% from the people around them, and 3.3% from the press. In the study conducted by Aksu et al. (19), the first-line information source was reported as the press. Juby and Davis (20) determined that the main information sources of their patients were television, printed press, and friends. In our study, the patients expressed that they had been mostly informed on osteoporosis by people around them. We think that our patients had been informed about osteoporosis due to the presence of osteoporosis history in either the spouse or the mother in 20.5% of the participants. Even though approximately half of our patients had heard of osteoporosis from a physician, from people around, or press, only 11.5% of these had presented to a physician for this issue. Since most of the patients were male, even though they had heard or known osteoporosis, they had not felt obliged to present to a physician, thinking that osteoporosis was a disease of women and they were not in the risk group. The delusion rate of osteoporosis as being perceived as a disorder concerning women only is high (22). Unlike the medical literature, in our study, only 3% of our patients expressed that they had been informed through press. We suggest that this originated from the press providing insufficient information on osteoporosis. Therefore, more space should be given to attention-grabbing news in the written and visual media for education of the people.

Providing patient education will increase the compliance of patients with treatment besides raising awareness about osteoporosis. In a conducted study, it was shown that the osteoporosis-related education provided by the physician to the osteoporotic patients increased the compliance of the patients with their treatment (26). This suggests that for compliance with treatment, not only education is enough, but also the source of information is important. In our study, only 0.8% of the patients had been informed on osteoporosis by a pulmonologist. Therefore, besides training about treatment of the primary disease, the pulmonologists should also be educated on raising patient awareness about osteoporosis, which has an increased likelihood of accompanying the disorder, together with their referral to a relevant physician.

In our study, 93.4% of the patients were not aware that COPD was a risk factor for osteoporosis. This suggests that in outpatient clinics, the primary disease and its treatment are focused on more, and probable comorbidities are not dealt with satisfactorily. In a study conducted in United Kingdom, it was found that practitioners had not been sufficiently informed about osteoporosis during their training (27).

Aging is an important risk factor for osteoporosis (28). COPD is a disorder that is met in patients over 40 years of age and has an increasing incidence with age (29). In our study, the mean age of the patients was 66.64 years, and it was determined that 60.6% of the patients had not known that aging was a risk factor for osteoporosis. In COPD patients, in addition to the disorder itself, administered steroids also increase the risk of osteoporosis. It has been recommended in a study that, whatever the initial bone density measurement scores of the patients are, dual energy x-ray absorptiometry should be conducted on a yearly basis in all COPD patients in whom oral corticosteroids are administered (30). In a study, bone density measurements were performed and treatment was initiated in only 48% of the patients using oral corticosteroids, and since the rest of the patients were not investigated, severe osteoporosis and related fractures were not able to be identified in advance (31). In our study also, 77% of the patients were unaware of whether they had been using corticosteroids or not. When their records were evaluated, it was determined that 21.3% of them had used systemic corticosteroids in the last year, and 62.3% of them were currently using inhaled steroids; however, in only 11.5% of the patients, bone density measurements were performed. Moreover, 93.4% of the patients did not know that the drugs they had been using were risk factors for osteoporosis.

Smoking is one of the significant risk factors for osteoporosis. However, patients do not have enough information about this factor. In a study, it was determined that 27.6% of patients did not know that smoking was a risk factor for osteoporosis (32). In our study, 80.3% of the patients did not know that smoking was a risk factor and 23% were currently active smokers.

When risk factors for osteoporosis are taken into consideration in general, while awareness about age, female gender, inadequate calcium intake, and not to exercise as risk factors were partially more, awareness about thyroid disorders, drugs, and caffeine-containing beverages such as tea-coffee as risk factors were found significantly less.

Fractures occurring because of osteoporosis are significant causes of morbidity and mortality. Most commonly, hip fractures occur following osteoporosis, and since these are symptomatic, the patients are hospitalized; thus, the prevalence of hip fractures is more clearly known. Because most of the vertebral fractures are asymptomatic, its prevalence is not certainly known. In a study, the prevalence of vertebral fractures was reported to be 72% higher in COPD patients compared to the control group (33). In our study, 11 patients had a history of fracture. Of these, six were forearm, three were hip, and two were vertebral fractures. Since vertebral fractures may be asymptomatic, we think that the actual number of fractures might have been more. Once a vertebral fracture develops, the occurrence risk of fractures in other vertebrae increases, and eventually, asymptomatic fractures become symptomatic with developing pain, impairing the quality of life of the patient. Additionally, vertebral fractures cause a reduction in vital capacity, leading to an increase in symptoms of COPD patients with limited respiratory reserve. In a published study, it was reported that each vertebral fracture had led to a 9% reduction in vital capacity (34).

Since osteoporosis is an important disorder that might cause fractures, probable complications can be avoided by taking

preventive and therapeutic measures like identification of risk groups such as COPD, providing information to those patients, and directing them to relevant physicians (19).

Conclusion

It was determined that even though the risk of osteoporosis was increased in COPD patients, they did not have enough information about this subject. The patients were found to be informed mostly by the people around them, followed by the physicians. However, it was realized that the chest physicians had not sufficiently informed their patients and had not referred them to the relevant physicians. It was also detected that the patients had not received enough information through press. Therefore, we think that more space should be given to attention-grabbing news in the written and visual media for informing COPD patients about osteoporosis, and all relevant physicians, mainly the pulmonologists, should give the necessary attention to this subject.

Ethics

Ethics Committee Approval: The study was designed as a prospective cross-sectional study and was approved by Aydın Adnan Menderes University Ethical Committee, Aydın, Turkey (no: 2018/1356).

Informed Consent: All participants signed informed consent forms.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: O.Y., Ş.T.G., Concept: O.Y., Ş.D.Y., Design: O.Y., Ş.T.G., Data Collection or Processing: O.Y., Ş.D.Y., Analysis or Interpretation: O.Y., Ş.D.Y., Literature Search: O.Y., Ş.T.G., Ş.D.Y., Writing: O.Y., Ş.T.G, Ş.D.Y.

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Prevalence and Risk Factors of Osteoporosis in Men with Chronic Obstructive Pulmonary Disease in Kars Province

Kars İlinde Kronik Obstruktif Akciğer Hastalığı Olan Erkeklerde Osteoporoz Sıklığı ve Risk Faktörleri

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Abstract

Objective: Chronic obstructive pulmonary disease (COPD) is an important cause of morbidity and mortality today. Osteoporosis is known to be seen more commonly in COPD patients. This study aimed to evaluate the prevalence and risk factors of osteoporosis in men with COPD in Kars province.

Materials and Methods: In this retrospective study performed on 88 male patients diagnosed with COPD, demographic data of the patients were recorded. The histories that duration of smoking and the use of steroid were documented. Pulmonary function tests and bone mineral densities were analyzed from their files.

Results: The prevalence of osteopenia and osteoporosis in our study was 46.5% and 50%, respectively. The patient's age, smoking duration, COPD stage, and use of steroid history was significantly associated with osteoporosis ($p<0.05$). This relationship could not be demonstrated in the body mass index.

Conclusion: The advanced stage of the disease, smoking, and the use of steroid should be a stimulant for osteoporosis in COPD patients. Early diagnosis and treatment are important in terms of protection from possible vital complications, especially fractures.

Keywords: Osteoporosis, chronic obstructive pulmonary disease, cigarette

Öz

Amaç: Kronik obstrüktif akciğer hastalığı (KOAH), günümüzde önemli bir morbidite ve mortalite nedenidir. KOAH'li hastalarda osteoporozun daha sık görüldüğü bilinmektedir. Bu çalışma, Kars ilindeki KOAH'li erkeklerde osteoporoz prevalansını ve risk faktörlerini değerlendirmeyi amaçlamıştır.

Gereç ve Yöntem: KOAH tanısı olan 88 erkek hasta üzerinde retrospektif olarak yapılan çalışmada hastaların demografik verileri kaydedildi. Sigara kullanım süresi, steroid kullanım öyküleri dokümante edildi. Solunum fonksiyon testleri ve kemik mineral yoğunlukları dosyalarından analiz edildi.

Bulgular: Çalışmamızda osteopeni ve osteoporoz prevalansı sırasıyla %46,5 ve %50 idi. Hastanın yaşı, sigara kullanım süresi, KOAH evresi, steroid kullanım öyküsü osteoporoz ile anlamlı olarak ilişkiliydi ($p<0,05$). Bu ilişki vücut kitle indeksinde gösterilemedi.

Sonuç: KOAH'li hastalarda hastalığın ileri evre olması, sigara ve steroid kullanımı osteoporoz açısından uyarıcı olmalıdır. Erken teşhis ve tedavi başta kırık olmak üzere olası hayati komplikasyonlardan koruması yönüyle önemlidir.

Anahtar kelimeler: Osteoporoz, kronik obstrüktif akciğer hastalığı, sigara

Introduction

Chronic obstructive pulmonary disease (COPD) is a completely irreversible disease characterized by airflow restriction due to the abnormal inflammatory response of lungs, particularly cigarettes, to harmful particles and gases. COPD, which has a multi-systemic involvement especially in lungs, may cause osteopenia and osteoporosis in bones (1,2). The main goal of COPD treatment is to eliminate the symptoms associated with pulmonary dysfunction. On the other hand, possible complications, which may develop with the progression of the disease and the effect of drugs used in the treatment of the disease, should be considered (3). In COPD patients, osteoporosis may develop due to lung disease (decrease in

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dyspnea-related activity, systemic inflammation, decrease in skeletal muscle mass), treatment (corticosteroid treatment), aging (hypogonadism, inactivity, decrease in muscle mass) and habits (smoking, alcohol) (4). Osteoporosis is a progressive metabolic bone disease that results in increased bone fracture and fracture tendency as a result of low bone mass and disruption of micro-architecture of bone tissue (5). It may cause multiple fractures in the spine, causing chronic pain, shortening of the length, kyphotic posture, and consequently respiratory dysfunction (6). In COPD patients, it is important to carry out the necessary examinations and preventive measures before the fracture occurs and to start the treatment of osteoporosis. Although the relationship between COPD and osteoporosis has not been fully established, they are known to have similar risk factors [smoking, older age, low level of vitamin D, long-term treatment with corticosteroids, excessive weight loss, and low body mass index (BMI)]. In this study, we aimed to determine the prevalence of osteoporosis and risk factors in COPD patients in Kars city.

Materials and Methods

This cross-sectional study was retrospectively performed in Kars Harakani State Hospital, Clinic of Chest Diseases and Physical Medicine and Rehabilitation in 2019. The records of 88 male patients with COPD between 50 and 84 years of age were evaluated for bone mineral density (BMD) and pulmonary function tests. The study was approved by the ethics committee of Kafkas University Faculty of Medicine. Patients with stable COPD, who were observed in Kars Harakani State Hospital Clinic of Chest Diseases and admitted to Kars Harakani State Hospital Clinic of Physical Medicine and Rehabilitation for diagnosis of osteoporosis and accounts for the COPD description of the Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria, were included in the study (3). Inclusion criteria were; having been followed at the COPD polyclinic for at least 2 years and being a volunteer to participate in the study. Patients with respiratory disease other than COPD, patients with other diseases that would affect bone metabolism (endocrine, metabolic, renal, hepatic, rheumatologic), and patients using drugs other than corticosteroid that would affect bone metabolism (antiresorptive drugs, diuretics, etc.) were excluded from the study.

