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Vajinal Pesser Kullanan Hastalarda Vajen Kültür Sonuçlarının Değerlendirilmesi

Evaluation Of Vaginal Culture Results in Patients Using Vaginal Pessary

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ÖZET

Giriş: Uterin prolapsus görülen olgularda esas tedavi cerrahi olmasına rağmen, komorbid hastalıklar, hastanın cerrahiden kaçınması gibi nedenlerle cerrahi yapılamayan olgularda vajinal pesser kullanımı önemli bir alternatiftir. Pesser kullanımı ile pelvik organlar yerinde tutulmakta ve hastanın yaşam kalitesinde önemli ölçüde bir düzelme sağlanmaktadır.
Amaç: Vajinal pesser kullanan hastaların vajinal enfeksiyona maruz kalacağı aşikardır. Bu durumu daha iyi değerlendirmek ve hastaların karşılaşacağı sorunların çözümüne ışık tutmak adına hastalardan alınan vajinal kültür sonuçlarının değerlendirilmesini amaçlanmıştır.
Yöntem: Araştırmaya Kadın hastalıkları ve Doğum polikliniklerine başvuran çeşitli pelvik organ prolapsusu nedenleri ile vajinal pesser kulanan 22 hasta dahil edildi. Olguların yaş, gravida, parite, boy, kilo, bmı, mevcut şikayet, ek hastalık, cerrahi yapılamama nedeni, Pelvik organ prolapsus şekli ve derecesi, inkontinansın eşlik edip etmediği ve ultrasonografi ile patolojik bulgular açısından incelemesi yapıldı.
Bulgular: Pesser kullanımı nedeni ile vajinal akıntısı olan hastaların steril spekulum muayenesinde sadece 1'inde(%4) yoğun lökore tespit edilirken; 9'unda (%40,9) minimal lökore mevcuttu. Hasta şikayeti olmasına rağmen muayene sırasında hastaların 12'sinde(%54,5) enfeksiyon lehine bulgu saptanmadı. Alınan vajinal kültür sonuçlarında 22 hastanın 7'sinin (%31) kültür sonucu "üreme yok" şeklinde raporlanırken 12'sinde (%54) normal flora elemanları ürediği raporlandı. Sadece 3 (%13,6) hastada ise patojen mikroorganizma gözlendi. Vajinal kültürde üreme olan hastaların 2'sinde etken mikroorganizma Echechia coli, 1'inde ise Enterococcus faecealis gözlendi.
Sonuç: Bu çalışmanın sonucunda vajinal pesser kullanan hastalarda profilaktik olarak kullanılan lokal antibiyotik ve doku hasarını önlemek için verilen lokal östrojenin yeterli tedaviyi sağladığı, ancak hastaların hayat kalitesinin artırılması için kültürden ziyade vajinal muayene ile enfeksiyon varlığının gösterilmesinin daha kıymetli olduğu görülmektedir.

Anahtar Kelimeler: Pelvik Organ Prolapsusu, Pesser, Vajinal Kültür.

ABSTRACT

Introduction: Although surgery is the main treatment in cases with uterine prolapse, the use of vaginal pessary is an important alternative in cases where surgery cannot be performed due to comorbid diseases and patient avoidance of surgery. With the use of pessaries, the pelvic organs are held in place and a significant improvement in the patient's quality of life is achieved.
Objective: Obviosly Usage of vaginal pessaries cause to vaginal infection. The aim of this study to determine solutions of the problems that patients may encounter and better evaluate this situation in the light of vaginal culture results taken from patients.
Method: 22 patients who applied to Gynecology and Obstetrics outpatient clinics and used vaginal pessaries due to pelvic organ prolapse for various reasons were included in the study. Previous vaginal culture results due to infection were evaluated retrospectively in the patients who are using pessaries. The cases were examined in terms of age, gravida, parity, height, weight, BMI, existing complaint, comorbidity, reason for not being able to undergo surgery, shape and degree of pelvic organ prolapse, whether it was accompanied by incontinence, and pathological findings using ultrasonography.
Results: During sterile speculum examination of the patients with vaginal discharge due to pessary use intense leukorrhea was detected in just 1 patient (4%) and 9 patient (40.9%) had minimal leukorrhea. Although the patient had a complaint, no evidence of infection was detected in 12 of the patients (54.5%) during the examination. The vaginal culture results shows that 7 of 22 patients (31%) were reported as "no growth". Normal flora elements grew in 12 of them (54%). Pathogenic microorganisms were observed in only 3 (13.6%) patients. The causative microorganism Echechia coli was observed in 2 of the patients with growth in vaginal culture, and Enterococcus faecealis was observed in 1.
Conclusion: As a result of this study, it is seen that local antibiotics used prophylactically and local estrogen given to prevent tissue damage provide adequate treatment in patients using vaginal pessaries, but it is more valuable to show the presence of infection by vaginal examination rather than culture to improve the quality of life of patients

Keywords: Pelvic Organ Prolapse, Pessary, Vaginal Culture.

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GİRİŞ

Uzayan yaşam süresi ile birlikte yaşlı populasyonu artmaktadır ve artan yaş ortalaması beraberinde bazı sorunları da getirmektedir. İlerleyen yaş ile birlikte kadınlarda vücuttaki östrojen azlığı, travmalar (doğum gibi), kollajen kaybı gibi sorunlara bağlı olarak pelvik organ prolapsus sıklığı artmaktadır. İleri yaş grubunda pelvik organ prolapsus sıklığı yaklaşık %14 olarak bildirilmiştir (1). Uterin prolapsus görülen olgularda esas tedavi cerrahi olmasına rağmen, komorbid hastalıklar, hastanın cerrahiden kaçınması gibi nedenlerle cerrahi yapılamayan olgularda vajinal pesser kullanımı önemli bir alternatiftir (2). Pesser kullanımı ile pelvik organlar yerinde tutulmakta ve hastanın yaşam kalitesinde önemli ölçüde bir düzelme sağlanmaktadır (1). Pesser kullanacak hastaların belirlenmesinde ve seçiminde standart olmasına rağmen bakımı ile ilgili yeterli veri bulunmamaktadır. Birçok uzman 3-6 ayda bir hekim tarafından muayenenin yapılmasını önermektedir (3,4). Pesser çıkarıldıktan sonra antibakteriyel özellikli sabun ve sıcak su ile temizlenmelidir. Silikon pesserlerin maksimum kullanım süresi 1-2 yıldır (5,6). Pesserin en yaygın komplikasyonu hipoöstrojenik vajinal mukoza nedeni ile vajinal irritasyondur. Ayrıca ortamda bulunan yabancı cisim nedeni ile de vajinal enfeksiyonlara duyarlılık artmaktadır (5).

Bu çalışmada Vajinal pesser kullanan hastalarda gelişen vajinal enfeksiyonu daha iyi değerlendirmek ve hastaların karşılacağı sorunların çözümüne ışık tutmak adına hastalardan alınan vajinal kültür sonuçları incelenmiştir. Ayrıca mikrobiyolojik, klinik ve smear sonuçları karşılaştırılmıştır.

YÖNTEM

Bu retrospektif çalışma Erzincan Binali Yıldırım Üniversitesi Klinik Araştırmalar Etik Kurulu'nun 21.06.2021 tarihli ve 08 sayılı toplantısında alınan 2021/08 karar numarası ile onaylanmıştır. Tüm çalışma süreci Helsinki Bildirgesi ilkelerine uygun olarak yürütülmüştür. Araştırmaya Mart 2020-Mart 2021 arasında Kadın hastalıkları ve Doğum polikliniklerine başvuran çeşitli pelvik organ prolapsusu nedeni ile vajinal pesser kulanan 22 hasta dahil edildi. Vajinal kültür alındığı sırada antibiyoterapi almakta olan hastalar çalışma dışında bırakıldı. Veriler retrospektif olarak değerlendirildiği için hastalardan ayrıca bir onam alınmadı. Olguların yaş, gravida, parite, boy, kilo, bmı, mevcut şikayet, ek hastalık, cerrahi yapılamama nedeni, pop şekli ve derecesi, inkontinansın eşlik edip etmediği ve ultrasonografi ile jinekolojik patolojinin eşlik edip etmediği kaydedildi. Hastalardan daha önce alınmış ve steril swab ve taşıma besi yeri ile mikrobiyoloji laboratuarına gönderilmiş olan vajinal kültürler sonuçları incelendi.