Pulmonary Function Tests and COPD Staging

Pulmonary function tests were evaluated by experienced technicians. Forced expiratory volume (FEV1) and forced vital capacity (FVC) were measured with spirometry. FEV1/FVC ratio was calculated. COPD patients were divided into 4 stages based on FEV1 values in GOLD guidelines (7).

BMD Measurements

BMD was measured by dual-energy X-ray absorptiometry and Norland XR-800 was used to measure the spine (Lumbar 1-4) and hip (femoral neck) of all subjects. Results were evaluated in gr/cm^2. T score was used to determine how much BMD deviated from the mean of young adults. Based on World Health Organization criteria, T score <2.5 standard deviation (SD) was evaluated as osteoporosis, value between -1 SD and -2.5 SD was evaluated as osteopenia (8).

Statistical Analysis

Data was presented using frequency and percentage for categorical variables. The chi-square test was used to compare the groups of the categorical variables. All statistical analyses were performed by using SPSS so ware version 19 and p values less than 0.05 were considered statistically significant.

Findings

Eighty-eight COPD patients aged 55-84 years participated in the study. Most of the patients (39.7%) were between 65 and 74 years of age. BMI was normal in 36.3% of the patients. According to GOLD criteria, of the patients, 22 (25%) had stage I, 22 (25%) had stage II, 22 (25%) had stage III, 22 (25%) had stage IV COPD. According to World Health Organization criteria, 43 patients (48.8%) had osteoporosis. The results of the relationship between lumbar spine and femoral neck BMD and other parameters are shown in Table 1.

Patients' age, smoking duration, COPD stage, use of steroid history was significantly associated with BMD. This relationship could not be demonstrated in BMI. There was a correlation between COPD stage and BMD scores of both femoral neck and lumbar spine. Similarly, there was a correlation between inhaled and oral steroid use and BMD scores of femoral neck and lumbar spine, but no correlation was found between age, smoking and lumbar spine BMD (Figure 1,2,3,4,5).

Discussion

In addition to non-modifiable risk factors such as age, sex and genetic characteristics, some modifiable factors such as nutrition and exercise habits and smoking-alcohol use play an important role in osteoporosis development. Previous studies have shown that osteoporosis is closely associated with common chronic diseases such as diabetes, hypertension, chronic kidney disease, rheumatologic disease and COPD (9,10). In this study, we determined the prevalence of osteoporosis, risk factors in COPD patients in Kars and planned to draw attention to the issues such as early diagnosis, treatment and prevention of possible complications of osteoporosis.

In our study, the prevalence of osteopenia and osteoporosis in COPD patients in Kars was 46.5% and 50%, respectively. In the literature in the studies performed on patients with COPD, osteopenia and osteoporosis rates were shown respectively as 31.5% and 52.8% by Abbasi et al. (11) and 50% and 30% by Abu-Bakr et al. (12). Biskobing et al. (13) in their compilation reported 35-72% osteopenia and 36-60% osteoporosis in the COPD patients. Karapolat et al. (3) in their study proportioned lumbar and femur regions separately. 59.1% femur neck, 60.0% femur ward's triangle and 61.9% lumbar osteopenia

was detected. 4.5% femur neck, 10.0% femur ward's triangle and 19.4% lumber osteoporosis was detected. Mansour et al. (14) reported the prevalence of osteoporosis and osteopenia in COPD patients between the ranges of 9-69% and 27-76%, respectively. The reason for this wide range may be that different populations have been studied and different diagnostic methods have been used. The rates in our study were within the range defined in the literature (13,15). Advanced age and smoking are common risk factors for osteoporosis and COPD (8,16). The effect of smoking on osteoporotic fracture is also known, but is thought to have a limited effect on BMD. In our study, a statistically significant relationship was found between smoking duration and femoral neck osteoporosis (Figure 1). In the literature, smokers have been reported to have lower bone

Table 1. Frequency of different risk factors of osteoporosis in chronic obstructive pulmonary disease patients

	Spine			**p***	**Femur**			**p***
	Normal	**Osteopenia**	**Osteoporosis**		**Normal**	**Osteopenia**	**Osteoporosis**	
	n (%)				**n (%)**			
Age group (year)				0.220				**0.003**
55-64	14 (43.8%)	16 (32.7%)	3 (42.9%)		3 (60%)	19 (47.5%)	11 (25.6%)	
65-74	13 (40.6%)	21 (42.9%)	1 (14.3%)		2 (40%)	16 (40%)	17 (39.5%)	
75-84	5 (15.6%)	12 (24.5%)	3 (42.9%)		0 (0%)	5 (12.5%)	15 (34.9%)	
Smoking (pack-year)				0.306				**0.024**
<20	15 (46.9%)	18 (36.7%)	3 (42.9%)		3 (60%)	20 (50%)	13 (30.2%)	
20-40	8 (25%)	10 (20.4%)	1 (14.3%)		1 (20%)	9 (22.5%)	9 (20.9%)	
>40	9 (28.1%)	21 (42.9%)	3 (42.9%)		1 (20%)	11 (27.5%)	21 (48.8%)	
COPD stage				**0.034**				**<0.001**
Mild 1 (FEV1>80)	13 (40.6%)	9 (18.4%)	-		3 (60%)	13 (32.5%)	6 (14%)	
Moderate (FEV1=50-80)	8 (25%)	11 (22.4%)	3 (42.9%)		1 (20%)	12 (30%)	9 (20.9%)	
Severe 3 (FEV1=30-50)	4 (12.5%)	16 (32.7%)	2 (28.6%)		1 (20%)	10 (25%)	11 (25.6%)	
Very severe (FEV1<30)	7 (21.9%)	13 (26.5%)	2 (28.6%)		0 (0%)	5 (12.5%)	17 (39.5%)	
BMI (kg/cm^2)				0.071				0.322
Low	2 (6.3%)	5 (10.2%)	3 (42.9%)		0 (0%)	4 (10%)	6 (14%)	
Moderate	10 (31.3%)	16 (32.7%)	2 (28.6%)		1 (20%)	15 (37.5%)	12 (27.9%)	
Overweight	14 (43.8%)	22 (44.9%)	1 (14.3%)		3 (60%)	13 (32.5%)	21 (48.8%)	
Obese	6 (18.8%)	6 (12.2%)	1 (14.3%)		1 (20%)	8 (20%)	4 (9.3%)	
Corticosteroid								
Inhaled steroid	25 (78.1%)	48 (98%)	7 (100%)	**0.004**	2 (40%)	35 (87.5%)	43 (100%)	**<0.001**
Intravenous methylprednisolone	7 (%21.9)	24 (49%)	4 (57.1%)	**0.013**	0 (0%)	7 (17.5%)	28 (65.1%)	**<0.001**

COPD: Chronic obstructive pulmonary disease, BMI: Body mass index, FEV: Forced expiratory volume
*Chi-Square test

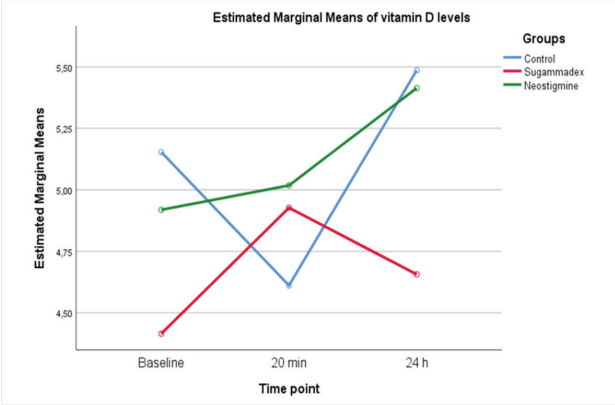

Figure 1. Interaction between osteoporosis in the femoral neck and severity of smoking

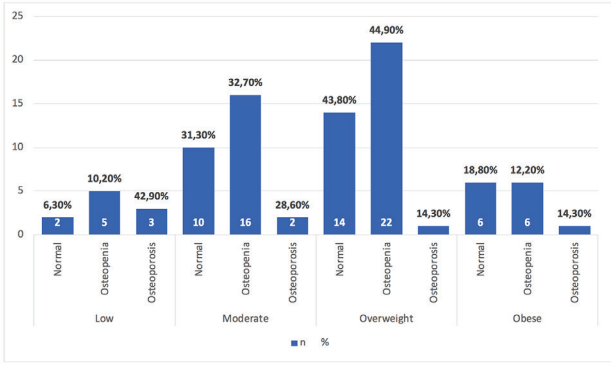

Figure 2. Interaction between osteoporosis in the spine and severity of smoking

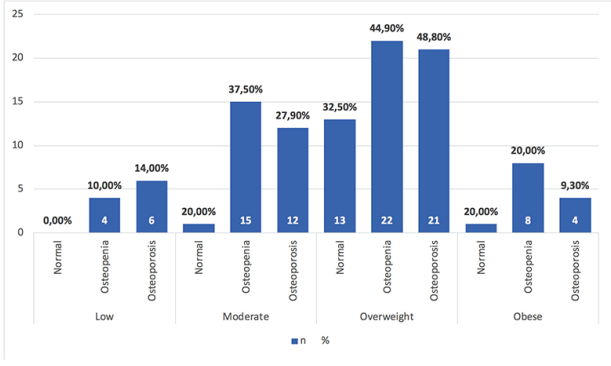

Figure 3. Interaction between osteoporosis in the femur neck and BMI

mass and a faster rate of bone loss. It is thought that women who smoke are lower in weight and therefore have earlier menopause (15). On the other hand, smoking increases blood cortisol levels and causes a decrease in BMD (17). Although the smoking rate of the patients in our study was high, the high body mass index prevented the negative correlation between osteoporosis and body mass index (Figure 2,3). In women, body weight has been shown to increase BMD both by exerting mechanical load on the skeleton and by estrogens stored in adipose tissue. However, there is no study on men about this subject (18). Studies investigating the relationship between

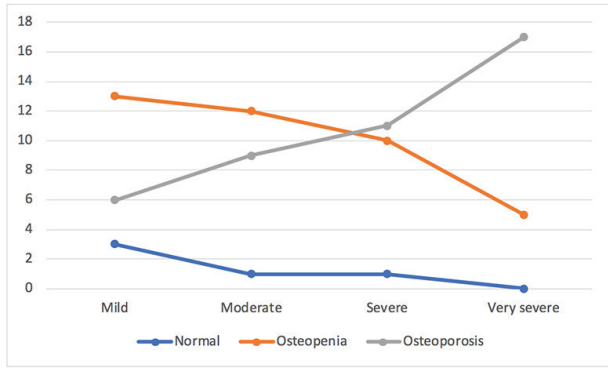

Figure 4. Interaction between osteoporosis in the femoral neck and severity of COPD