İstatistiksel Analiz

Elde edilen veriler bir veri tabanında toplandı ve SPSS 20.0 (12- IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp) kullanılarak analiz edildi. Sosyodemografik veriler ve enfeksiyon varlığı sayı (n), yüzde (%), ortalama ± standart sapma ve ortanca (en küçük-en büyük) olarak verildi.

BULGULAR

Çalışmaya kriterleri karşılayan toplamda 22 hasta dahil edildi. Hastaların demografik bilgileri incelendiğinde; yaş ortalaması 77,75 (62-87), Gravida sayıları 3-8 (mean 5) ve parite sayıları 3-8 (mean 4) arasında değişmekteydi. Hastaların sadece 4'ünde (%18) 4500 gr ve üzeri doğum öyküsü (makrozomik bebek) mevcuttu. Pelvik organ prolapsusu risk faktörleri içerisinde önemli bir yeri bulunan kilo açısından incelendiğinde hastaları bmı 23 ve 34 arasında (mean d: 27,3) değişmekteydi. Hastaların hiçbiri sigara kullanmıyordu. Menopoz süresi açısından incelendiğinde 15-40 yıl (mean:27,5) olarak tespit edildi (Tablo1).

Tablo 1. Demografik Bilgiler

Sosyodemografik özellikler	Ortalama ±SD
Ortalama yaş	77,75±15
Ortalama gebelik sayısı	5±3
BMI	27,3 ±5
Menopoz süresi	27,5 ±13

SD: Standart Deviasyon

Hastaların 19'unda (%77,2) total uterin prolapsus, 1'inde (%4,5) kaff prolapsusu, 2'sinde(%1) grade 2 desensus uteri, 5'inde(%22,7) grade 3 sistosel, 12'sinde (%54,5) grade 2 sistosel saptandı. 3 hastada muayenede sistosel bulgusuna rastlanılmadı. Hastaların sadece 1'inde (%4) grade 2-3 rektosel saptanırken, 3'ünde(%13,6) grade 2 rektosel eşlik ettiği tespit edildi. 4 (%18,1) hastada pelvik organ prolapsusuna stress inkontinans eşlik ederken, 2 (%9) hastada urge inkontinans mevcuttu. Hastaların ortalama menapoz süresi 27,5 yıl (15-39 yıl) tespit edildi. (tablo 2)

Hastaların sadece 1'inde(%4) yoğun lökore tespit edilirken; 9'unda (%40,9) minimal lökore mevcuttu. 12'sinde(%54,5) enfeksiyon lehine bulgu saptanmadı. Yoğun lökore saptanan hastanın ultrasonografik muayenesinde apse ile uyumlu görünüm izlendi.

Prolapsus süreleri 2 ay ile 10 yıl (mean değeri 3,5 yıl) arasında değişmekle birlikte, pesser kullanım süreleri 2 ay ve5 yıl arasında (mean 3,5 yıl) tespit edildi. Lökore ile pesser kullanım süresi arasında ilişki saptanmadı.

Tablo 2. Pesser Kullanım Nedenleri

Pesser kullanım nedenleri	N	%
Sistosel	17	77,2
Rektosel	3	13,6
Uterin prolapsus	19	86,3
Kaff prolapsusu	1	4,5

N: sayı; %: yüzde

Hastaların 11'i (%50) ek hastalık ve anestezi sırasında yüksek risk nedeni ile, 1'inde (%4) geçirilmiş operasyon, 2'sinde(%8) hastanelerdeki covid pandemsi nedeni ile operasyon kısıtlaması yüzünden ve 8'inin (%36) kendi isteği üzerine cerrahi yapılmadığı öğrenildi.