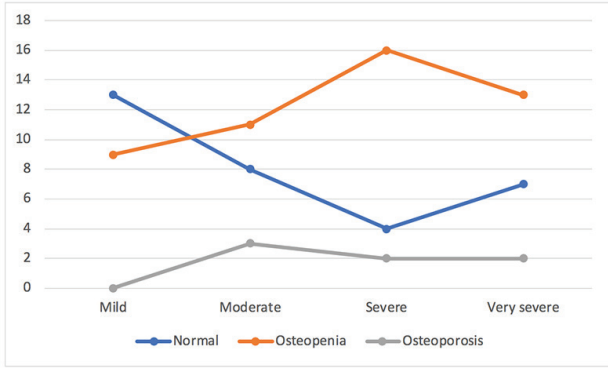

Figure 5. Interaction between osteoporosis in the spine and severity of COPD

smoking and osteoporosis in men have concluded that smoking is an important risk factor for bone loss and osteoporotic fracture (19,20,21). It is even reported that the harmful effect of smoking on bone mass in men is 50% to 300% higher than in women. This gender difference may be due to the fact that males smoke more, or estrogen has a protective effect on bone in women (16). In the literature, a correlation has been reported between osteoporosis and decreased respiratory function. Decreased FEV at first second and advanced COPD stages have been shown to correlate with low BMD. Nuti et al. (22) have shown that BMD is low in COPD patients and bone density decreases with increasing disease severity. Abbasi et al. (11) found a correlation between femoral neck BMD and COPD severity. In our study, similar to the literature, a correlation was found between COPD stages and BMD of both femoral neck and lumbar spine (Figure 4,5). The relationship between pulmonary function parameters and osteoporosis is complex. In an experimental biopsy study, bone microarchitecture was seen to be more affected in COPD patients compared to the control group (23). Therefore, it has been shown that patients with COPD have a continuous systemic inflammatory condition that leads to the release of proinflammatory cytokines such as TNF-α, IL-1 and IL 6. On the other hand, the increase in the production of catalytic enzyme also affects this process (11). As a result, bone resorption increases and new bone formation is

suppressed (24). In addition, the decrease in exercise capacity of the patients with pulmonary dysfunction and therefore their dependence on the home causes predisposition to osteoporosis (25,26). The use of steroids in COPD patients is also known to be associated with low BMD. In our study, this condition was evaluated and an association was found between oral and inhaled steroid use and low BMD of both femoral neck and lumbar spine. Almost all of our patients were on inhaled steroids, but there was a history of oral steroid use in patients with stage 3 and 4 COPD, but it was not clear how often and in what posology they used. Although the rate of bone loss varies depending on steroid dose and duration of use, we could not differentiate this in our study due to the reasons mentioned. In the literature, Abbasi et al. (11) detected an association between oral steroid use and femoral neck BMD. However, it has been observed that it has no effect on lumbar spine BMD. Although there have been studies in the literature that inhaled steroid use adversely affects BMD and increases fracture risk, there are also studies that argue otherwise. Langhammer et al. (27) examined the effect of inhaled corticosteroid use on BMD in 65225 adults and emphasized that inhaled corticosteroid use was associated with low bone mass. In a meta-analysis, significant reduction in bone density was reported in high-dose inhaled steroid users (>1.5 mg/day prednisone or equivalent) (28). Abbasi et al. (11) reported that inhaled steroid use did not cause BMD loss. Vitamin D deficiency has been shown to be associated with osteoporosis in COPD patients (2). Dyspnea and peripheral muscle weakness cause exercise intolerance in patients. As a result, patients prefer to live at home and are sedentary. Vitamin D is low in patients who cannot benefit from sunlight sufficiently. The fact that we did not check vitamin D levels in our study may have prevented us from detecting possible BMD influences. Other limitations of our study were the fact that our patient group consisted of only male patients, the number of patients was low, corticosteroid use was evaluated retrospectively, and the exact duration and dose of steroids were not known. Randomized controlled studies involving more cases are needed to evaluate the relationship between operational risk factors and BMD. All physicians interested in osteoporosis should consider these factors when applying preventive approaches before therapeutic strategies. In this way, it is thought that mortality and morbidity caused by fractures can be prevented and treatment costs can be reduced (29).

Conclusion

In conclusion, osteoporosis may cause mortality and morbidity in patients with COPD. Patients with a history of smoking, steroid medication, advanced stage COPD should be followed up more frequently for osteoporosis and possible complications. In osteoporosis, taking preventive measures, making early diagnosis and timely planning of treatment is important.

Ethics

Ethics Committee Approval: The study was approved by the ethics committee of Kafkas University School of Medicine.
Informed Consent:
Peer-review: Internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: F.B., G.P., Concept: F.B., G.P., Design: F.B., G.P., Data Collection or Processing: F.B., G.P., Analysis or Interpretation: F.B., G.P., Literature Search: F.B., G.P., Writing: F.B., G.P.,
Conflict of Interest: No conflict of interest was declared by the authors.
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Evaluation of Vitamin D Levels in Patients with Breast Cancer-related Lymphedema: An Observational Cross-sectional Study

Meme Kanseri İlişkili Lenfödem Hastalarında Vitamin D Düzeylerinin Değerlendirilmesi: Kesitsel Gözlemsel Araştırma

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Abstract

Objective: The aim of our study was to compare plasma vitamin D levels between patients with breast cancer-related lymphedema (BCRL) and healthy population, and also to investigate the effects of socio-demographic and clinical factors and lymphedema severity on vitamin D levels.

Materials and Methods: Eighty patients with BCRL [mean age 55.5±8.9 (36-81)] and age- and sex-matched 80 healthy controls [mean age 53.7±7.4 (32-70)] who were not on calcium or vitamin D supplementation were included in the study. Socio-demographic and clinical characteristics of the subjects were questioned. Plasma 25-Hydroxyvitamin D3, calcium, phosphorus, alkaline phosphatase (ALP), and parathormone (PTH) levels were evaluated. Lymphedema was classified as stage 0, I, II, or III.

Results: The mean duration of lymphedema was 23.5±13.8 months. Comparisons revealed lower vitamin D levels and higher PTH and ALP levels in patients with BCRL than healthy controls. As a result of multivariate regression analysis, a significant relationship was revealed between vitamin D levels and age, breast cancer stage, and disease duration in patients with BCRL. Vitamin D levels were significantly lower and PTH levels were significantly higher in stage 3 lymphedema patients compared to stage 1.

Conclusion: Vitamin D levels were detected lower in patients with lymphedema than healthy controls. Although vitamin D levels were found to be lower in patients with severe lymphedema, the multivariate regression analysis revealed that the severity of lymphedema does not have a significant effect on vitamin D levels.

Keywords: Vitamin D, breast cancer, lymphedema, parathormone

Öz

Amaç: Çalışmamızın amacı meme kanseri ile ilişkili lenfödem (MKİL) ve sağlıklı popülasyondaki hastalarda plazma D vitamini düzeylerini karşılaştırmak ayrıca sosyo-demografik ve klinik faktörlerin ve lenfödem şiddetinin D vitamini düzeylerine etkilerini tespit etmekti.

Gereç ve Yöntem: MKİL'li 80 hasta [yaş ortalaması 55,5±8,9 (36-81)] ve kalsiyum ya da Vitamin D tedavisi altında olmayan 80 yaş ve cinsiyet uyumlu sağlıklı kontrol [yaş ortalaması 53,7±7,4 (32-70)] çalışmaya alındı. Olguların sosyo-demografik ve klinik özellikleri sorgulandı. Plazma 25-Hydroxyvitamin D3, kalsiyum, fosfor, alkalen fosfataz (ALP), parathormon (PTH) düzeyleri değerlendirildi. Lenfödem evre 0, I, II veya III olarak sınıflandırıldı.

Bulgular: Ortalama lenfödem süresi 23,5±13,8 aydı. MKİL'li hastalarda sağlıklı kontrollere oranla daha düşük D vitamini düzeyleri ve daha yüksek PTH ve ALP düzeyleri saptandı. Çok değişkenli regresyon analizi sonucunda, MKİL hastalarında D vitamini düzeyleri ile yaş, meme kanseri evresi ve hastalık süresi arasında anlamlı bir ilişki olduğu ortaya çıkarıldı. Evre 3 lenfödem hastalarında, evre 1'e kıyasla D vitamini düzeyi daha düşük ve PTH düzeyi anlamlı olarak daha yüksekti.

Sonuç: D vitamini düzeyleri lenfödemli hastalarda sağlıklı kontrollere oranla daha düşük saptanmıştır. Şiddetli lenfödemi olan hastalarda D vitamini düzeylerinin daha düşük saptanmasına rağmen, çok değişkenli regresyon analizi lenfödem şiddetinin D vitamini düzeyleri üzerinde anlamlı bir etkisi olmadığını ortaya koymuştur.

Anahtar kelimeler: D vitamini, meme kanseri, lenfödem, parathormon

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Introduction

Vitamin D has an essential role to maintain healthy bone structure and muscle function. Sufficient serum level of 1.25 dihydroxy vitamin D3 [1.25 (OH)2D3], which is the major determinant of calcium (Ca) absorption, is important for bone mineralization (1). Vitamin D deficiency is a highly prevalent condition worldwide (2). The risk factors include age, body mass index, conservative dressing style, sunscreen use, reduced sun exposure, less outdoor time, skin tone and geographic location (3-5). The primary origin of vitamin D is photoproduction in the skin following ultraviolet B exposure. Vitamin D3 is transported to the liver with vitamin D binding protein (DBP) and hydroxylated by 25-hydroxylase to form 25 hydroxyvitamin D3 [25(OH) D3]. Afterwards, 25(OH) D3 is transported to the kidney and converted to 1.25 (OH)2D3 by 1α-hydroxylase. 1.25 (OH)2D3 (calcitriol) is the biologically active form of the hormone and regulates serum Ca and phosphorus (P) concentrations for essential cellular functions and supports the mineralization of the bone (1,5,6). However, in recent years the number of researches focused on the extraskeletal functions of vitamin D were increased. Vitamin D deficiency has been associated with the increased risk of diabetes mellitus, obesity, cardiovascular diseases, infections, asthma, inflammatory bowel disease, several neurological diseases, and cancers (7).

Several studies also demonstrated that vitamin D had potential role in cancer prevention and progression (8-11). A meta-analysis conducted by Wang et al. (12) revealed that the active form of vitamin D level was inversely correlated with the risk of breast cancer. Another meta-analysis for impact of vitamin D on cancer outcome revealed that higher levels of vitamin D provided lower risk of mortality in breast cancer patients (13). The bioactive form of vitamin D has favorable effects against cancer by stimulation of apoptosis and cell differentiation, and by inhibition of inflammation, cell proliferation, and angiogenesis. It is possible that vitamin D also plays role in preventing the invasion and metastasis of the cancer cells (7,14,15). It is also shown that chemotherapy is associated with reduced serum vitamin D levels (5). In a recent study, Pineda-Moncusi et al. (16) demonstrated that patients with breast cancer had reduced 25(OH) D levels particularly after recent chemotherapy. Over long term, it had partially recovered but still remained lower compared to healthy population.

Today, the 5-years survival rate for breast cancer is up to 90% due to the improvements in cancer treatment (17). Breast cancer survivors are at risk for long-term complications such as breast cancer-related lymphedema (BCRL). It is characterized by the accumulation of protein-rich lymphatic fluid in the interstitial spaces which leads to swelling of the subcutaneous tissue. Lymph node dissection and/or radiotherapy can lead to damage to the lymphatic system which causes blockage of the lymphatic fluid passages and almost 40% of the patients may eventually develop lymphedema (18). It has previously shown that lymphedema has a negative impact on patient's quality of life and causes elevated rates of anxiety, depression and physical impairment compared to breast cancer survivors without lymphedema (19,20). Patients with lymphedema or at risk of developing lymphedema are also advised several precautions. Applying sunscreen, avoiding being outside during the hottest hours of the day and excessive sun exposure are some of them (21). These recommendations mentioned above and reduced outdoor time due to the psychological distress and physical impairment may affect the vitamin D levels negatively in patients with lymphedema. In this study we aimed first; to compare serum vitamin D levels in patients with BCRL and healthy population, second; to determinate the socio-demographic and clinical risk factors affecting vitamin D levels in patients with BCRL, third; to investigate the impact of lymphedema severity on vitamin D levels.

Materials and Methods

A total of one hundred consecutive patients with the diagnosis of BCRL were evaluated in the lymphedema follow-up clinic between June 2012 and May 2013. Subjects who have ≥2 cm difference in circumferential measurements or a 200 mL limb volume difference between the extremities evaluated as BCRL. Data from adults >18 years who had a history of breast cancer treatment at least 3 months ago were included. Patients who had history of any disease or drug use which might affect the metabolism of vitamin D (alcoholism, chronic liver or kidney failure, malabsorption syndromes, inflammatory bowel disease, tuberculosis or anticonvulsant medication) were excluded from the study. Among the 100 patients with the diagnosis of BCRL, 4 patients had chronic liver disease, 6 had kidney disease, 4 had known parathyroid adenoma and 6 patients had the use of anticonvulsant drugs for neuropathic pain. Therefore 20 patients excluded from the study group and consequently 80 patients with BCRL were eligible for the study. Eighty age and sex-matched healthy controls who were not on Ca and vitamin D supplementation were also included in the study for further comparisons. Our study was approved by the local ethics committee and informed consent was obtained from all participants.

Socio-demographic (age, body mass index, educational status, work status) and clinical characteristics of the lymphedema patients (disease duration, pathological features, breast cancer grade, treatment with chemotherapy and radiotherapy, duration of lymphedema, stage of lymphedema, presence of systemic disease, previous use of vitamin D) were questioned and recorded.

Laboratory Evaluation

Serum 25(OH) D3 concentrations were determined by the chemiluminescence microparticle immunoassay technology by Architect i2000 (Abbott, Germany) device. A serum level of more than 29 ng/mL was evaluated as normal, 20-29 ng/mL as insufficient and lower than 20 ng/mL as deficient (22). The serum vitamin D levels were measured in autumn and summer

seasons in both BCRL and control groups in order to minimize the seasonal difference. Ca, P, alkaline phosphatase (ALP), parathormone (PTH), kidney and liver function tests were also evaluated.

Lymphedema Classification

Lymphedema is classified as stage 0, I, II, or III. stage O lymphedema is a preclinical stage in which the patient has the potential for developing lymphedema. Visible pitting edema exists in Stage I and it can be reduced with limb elevation. In stage II, the volume of the edema increases and the structure becomes firmer due to the fibrosis. The swelling can't be reduced with the limb elevation. Stage III is characterized with extremely swollen and thickened tissue usually accompanied by skin changes such as papules and open draining wounds (23).

Statistical Analysis

SPSS version 20.0 (SPSS Inc., Chicago, IL, USA) was performed for the statistical analyses. Distributions of continuous variables were evaluated by the Shapiro-Wilk test. For the continuous variables mean ± standard deviation was used for determination, median (minimum - maximum) was used for discrete variables and number (n) and percentage (%) were used for categorical variables. The significance of the difference in mean values between two groups was analyzed with Student's t-test, and analyzed with one way ANOVA for more than two groups. Multivariate regression analysis is used to investigate the clinical and socio-demographical factors affecting vitamin D levels in patients with BCRL. A p-value of <0.05 was evaluated as statistically significant.

Results

Eighty patients with BCRL [mean age 55.5±8.9 (36-81)] and 80 age and sex-matched healthy control [mean age 53.7±7.4 (32-70)] were included in the study. All patients in both groups were female. The mean duration of lymphedema in patients with BCRL was 23.5±13.8 months. Twenty-four of the patients had stage 1, 42 of the patients had stage 2 and 14 of them had stage 3 lymphedema. The socio-demographic and clinical characteristics of the patients were demonstrated in Table 1. Between-group comparisons revealed lower vitamin D levels and higher PTH and ALP levels in patients with BCRL (Table 2). Only 29 (36.2%) of the patients with BCRL have been evaluated in terms of serum vitamin D levels in the last 6 months and only 21 (26.3%) of the patients used vitamin D replacement therapy. Eleven (13.7%) of the patients had the history of osteoporosis and the number of patients who were still on bisphosphonate therapy was 5 (6.2%). Among the lymphedema patients; 12 (%15) of them had normal ranges of vitamin D, 20 (25%) of them had deficient and 48 (%60) of them had insufficient vitamin D levels. We also performed a multivariate regression analysis to investigate clinical and socio-demographic factors affecting vitamin D levels in patients with lymphedema. The analysis revealed a significant relation between vitamin D levels and age, the grade of breast cancer and disease duration (F (6.5)=5.160; p=0.04) (Table 3). BCRL patients were divided into 3 groups according to the severity of lymphedema and there were significant differences in stage 3 lymphedema compared to stage 1 in terms of vitamin D and PTH levels (Table 4).

Table 1. Socio-demographic and clinical properties of lymphedema patients

Variables	n=80
Age, years	55.5±8.9(36-81)
Sex, female	80(100)
BMI, kg/m^2	30.5±5.3
Educational status	
İlliterate	11 (13.7)
Low	37 (46.3)
High	32 (40)
Work status	
Working	18 (22.5)
Not-working	62 (77.5)
Pathology	
İnvazive ductal	68 (85)
İnfiltrative lobular	12 (15)
Breast cancer gr	
Grade 1	10 (12.5)
Grade 2a/2b	31 (38.8)
Grade 3a	23 (28.7)
Grade 4	16 (20)
Chemotherapy	79 (98.7)
Radiotherapy	59 (73.8)
Disease duration, months	55.8±28.8
Lymphedema duration, months	23.5±13.8
Lymphedema stage	
Stage 1	24 (30)
Stage 2	42 (52.5)
Stage 3	14 (17.5)
Vitamin D levels, ng/mL	14.3±8.7
Normal	5 (6.3)
Insufficiency	19 (23.7)
Deficiency	56 (70)
Parathormon (pg/mL)	63.2±18.4
Calcium (mg/dL)	10.5±5.3
Phosphorus (mg/dL)	3.8±1.9
Alkaline phosphatase (IU/L)	79.8±18.9

BMI: Body mass index, Vitamin D Deficiency: <20 ng/mL, Insufficiency: 21-29 ng/mL, normal: >30 ng/mL, Values are mean ± SD and n (%)

Discussion

Vitamin D deficiency is widely seen all over the world, and in recent years studies have examined its extra-skeletal effects. There are also many studies evaluated the relationship between breast cancer and vitamin D (12,16,24-29). It is claimed that vitamin D deficiency may contribute to breast cancer development and is related with poor prognosis. It is also suggested that cancer and cancer treatment may cause a decrease in vitamin D levels. The aim of our study was to compare vitamin D levels between patients with BCRL and

healthy controls, and to determine the effects of the severity of lymphedema and other factors on vitamin D levels. As a result, we demonstrated that vitamin D levels were significantly lower in patients with BCRL and; the increase in age, duration of disease and grade of breast cancer were related with reduced vitamin D levels. We also revealed that vitamin D levels were lower and PTH levels were higher in patients with severe lymphedema than mild lymphedema.

In the literature, the studies investigating the relation of vitamin D and breast cancer are mostly about whether vitamin D was a risk factor in the development of breast cancer (24-26). Circulating 25(OH) D3 is combined with vitamin-DBP and transferred into normal breast cells. Vitamin D interacts with many genes such as VDR, CYP27B1, CYP24A1, and megalin. The proper functioning of this cycle is important in the differentiation of the cells. Any failure in this chain has been suggested to contribute to the development and progression of breast cancer (25,26). In our study, we found that serum vitamin D levels were lower in patients with BCRL compared to healthy controls. The decrease in vitamin D levels may be caused by several factors. As suggested by the previous studies the hypothesis of 'previous low levels of vitamin D increases the risk of cancer development' may be the reason for our result. The negative effects of cancer treatments (especially chemotherapy) on vitamin D levels may also be a reason (5). In addition, we consider that various negative conditions caused by lymphedema might also affect the vitamin D levels.

Isenring et al. (5) suggested that cancer treatments were associated with low vitamin D status because of the treatment-related fatigue, decreased time spent outdoors, dietary changes and sun avoidance. Another reason for low vitamin D levels in patients receiving chemotherapy is the conversion of vitamin D to inactive form due to upregulation of cytochrome P450 enzymes. Chemotherapy may also cause hepatotoxicity and the acute phase response leading lower levels of albumin and DBP (5,30). In another study, Pineda-Moncusi et al. (16) compared vitamin D levels with healthy controls. And they revealed that patients who underwent recent chemotherapy had the lowest levels of 25(OH) D3. They explained this result with photosensitivity effect of chemotherapy which causes reduction of sunlight exposure. They also demonstrated that 25(OH) D3 levels partially recovered in long-term patients but the values stayed under the levels of the healthy controls. The reason of this result couldn't explained clearly but they suggested that genetic or physiological factors might cause lower vitamin D levels in patients with breast cancer (16).

BCRL is an important complication in breast cancer survivors and leads to deteriorations in upper extremity functions and quality of life (31-33). In our study, several negative conditions

Table 2. Comparisons of laboratory results in patients with lymphedema and healthy control

Variables	Lymphedema patients n=80	Control group n=80	p
Age, years	55.5±8.9	53.7±7.4	0.16
BMI, kg/mw2	30.5±5.3	29.4±5.1	0.22
Vitamin D levels, ng/mL Normal Deficiency Insufficiency	14.3±8.7 12 (15) 20 (25) 48 (60)	21.8±9.7 17 (21.3) 30 (37.5) 33 (41.2)	0.02
Parathormon (pg/mL)	63.2±18.4	49.4±18.7	**0.01**
Calcium (mg/dL) Phoshorus (mg/dL) Alkaline phosphatase (IU/L)	10.5±5.3 3.8±1.9 79.8±18.9	9.4±3.4 6.2±2.26 64.06±20.1	0.47 0.10 0.01

BMI: Body mass index
Values are mean ± SD and n (%), Significance at p<0.05

Table 3. Multivariate regression analysis for the factors affecting vitamin D levels

Variables	R2	Constant	p
Age	0.86	-0.38	0.04
Breast cancer grade	-	-3.34	0.007
Disease duration	-	-0.57	0.02
Lymphedema duration	-	0.43	0.09
Lymphedema stage	-	1.65	0.08

Table 4. The comparisons of laboratory results among the severity of lymphedema

Variables	Stage 1 lymphedema n=24	Stage 2 lymphedema n=42	Stage 3 lymphedema n=14	p
Age	54.3±10.9	58.0±10.9	53.5±9.2	0.84
BMI	27.6±5.3	31.5±3.1	34±2.4	0.32
Vitamin D levels, ng/mL	17.3±6.5	14.3±6.2	10.7±5.4	0.02*
Parathormon, pg/mL	51.1±13.1	66.8±14.6	79.8±18.5	0.04*
Calcium, mg/dL	9.5±1.35	11.3±2.1	9.2±0.7	0.22
Phosphorus, mg/dL Alkaline phosphatase, IU/L	3.6±0.6 74.0±18.7	3.7±0.5 81.6±21.5	4.1±1.2 73.8±17.6	0.57 0.52

BMI: Body mass index
*p<0.05 for stage 3 lymphedema compared to stage 1 lymphedema

associated with lymphedema may have contributed to the lower levels of vitamin D. To the best of our knowledge, in the literature, among to the studies about breast cancer and vitamin D; there is no other study evaluating patients with lymphedema and also the effects of lymphedema on vitamin D levels. In our study, we demonstrated that patients with severe lymphedema (stage 3) had lower levels of vitamin D than mild lymphedema (stage 1). Several factors might cause this result. It has previously shown that higher levels of psychological distress existed in patients with lymphedema which may reduce the outdoor time and sun exposure (34). In addition, precautions given to this patient group including avoidance of being outside at the hottest hours of the day and application of sun-screen might also affect the results. These recommendations help to avoid excessive sunlight exposure to prevent the increase in blood flow and lymphatic load caused by heat. Applying sunscreen is also useful in preventing superficial burns which can cause inflammation, vasodilatation, and infection (21,35). These reasons might contribute to the reduced vitamin D synthesis especially in patients with severe lymphedema.

In our study, we also revealed that 60% of the lymphedema patients had vitamin D insufficiency and 25% had vitamin D deficiency. In the literature, Hsieh et al. (36) evaluated the vitamin D levels in breast cancer survivors and they demonstrated that 58.2% of them had deficient and 35.2% had insufficient levels consisted with our study. In our study, only 15% of the lymphedema patients had adequate vitamin D levels, but only 36.2% of the patients were evaluated for serum vitamin D levels in the last 6 months. Among this population, only 26.3% of the BCRL patients have received vitamin D replacement therapy. These results may show that vitamin D levels were not taken into account and treated adequately in this patient group. Considering the increased risk of getting new breast cancer in this population, although it is not fully supported in the literature, keeping vitamin D levels at normal levels may be beneficial (37).

In our study, we also identified socio-demographic and clinical factors related to vitamin D levels among patients with lymphedema. The multivariate regression analysis revealed significant relations between vitamin D levels and age, the grade of breast cancer and disease duration. Although lower levels of vitamin D demonstrated in patients with severe lymphedema, the multivariate analysis didn't reveal significant effect of the severity of lymphedema. In the literature, Shin et al. (29) identified the determinants for 25(OH) D in Korean breast cancer survivors and they observed that time from diagnosis, vitamin D and other supplementations, the season of the blood sampling, smoking, and the number of parity were related with the serum 25(OH) D levels.

Study Limitations

Our study was a cross-sectional study, and does not provide cause and effect relationships. In addition, this study did not include information about psychological status, quality of life, outdoor spent-time or amount of the dietary intake of the vitamin D of the participants. Thus we couldn't do inter or intra-group comparisons among these variables. Another important limitation of this study was not including a third group having breast cancer but without lymphedema.

Conclusion

In this study, we demonstrated that vitamin D levels were lower in patients with BCRL compared to healthy population. We also revealed that patients with severe lymphedema had lower levels of vitamin D compared to mild lymphedema. Future studies including larger study population and more detailed information among lymphedema patients such as sun exposure time, dietary intake and psychological status are needed.

Ethics

Ethics Committee Approval: The study were approved by the Ankara Physical Therapy and Rehabilitation Training and Research Hospital of Local Ethics Committee (protocol number: 2321).

Informed Consent: Consent form was filled out by all participants.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Concept: D.S.Ö., M.D., B.F.K., Design: D.S.Ö., M.D., Data Collection or Processing: D.S.Ö., S.E., M.D., Analysis or Interpretation: D.S.Ö., S.Ü.D., B.F.K., Literature Search: D.S.Ö., S.E., S.Ü.D., M.D., Writing: D.S.Ö.

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Examination of the Etiologic Causes in Patients Presenting with Elevated Parathormone

Parathormon Yüksekliği ile Başvuran Hastalarda Etiyolojik Nedenlerin İncelenmesi

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Abstract

Objective: Parathyroid hormone (PTH) levels are elevated in the blood due to various reasons and named as primary or secondary hyperparathyroidism. There is no any study that investigated the etiology of elevated PTH.
Materials and Methods: The study included 137 patients who had elevated PTH, which was detected in blood tests that were performed due to any reason, during 1-year period.
Results: Of all patients 118 (86.1%) were female and 19 (13.9%) were male. Vitamin D deficiency was found in 88 (64.2%), primary hyperparathyroidism (PHPT) in 38 (27.7%), familial hypocalciuric hypercalcemia (FHH) in 8 (5.8%), and chronic renal failure (CRF) in 3 (2.2%) patients.
Conclusion: Vitamin D deficiency is a common disorder in general population, and occasionally coexisted with increased PTH level. Therefore, vitamin D deficiency should be kept in mind when PTH studied as a first test and is found to be high. The other reason such as PHPT, FHH and CRF must be also investigated.
Keywords: Parathormone, etiologic causes, vitamin D deficiency

Öz

Amaç: Parathormon (PTH) düzeyi kanda çeşitli nedenlerle yükselir ve primer veya sekonder hiperparatiroidizm olarak adlandırılır. PTH yüksekliğinin etiyolojisini araştıran herhangi bir çalışma yoktur.
Gereç ve Yöntem: Çalışmaya 1 yıllık süre içerisinde herhangi bir sebeple yapılan kan testlerinde saptanan PTH yüksek bulunmuş 137 hasta dahil edildi.
Bulgular: Tüm hastaların 118'i (%86,1) kadın, 19'u (%13,9) erkekti. D vitamini eksikliği 88'inde (%64,2), primer hiperparatiroidizm (PHPT) 38'inde %27,7'sinde ailesel hipokalsiürik hiperkalsemi (AHH), 8'inde (%5,8) ve 3'ünde (%2,2) kronik böbrek yetmezliği (KBY) tespit edildi.
Sonuç: D vitamini eksikliği, genel popülasyonda sık görülen bir hastalıktır ve bazen artan PTH düzeyi ile birlikte bulunur. Bu nedenle, PTH ilk test olarak okunduğu ve yüksek olduğu tespit edildiğinde D vitamini eksikliği akılda tutulmalıdır. PHPT, AHH ve KBY gibi diğer sebepler de araştırılmalıdır.
Anahtar kelimeler: Parathormon, etiyolojik nedenler, D vitamin eksikliği

Introduction

Parathyroid hormone (PTH) is a peptide hormone secreted from parathyroid glands into the circulation and its main effect is to provide serum calcium homeostasis (1). PTH levels are elevated in the blood due to various reasons. The most important cause is primary hyperparathyroidism (PHPT). This is characterized by an increase in serum calcium levels as a result of autonomically over secretion of PTH from parathyroid glands (2). Whereas secondary hyperparathyroidism (SHPT) occurs due to the stimulation of parathyroid glands as a result of dysfunction in one or more mechanisms in providing calcium homeostasis of the body, which result in increased PTH secretions (3). SHPT often develops as a result of chronic renal failure (CRF) or vitamin D deficiency (3).

In clinical practice, PTH levels are studied in order to investigate the etiology when a decrease or increase is detected in

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calcium values. However, PTH levels are ordered with initial investigations especially in persons with osteoporosis detected, and a confusion occurs when elevated PTH levels are found. In this case, CRF, vitamin D deficiency, absorption disorders, the use of lithium, and familial hypocalciuric hypercalcemia (FHH) that can cause SHPT should be first ruled out. After ruling out these causes, the diagnosis of normocalcemic PHPT is established (4). Although the most important causes of PHPT and SHPT are known, there is no any study about the cause of this condition when elevated PTH is initially found.

In this study, we aimed to reveal the causes of elevated PTH by screening information of patients with elevated PTH who were referred to our outpatient clinic.

Materials and Methods

In this study, 137 patients who had elevated PTH, which was detected in blood tests that were performed due to any reason, and were referred to the endocrinology outpatient clinic of Harran University Faculty of Medicine during 1-year period from January 2018 through March 2019 were retrospectively studied. Patients' age, gender, serum levels of calcium, phosphorus, magnesium, albumin, creatinine, 25 hydroxy vitamin D and PTH values, and spot urine calcium and creatinine levels were recorded from the hospital records. If 24-h urine was collected and daily calcium excretion was calculated, these values were also recorded. Patients receiving renal replacement therapy were excluded from the study. Also data of the patients who underwent parathyroid ultrasonography and scintigraphy upon suspected PHPT were recorded. The necessary permission was obtained from the hospital board in order to use the data. The study protocol was approved by the local ethics committee. Serum PTH samples were studied with immulite 2000 using chemiluminescence assay. Informed consents from patient were taken.

Statistical Analysis

Continuous variables are expressed as mean (minimum-maximum), and categorical variables as n (%). The data between groups were compared with Kruskal-Wallis and Mann-Whitney U tests. The statistical analysis was performed using SPSS version 20.0 software.

Results

A total of 137 patients were included in the study. Of all patients 118 (86.1%) were female and 19 (13.9%) were male. The mean age was found as 54.6±16.2 (19-99) in overall patients, 54.1±16.2 (19-96) in the female and 57.6±15.9 (28-85) in the male patients. According to the investigations performed; vitamin D deficiency was found in 88 (64.2%), PHPT in 38 (27.7%), FHH in 8 (5.8%), and CRF in 3 (2.2%) patients. The mean creatinine values of the patients was found as 0.73±0.16 (0.4-1.5), the mean calcium value as 9.90±0.87 (8-12), the mean phosphorus value as 3.09±0.60 (1.9-5.1), the mean PTH value as 176.2±72.5 (90-476), and the mean vitamin D level as 15±11.8 (2.4-65). The mean 24-h urine calcium level was found as (n=44) 259±178.9 (22-910) and the mean calcium clearance (n=86) as 0.011±0.009 (0.007-0.431).

Afterwards, the data were compared according to the etiological causes (vitamin D deficiency, PHPT and FHH). CRF was not take into account since the small number of participant (n=3). Calcium levels were highest in PHPT group, and lowest in vitamin D deficiency; there were significantly differences between all groups. Phosphorus levels were significantly lower in PHPT group when compared to the other two groups. Furthermore, calcium clearance levels were higher in PHPT group according to the other two groups. All of the parameters and p values were shown in Table 1.

Discussion

PTH primarily leads to transmission of calcium to the bloodstream by increasing bone resorption. In addition, it increases the synthesis of 1.25-dihydroxy vitamin D3 in the kidneys. Thus, intestinal calcium absorption increases (5). When PTH is over secreted due to reasons such as adenoma hyperplasia or parathyroid cancer, it may be found elevated in the blood together with increased calcium level. In addition, there may be also a secondary elevation in order to compensate for unexpected changes in blood calcium levels such as in case of

Table 1. Comparison of parameters according to etiological cause

	Vitamin D deficiency (n=88)	PHPT (n=38)	FHH (n=8)	p
Ca*	9.8±0.6[a*, b**]	10.9±0.6[c***]	10.2±1.0	*<0.001, **0.035, ***0.027
P*	3.26±0.58[a*]	2.76±0.49[c**]	3.2±0.64	*<0.001, **0.023
Mg	1.97±0.21	1,96±0,25	1,84±0,23	NS
PTH	166±72.8	201±95	142.5±24.7	NS
Ca clearance*	0.0078±0.005[a*]	0.0185±0.009[c*]	0.047±0.0015	*<0.001

[a]: between "vitamin D deficiency" and "PHPT", [b]: between "vitamin D deficiency" and "FHH", [c]: between "PHPT" and "FHH".
PHPT: Primary hyperparathyroidism, FHH: Familial hypocalciuric hypercalcemia, PTH: Parathyroid hormone

CRF or vitamin D deficiency (6). When PTH is studied due to any reason and found to be elevated, there may be multiple causes of this elevation.

First, calcium value should be measured in order to make differential diagnosis of elevated PTH. Differential diagnosis of PHPT and FHH should be established in patients with high blood calcium levels detected. While urine calcium excretion is increased in PHPT, it is decreased in FHH because of the mutation in calcium sensitizer receptors (CaSR) (7). Similarly the use of lithium may antagonize CaSR, causing hyperparathyroidism, hypercalcemia, and hypercalciuria (8). Therefore the use of lithium should be questioned before making a differential diagnosis.

In CRF, when glomerular filtration rate drops under 60 mL/min/1.73 m^2, PTH begins to elevate mainly as a physiological response in order to compensate elevated phosphorus (9). Phosphorus level increases with progression of renal failure, and this increase leads to a decrease in calcium levels. In addition, vitamin D related intestinal calcium absorption is also disrupted because 1-alpha-hydroxylase activity will also decrease in this case. As a result, PTH level elevates and SHPT occurs (10).

Another cause of SHPT is vitamin D deficiency. Vitamin D deficiency is common in the general population (11). While about one billion people experience vitamin D deficiency, 50% of the general population have vitamin D insufficiency worldwide (12). In a recent study from Ankara province of our country, Oksuz et al. (13) found vitamin D deficiency by very high rates of (51.8%), and vitamin D insufficiency by 20.7%. There is an inverse association between 25-OH vitamin D and PTH levels. When vitamin D level decreases, parathyroid glands augment the synthesis and secretion of PTH. Elevated PTH accompanies 20-45% of patients with vitamin D deficiency (14). Normocalcemic hyperparathyroidism (ncHPT) is constantly normal serum calcium levels and elevated PTH levels without any secondary cause that will lead to elevation in PTH levels (15,16). In order to establish the diagnosis of ncHPT both total and ionized calcium levels should be within normal limits. It is recommended that 25-OH vitamin D levels should be elevated above 30 ng/mL (75 nmol/L) in order to make the diagnosis of ncHPT (15). Sometimes normocalcemic patients may become hypercalcemic when 25-OH vitamin D levels exceed 30 ng/mL. PHPT is the most common cause of hypercalcemia together with malignancies. Although its incidence is decreasing it is still 15/100000. The incidence in the United States of America is estimated as 66/100000 persons per year in women and 25/100000 persons per year in men (12). PHPT is a common endocrine disease biochemically characterized by hypercalcemia and increased or improper normal PTH levels. PHPT is more common in elderly population and its prevalence is up to 2% (17). It is caused by a single parathyroid adenoma in many cases (80%), more rarely by multiple gland disorder (e.g. multiple adenomas or multiple gland parathyroid hyperplasia), and rarely (<1%) by parathyroid carcinoma (18). FHH is an autosomal dominant-pattern hereditary conditions which is equally distributed in both sexes. The prevalence of FHH is estimated as 1/78000, but it is possibly underestimated because of its subclinic nature (19). In PHPT, hypercalcemia is accompanied by low phosphorus value, while calcium and phosphorus levels remain low in vitamin D deficiency (14,20). The laboratory findings of FHH can imitate the PHPT with high calcium and normal/low phosphorus levels (19). In accordance with this information, the highest calcium and the lowest phosphorus levels were observed in the PHPT group in our study. On the other hand, a calcium clearance level was higher in PHPT group when compared to the other two groups. It is well known that PHPT accompanied with overflow hypercalciuria, while low calcium clearence levels are seen in the case of vitamin D deficiency and FHH (7). Best to the knowledge, there was no study in the literature that investigates the etiology of PTH elevation. In our retrospective study, the most common reason of elevated PTH was vitamin D deficiency (64.2%), and the others were respectively as PHPT (27.7%), FHH (5.8%), and CRF (2.2%).

Conclusion

In conclusion, vitamin D deficiency is a common disorder in general population, and occasionally coexisted with increased PTH level. Therefore, vitamin D deficiency should be kept in mind when PTH studied as a first test and is found to be high. The other reason such as PHPT, FHH and CRF must be also investigated.

Ethics

Ethics Committee Approval: The study were approved by the Harran University of Local Ethics Committee (protocol number: 19.01.18).

Informed Consent: Informed consents from patient were taken.

Peer-review: Externally peer- reviewed.

Authorship Contributions

Surgical and Medical Practices: M.A.E., İ.K., Concept: İ.K., Design: M.A.E., İ.K., Data Collection or Processing: M.A.E., İ.K., Analysis or Interpretation: M.A.E., İ.K., Literature Search: İ.K., Writing: İ.K.

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A Rare Cause of Acute Paraplegia: Aneurysmal Bone Cyst

Akut Paraplejinin Nadir Bir Nedeni: Anevrizmal Kemik Kisti

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Abstract

Aneurysmal bone cyst of the spine can rarely cause acute paraplegia in young patients. A 30-year-old male patient presented to our physical medicine and rehabilitation outpatient clinic with back pain and bilateral lower extremity weakness for 2 weeks. The patient had no history of trauma. In magnetic resonance imaging, the cystic lesions were determined which destructive, contain internal septations and have multiple fluid-fluid levels at the T5-T6 level. The aneurysmal bone cyst was shown by histopathology. Complete resection to the cystic lesion and posterior segmental instrumentation at T2-T7 level were performed. In the control examination performed 6 months later, lower extremity muscle strength was complete and no recurrence was detected.
Keywords: Acute paraplegia, aneurysmal bone cyst, young patient

Öz

Genç hastalarda omurga yerleşimli anevrizmal kemik kistleri nadiren akut paraplejiye neden olabilirler. Otuz yaşında, erkek hasta 2 haftadır mevcut olan sırt ağrısı ve her iki bacakta güçsüzlük şikayeti ile Fiziksel Tıp ve Rehabilitasyon Polikliniği'mize başvurdu. Hastanın travma öyküsü yoktu. Dorsal magnetik rezonans görüntülemede T5-6 seviyesinde destrüktif, internal septasyonlar içeren, multipl sıvı-sıvı seviyesi olan kistik lezyonlar tespit edildi. Histopatoloji ile anevrizmal kemik kisti gösterildi. Kistik lezyona komplet rezeksiyon ve T2-T7 seviyesinde posterior segmental enstrümentasyon uygulandı. Altı ay sonra yapılan kontrol muayenesinde alt ekstremite kas gücü tamdı, rekurrens tespit edilmedi.
Anahtar kelimeler: Akut parapleji, anevrizmal kemik kisti, genç hasta

Introduction

Aneurysmal bone cyst (ABC) is vascular, non-neoplastic tumor like lesion. ABC consist of blood filled osteolytic cystic cavities separated by connective tissue septa containing fibroblast, osteoclast and reactive woven bone (1). Although ABC is benign lesion, it is extensive and destructive that can result in pathological compression fracture, spinal cord compression and spinal instability (2). ABC consist of 1-1.4% of all primary bone tumors (3,4). The spine is involved in 15% of them (5). Lumbar spine is most affected spine localization, cervical spine, thoracic spine, sacral spine also can be affected, respectively. We report a rare case of ABC with acute paraplegia with thoracic involvement that was successfully treated surgical decompression and stabilisation (1).

Case Report

A 30 year old young man admitted to the 50023 outpatient clinic with two weeks progressive back pain increasing with lying position, sudden onset paraplegia and decreased sensation in bilateral lower extremities. Before a week the patient admitted to emergency department and intramuscular (IM) myorelaxant and non-steroid anti-inflammatory drug injection was inserted with dorsal muscular strain diagnose. The patient stated that after IM injection lower extremity weakness had been started. On physical examination there was T4-6 spinous process tenderness. Neurological examination revealed right lower extremity proximal 4/5, distal 3/5 and left both upper and lower extremity 3/5 muscle strength. There was decreased sensation in bilateral lower extremities. Deep tendon reflexes were bilateral hyperactive in lower extremity. His bilateral Babinski sign was positive.The bowel and bladder habits were normal. There was no history of trauma. X ray of the spine was normal. The magnetic resonance imaging (MRI) revealed expansile mass that have characteristics of ABC with internal septationand multiple fluid-fluid level at T5-6 level. The lesion involved T5-6 vertebra with bilaminar destruction and severe spinal cord compression (Figure1). Neurosurgery consultant was offered. Urgent spinal cord decompression and stabilization

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were deemed necessary to prevent further neurological deterioration and to optimize clinical outcome. He underwent left transpedicular approach and complete excision of the lesion followed by posterior segmental instrumentation at the T2-T7 levels (Figure 2). Embolisation has not been applied because of thoracic aortography showed no abnormality except minimal opacification in left T5 intercostal artery. The excised lesion had consisted of cystic trabeculations with a dark red fleshy appearance with moderate vascularity. Final histopathology confirmed the diagnosis of ABC. Post operatively, he had complete relief of pain. The patient had dramatic improvement in her bilateral lower extremities strength with 5/5 muscle strength on the control examination after six months.

Discussion

ABC is a rare, non-neoplastic, expansile, highly vascular osseous lesion. ABC consist of blood filled spaces separated by connective tissue septa containing fibroblast, osteoclast and reactive woven bone (1). ABC was first defined by Jaffe and Lichtenstein

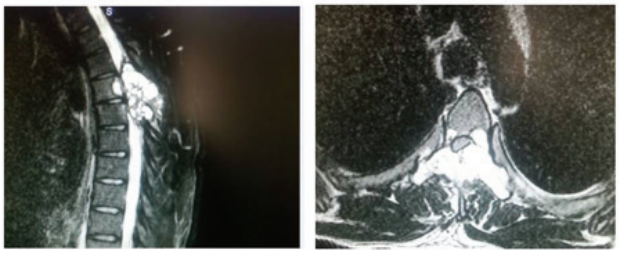

Figure 1. T2-weighted sagittalandaxial magnetic resonance imaging T2-weighted image of the thoracic spine demonstrating alyticlesion involving predominantly the posterior elements of the T5 and T6 vertebrae

Figure 2. Anteroposterior view X-ray of the thoracic spine showing posterior segmental instrumentation at the T2-T7 levels

(2). ABC have 1-1.4% of incidence all primary bone tumors (3,4). The spine is involved in 15% of the primary spine tumors. The cervical spine is affected in 30% of cases, the thoracic spine in 25-30%, the lumbar spine in 30-45% and the sacrum in 13% (5). Spinal lesion usually affects vertebral body and posterior elements (lamina, peduncle, facet joints) (60%). ABC also can affect vertebrae corpus (40%) (1,3). Boriani et al. (6) indicated that ABC had been seen in lumbar spine more often than the other spine parts. Zileli et al. (7) found that sacrum and lumbar spine has been more affected than the others. On the other hand, Papagelopoulos et al. (8) found that cervical and thoracal spine is more affected than the lumbar part of spine.

ABC usually occurs approximatelyin second decade of life and rarely after 30 years of age. ABC more often seen in females than males (9,10). Clinical presentation is usually pain, sensory disturbance, motor weakness, kyphoscoliosis and swelling. Pain with duration between 3 months and years, frequently increases at night and on supine position. Rarely symptoms related to acute vertebral collapse with or without spinal cord injury nerve, root compression, deformity and/or instability (9). Plain radiographs are inadequate in detection of ABC in early age, usually combination of plain radiography and advanced imaging techniques is necessary. Therefore, advanced imaging technique should be utilized such as MRI and computed tomography (CT). Characteristic ballooning of the posterior elements may be shown in plain radiography (7). CT scans typically reveal a characteristic soap-bubble appearance with fluid-fluid levels, which represents a ballooning, multilocular lytic lesion and pathologic fracture or vertebral collapse (3,11). The presence multiloculated cyst fluid-fluid filled levels due to presence of blood in different stages of within the cyst. Each multiloculated lobule gives different signal characteristics related to different stages lesions. MRI also shows cord and nerve root compression (12). In differential diagnose osteosarcoma, giant cell tm, chondroblastoma, fibrous dysplasia, fibrosarcoma, metastatic lesions should be recognized because these lesions also have fluid-fluid levels in advanced imaging techniques (10,13). In the present case, the lesion was diagnosed ABC based on typicalpattern multilocular cysts with fluid-fluid level on the MRI. The exact diagnose is biopsy. Open biopsy and frozen sections was offered to confirm diagnose (14). Biopsy confirmed the ABC diagnose.

Treatment of the ABC is controversial. In the literature, although there are a few reports of spontaneous ABC regression, the cause of spontaneous regression is unknown. Kitamura et al. (3) claimed that ABC can have spontaneous regression in elderly because elderly patients were attributable to thrombosis and fibrosis. On the other hand, in patients with neurological involvement early diagnose and treatment is should be utilized. Treatment choices are complete excision, curettage, arterial embolization, intralesional drug injections, radiation or combination of these (7,15). In conditions neurological deficit and/or spinal instability surgical treatment should be utilized. For less rate of recurrence complete excision seems to

be best choice. If also there is spinal instability, instrumented stabilization should be added. Partial excision and curettage can result in higher risk of recurrence (16).

In conditions only pain (without neurological deficit or spinal instability) arterial embolization, intralesional calcitonin or methylprednisolone injection can be treatment choice for pain relief, but carries recurrence risk (4). Calcitonin inhibits osteoclast activity and induce formation of cancellous bone. Methylprednisolone inhibits fibroblastic action and angiogenesis. But intralesional injection can be required long period to decrease symptoms (17). Arterial embolization aims to reduce vascularity. Amendola et al. (18) claimed that arterial embolization can be treatment choice for the small and less destructive lesions, also can decrease intraoperative bleeding. Radiation therapy is adjuvant therapy, not first line therapy for ABC. Radiation therapy should be added in conditions of partial excision or in aggressive recurrent ABC or inoperable lesions, but carries risk of sarcomatous changes and irradiation myelopathy (17). The presented case ABC of thoracic vertebrae was treated with surgical resection followed by vertebral fusion and instrumentation. Embolization has not been applied because of thoracic aortography showed minimal opacification. The surgical treatment concluded with no pain no neurological deficit after six months.

In conclusion ABC is a rare cause of acute paraplegia. Although ABC is benign bone tumor can result in expansilespontaneous hemorrhagic mass into the posterior epidural space that can cause spinal cord compression and paraplegia. Early diagnose and urgent decompression is necessary to prevent neurological complications.

Ethics

Informed Consent: Written in formed consent form was obtained.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: G.Ö., A.D.Ş.K., Concept: G.Ö., A.D.Ş.K., P.A., Design: G.Ö., A.D.Ş, F.Ü.O., Data Collectionor Processing: G.Ö., F.U.Ö.,İ.A., Analysis or Interpretation: G.Ö., F.U.Ö.,İ.A., Literature Search: G.Ö., A.D.Ş.K., Writing: G.Ö., A.D.Ş.K., P.A.

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Olgu Sunumu / Case Report

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Deri Bulguları ve Akut Artrit ile Ortaya Çıkan Sarkoidoz

Sarcoidosis Revealed with Skin Manifestations and Acute Arthritis

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Öz

Otuz yedi yaşındaki kadın hasta, her iki diz ve ayak bileğinde şişlik ve vücudunda döküntülerle kliniğimize başvurdu. Hasta artrit etiyolojisine yönelik tetkik edildi. Derideki plak lezyonlardan alınan biyopside granülomatoz yapıda sarkoidal lezyonlar saptandı. Olguya klinik, laboratuvar ve radyolojik bulgular eşliğinde sarkoidoz tanısı konuldu. Deri tutulumu ile başlayan sarkoidoz literatürde nadiren görülmektedir. Spesifik deri lezyonlardan alınacak biyopsi, invaziv bir transbronşiyal biyopsiye gerek kalmadan tanı konulmasını sağlar. Bu nedenle deri bulguları ile tanı koyduğumuz sarkoidoz olgusunu sunmayı amaçladık.
Anahtar kelimeler: Sarkoidoz, artrit, deri bulguları

Abstract

A 37-year-old female patient admitted to our clinic with swelling in both knees and ankles and eruptions in her body. The patient was examined for the etiology of arthritis. In the biopsy taken from the plaque lesions on the skin, granulomatous sarcoidal lesions were detected. The case was diagnosed as sarcoidosis along with clinical, laboratory, and radiological findings. Sarcoidosis started with skin involvement is rarely seen in the literature. Biopsy from specific skin lesions allows diagnosis without the need for an invasive transbronchial biopsy. Therefore, we aimed to present a case of sarcoidosis diagnosed with skin manifestations.
Keywords: Sarcoidosis, arthritis, skin manifestations

Giriş

Sarkoidoz non-kazeifiye granülom oluşumu karakterize, enflamatuvar multisistemik kronik bir hastalıktır. Etyolojisi halen aydınlatılamayan bu hastalık başta akciğerler olmak üzere deri, kas iskelet sistemi, kalp gibi pek çok doku ve organı etkileyebilmektedir. Hastalığın klinik bulguları, seyri ve prognozu geniş bir yelpaze içinde yer almaktadır (1,2). Bu çalışmada her iki diz ve ayak bileği şişliği ve dirseklerde eritemli plaklar ile başvuran ve sonrasında sarkoidoz tanısı alan olgumuz sunulmuştur.

Olgu Sunumu

Çalışmamıza dahil edilen tüm hastalardan bilgilendirilmiş onam formu alınmıştır.

Otuz yedi yaşında kadın hasta her iki ayak bileğinde şişlik ve her iki diz ön yüzünde kızarıklık ve şişlik ile polikliniğimize başvurdu. Şikayetlerinin yaklaşık 2 aydır olduğu öğrenildi. Dizlerde yarım saati geçmeyen sabah tutukluğu tanımlıyordu. Bu şikayetlere son zamanlarda sağ dirsekte kızarık deriden kabarık lezyon eklenmişti. Polikistik Over sendromu ve Diyabetes Mellitus nedeniyle takipli olan hastanın romatolojik sorgusunda özellik yoktu. Muayenesinde her iki diz üzerinde kızarıklık ve şişlik mevcuttu (Şekil 1). Sağ dizde ısı artışı ve patellar ballotman alındı. Eklem hareket açıklıkları ağrı nedenli range sonu kısıtlı idi. Her iki ayak bileğinde de şişlik mevcuttu ancak ısı artışı gözlenmedi (Şekil 2). Her iki dirsekte eritemli, viyolase plaklar gözlendi (Şekil 3). Hastanın laboratuvar incelemelerinde hemogram normal, biyokimyasal parametrelerinde glukoz: 149 mg/dL, diğer biyokimyasal parametreler normal, C-reactive protein 1,69 mg/dL, sedimentasyon 62 mm/sa, hepatit serolojisi normal, romatoid faktör, ANA ve anti CCP (–) olarak bulundu.

Akciğer grafisinde hiler lenfadenopati ile uyumlu görüntü gözlenen hastaya toraks bilgisayarlı tomografi (BT) çekildi. Toraks BT'de sağ paratrakeal lokalizasyonlu, kısa aksı 15 mm olan lenf bezi ve sol akciğerde subplevral nodüller izlendi. PPD testi 5 mm olarak bulunan hastanın dirseğindeki eritemli plaklardan alınan biyopsinin histopatolojik incelemesi sarkoid ile uyumlu granülomatöz enflamasyon rapor edildi (Şekil 4).

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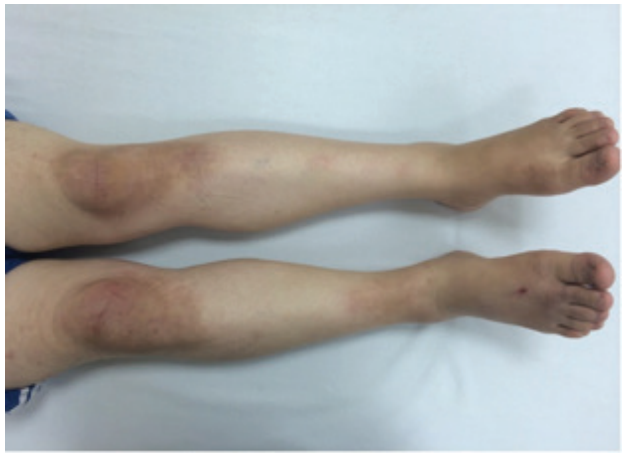


Şekil 1. Hastanın her iki dizinde görülen artrit

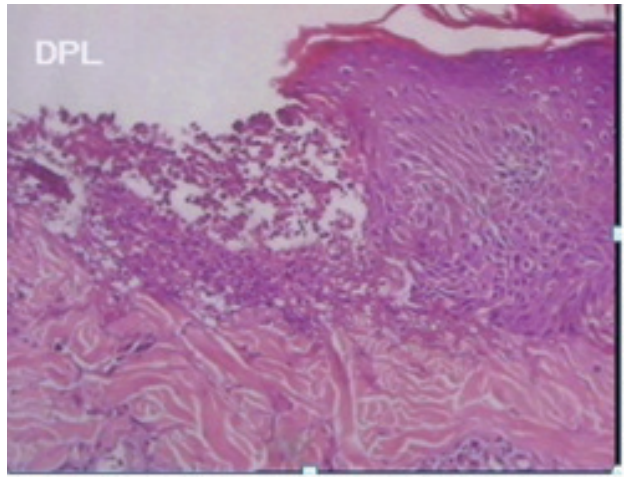
Şekil 2. Her iki ayak bileğinde görülen periartrit

Şekil 3. Dirsekte eritemli viyolase plaklar (periyodik asit-Schiff, d-periyodik asit-Schiff, Alcian-blue)

Yapılan incelemeler neticesinde hastaya sarkoidoz tanısı konuldu. Non-steroid anti-enflamatuvar ilaçlar ve topikal kortikosteroid başlandı.

Tartışma

Sarkoidoz nedeni bilinmeyen bir enflamatuvar hastalıktır. Akciğerler başta olmak üzere, deri, göz, kalp, karaciğer ve lokomotor sistemi tutabilir. Ekstrapulmoner tutulum akciğer tutulumundan önce olabileceği gibi, bizim hastamızdaki gibi



Şekil 4. Retiküler dermis alt kısımlarına kadar uzanan, sarkoidal natürde granülomatoz yangı fokusları

beraber veya sonrasında da gelişebilir. Akciğer bulgularının erken dönemde asemptomatik olması nedeniyle hastaların başvuru şikayetleri genellikle ekstrapulmoner olmaktadır (1,2).
Deri tutulumu hastalığın herhangi bir evresinde %15-20 sıklıkta bildirilmektedir. Spesifik ve non-spesifik lezyonlar şeklinde gözlenir. En sık non-spesifik deri lezyonu alt ekstremite pretibial bölgede ağrılı nodüller olarak ortaya çıkan ve pigmentasyon bırakarak iyileşen eritema nodozumdur. Ateş, artralji, bilateral hiler lenfadenopati ile beraber görüldüğü durum Löfgren sendromu olarak adlandırılır ve iyi prognoz belirtisi olarak görülür. Septal panniküllit olarak görülen eritema nodozumun ayırıcı tanısında başta tüberküloz ve streptokok enfeksiyonları olmak üzere diğer bağ doku hastalıkları düşünülmelidir. Spesifik deri lezyonlarından en önemlisi lupus perniodur. Yanaklar, burun, dudaklar ve kulaklarda ağrısız mor-kırmızı renkte deri lezyonları şeklinde görülür. Nazal ülserasyon ve perforasyona neden olabilir. Diğer spesifik deri lezyonları makülopapüler, papüler ve bizim hastamızda görüldüğü gibi plak şeklinde lezyonlardır. Plak lezyonlar zaman içinde büyüme gösterebilir Papüler lezyonlar yüzde, makülopapüler lezyonlar göğüs ve sırtta, plak lezyonlar ise ekstremiteler ve sırtta görülür. Sarkoidozda ayrıca subkutan nodüller ve psoriazisi andıran pullu lezyonlar görülebilir. Deriye yapılan travma deri lezyonlarının ortaya çıkışını kolaylaştırabilir (skar sarkoidozu) makülopapüler ve plak lezyonların tedavisinde topikal steroidler kullanılır. Ancak lupus pernioda sistremik kortikosteroid ve immünsupresif tedaviye gerek duyulur. (3-5)
Sarkoidozun lokomotor sistem bulguları eklem, kemik ve kas kaynaklı olabilir. Eklem tutulumu artralji, periartrit, akut artrit, kronik artrit, sakroiliit, spondilit ve entezit şeklinde prezente olabilir. Akut artrit en sık ayak bileği ve dizde görülmektedir. Yumuşak doku şişliğinin ön planda olduğu kemik değişikliklerinin görülmediği bir tutulum söz konusudur. Kronik artrit ise diz ayak bileği ile el ve ayağın küçük eklemlerini tutmakta ve erozyon gibi kronik kemik değişikliklerine neden olabilmektedir. Bizim hastamızda dizlerde periartrit, ayak bileklerinde yumuşak doku şişliği ve artralji görüldü. Sakroiliit, entezit ve spondilit yoktu. Laboratuvar değerlendirmesinde hastamızda olduğu gibi akut

faz reaktanları yüksek bulunabilir. Bunun dışında ACE yüksekliği, hipergammaglobülinemi, kronik hastalık anemisi görülebilir (2). Sarkoidoz tanısı klinik ve laboratuvar bulguların değerlendirilmesi ile konur. Ancak tanıda histopatolojik değerlendirme altın standart olarak görülmektedir. Akciğerden transbronşial veya eritema nodozum dışındaki deri lezyonlarından alınan kutanöz biopsi ile sarkoidoz tanısı konulabilir (3,5). Bizim hastamızdaki plak lezyonlardan alınan örneklerde sarkoidal natürde granülomatoz enflamasyon görülmüştür (Şekil 4).

Sonuç olarak sarkoidoz nadir görülen genellikle akciğerleri tutan bir hastalıktır. Akciğer bulgularının asemptomatik olabilmesi nedeniyle genelde ön plana çıkan klinik bulgu kas iskelet yakınmalarıdır. Sarkoidoz hastalarında nadiren saptanan deri lezyonları genelikle eritema nodosum olarak karşımıza çıkmaktadır. Bunun dışında görülebilen makülopapüler, papüler ve plak şeklindeki lezyonlar tanı açısından oldukça spesifiktir. Bu nedenle özellikle alt ekstremite büyük eklem artriti ile başvuran hastalarda deri lezyonları da varsa dikkatli değerlendirilmeli ve histopatolojik tanıya gidilmelidir.

Etik

Hasta Onayı: Çalışmamıza dahil edilen tüm hastalardan bilgilendirilmiş onam formu alınmıştır.

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A Case of Hydatid Cyst with Primary Paraspinal Muscle Involvement

Primer Paraspinal Kas Tutulumu Olan Bir Kist Hidatik Olgusu

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To the Editor;

A 41-year-old female patient was admitted to our clinic with a 3-month history of back pain. The pain was mechanical and there was no concomitant numbness or neuropathic pain such as tingling. The patient had no history of trauma, surgery, chronic illness or infection, and had not benefited from pain relief and myorelaxant drugs. On the physical examination, there was seen to be forward posture and tenderness in the paravertebral area of the back. Active myofascial Pain syndrome could not be detected. Sensory and motor functions were normal in the upper extremity and deep tendon reflexes were normoactive. A direct radiograph of the cervical and thoracic region revealed flattening of the cervical lordosis and an increase in thoracic kyphosis. In addition, mild degenerative changes were observed. The patient, who was followed-up with recommended exercise therapies to correct postural disorder, presented again after 1 month because of increased pain. Magnetic resonance imaging (MRI) of the back area was performed for further examination. At the level of the C7-T1 vertebrae, a lesion with a mass of approximately 3x2 cm was localized at the midline. A cystic lesion showing hypointensity on T1-weighted sequences and hyperintense septation on T2-weighted sequences was diagnosed as hydatid cyst (Figure 1, 2). Biochemical analysis revealed no leukocytosis and no eosinophilia. CRP was normal. The indirect hemagglutination test for the diagnosis of hydatid cyst was positive. Abdominal ultrasonography and conventional chest radiographs were requested to rule out possible liver or lung involvement. As no pathology was detected in the liver and the lungs, the patient was diagnosed with hydatid cyst with primary muscle involvement. The patient was referred to the Neurosurgery Clinic for surgical treatment and cyst excision surgery was performed. Albendazole 200 mg 2x1 treatment was given for six months after surgery. No new focus or recurrence was observed during follow-up.

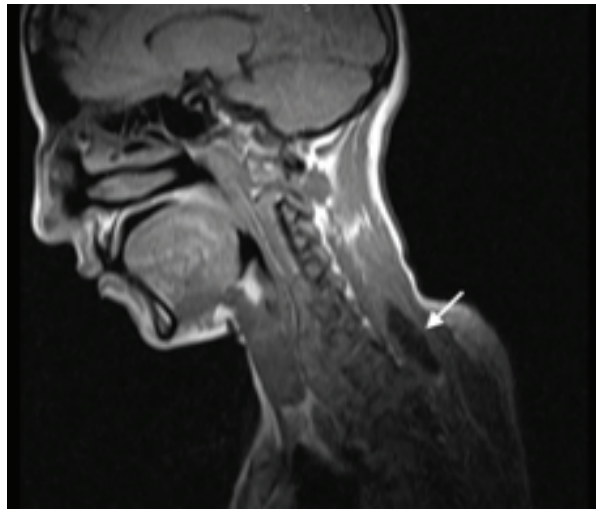

Figure 1. Cystic lesion showing hypointensity on T1-weighted sequences

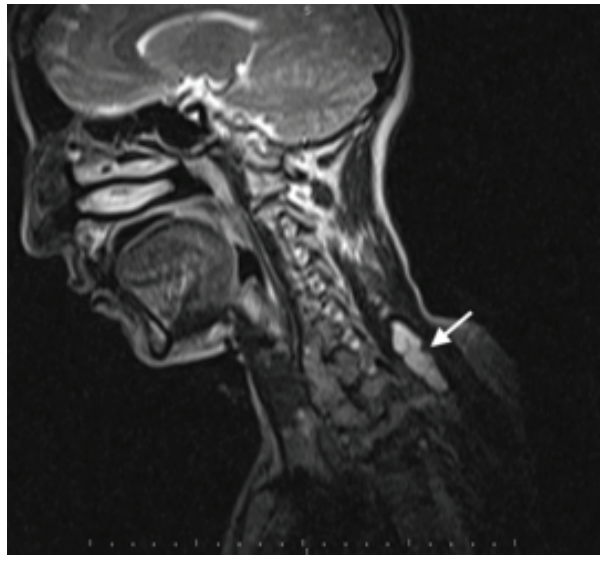

Figure 2. Hyperintense septation on T2-weighted sequences

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A hydatid cyst is a parasitic infection caused by the larval stage of Echinococcus granulosus and Echinococcus multilocularis, usually involving the liver, lungs, and brain (1). Echinococcosis has a worldwide distribution and causes health problems in endemic countries such as Australia, Argentina, Africa, the Middle East and the Mediterranean region (2). Hydatid disease rarely affects soft tissues even in endemic areas, and skeletal muscle involvement is extremely rare, with a reported prevalence of 0.5-4.7% (3). The pathogenesis of muscle involvement is not clearly understood. While some authors claim that it is through direct implantation, most authors believe the embryo can reach the muscles from the systemic circulation after leaving the intestine and passing through two filters: the liver and the lungs (4).

Hydatic cysts usually occur in liver and the lungs, but may localise in any area of the body (4). Since muscle involvement of hydatid disease is rare, our knowledge is limited to case series. Gedik et al. (4) presented a 20-year-old male patient with paravertebral hydatid cyst. Bagcier et al. (3) diagnosed a hydatid cyst in the gastrocnemius muscle of a 40-year old male patient. Both patients underwent surgical excision and medical treatment as in the current patient, and none have relapsed (3,4). Saad et al. (5) presented three hydatid cysts with psoas muscle involvement and Tyagi and Garg (2) reported a hydatid cyst in the brachialis muscle. Bilgic et al. (6) presented a case with paraspinal muscle involvement but used the puncture, aspiration, injection, re-aspiration technique instead of surgery. Musculoskeletal hydatid cyst diagnosis is clinically and radiologically difficult as it resembles a soft tissue tumor. Ultrasonography, computed tomography and MRI have a valuable role in the radiological diagnosis and follow-up of hydatid disease (3). Hydatid cyst should be considered in the differential diagnosis of soft tissue tumors, especially in areas where hydatid cyst is endemic. In addition, in the differential diagnosis of back pain resistant to medical treatment, muscle involvement of hydatid cyst should be considered.

Keywords: Cyst, back pain, magnetic resonance imaging
Anahtar Kelimeler: Kist, sırt ağrısı, manyetik rezonans görüntüleme

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