Hastaların 6'sında(%27,7) ultrasonografi ile uterin kavitede 4 ila14 mm arasında ölçülen sıvı izlenirken 1 hastada kavitede 4,5cm büyüklüğünde apse ile uyumlu görünüm tespit edildi. 15 hastada ise (%68,1) sonografik bulgular normal sınırlarda değerlendirilmişti.

Alınan vajinal kültür sonuçlarında hastaların 7'sinde (%31) kültür sonucu üreme yok şeklinde raporlanırken 12'sinde (%54) normal flora elemanları ürediği raporlandı. 3 (%13,6) hastada ise patojen mikroorganizma gözlendi. Vajinal kültürde üreme olan hastaların 2'sinde etken mikroorganizma Echechia coli , 1'inde ise Enterococcus faecealis tespit edildi.

Hastaların tamamında lokal antibiyotik (nitrofurazon ve fucidik asit) ve lokal estradiol kullanılmakta idi. Hastaların tamamında smear sonucu inflamasyon ile uyumlu raporlandı.

TARTIŞMA

Pelvik organ prolapsusu nedeni ile vajinal pesser kullanan hastalada vajinit ile sık karşılaşılmaktadır. Reprodüktif yaş grubunda vajinal florada asidik ortam sayesinde başta laktobasiller olmak üzere döneme uygun vajinal flora hakimken (7,8), postmenopozal hasta grubunda, vajen dokusunda oluşan atrofi, vajenin travma ve enfeksiyonlara hassas hale getirmekte, floradaki laktobasiller yerini patojenik kokların başını çektiği mikst floraya bırakmaktadır (9-12). Bizim çalışmamızda vajinal pesser kulanan hastalardan alınan vajinal kültürlerde hastaların %54'ünde (n=12) normal flora elemanları olduğu ve sadece %13'ünde (n=3) patojen mikroorganizma olduğu tespit edildi. Literatürde pesser kullanan hastalarda vajinal kültür çalışması bulunmamakta olup postmenopozal dönemde vajinal enfeksiyonlarda etken daha çok enterococcus ailesi tespit edilmiştir (13). Bizim çalışmamızda ise hasta sayısının kısıtlı olması nedeni ile tüm enfeksiyonların %6,6'sında etken Enterococcus faecealis gösterilmektedir.

2018'de yapılan 50 hastanın dahil edildiği bir çalışmada pelvik organ prolapsusu için cerrahi yapılan hastalarda vajinal kültür çalışılmış ve bu postmenopozal hasta grubunda da hastaların %1'inde patojen mikroorganizma tespit edilmiş, hastaların %48,3' ünde yine laktobasillerin baskın ve %51,7'sinin normal floraya sahip olduğu izlenmiştir (14). Bizim çalışmamızda ise operasyon yapılmadığ halde bu çalışmaya benzer olarak florada anlamlı bir değişiklik olmamış, hastaların %54,5'inde (n=12) normal flora elemanlarının olduğu, % 31'inde (n=7) üreme tespit edilmediği ve %4 (n=1) 'inde enterococcus facealis ürediği görülmüştür.

Vajinada yabancı cisim ile ilgili çalışmalar yaş grupları için farklı sonuçlar göstermektedir. Özellikle çocukluk döneminde pik yapmaktadır (15) ve postmenapozal dönemde oldukça nadir görülür (16).Vajinal pesser kullanımında kültür ile ilgili yeterli çalışma bulunmamaktadır (17). Bizim çalışmamızda, pesserin yabancı cisim etkisi ile hastaların %13,6'sında patojen mikroorganizma tespit edildiği düşünülebilir.

Pesser uygulamasının komplikasyonları nadirdir. Komplikasyonların çoğu irritasyon, enfeksiyon ve erozyon gibi minör komplikasyonlardır (18). En ciddi komplikasyonlar, ihmal edilmiş pesserlerden kaynaklanır ve vezikovajinal fistül, rektovajinal fistül, ince barsak inkarserasyonu, hidronefroz, pyelonefrit, ürosepsis, vajinal reepitelizasyon, vajinal kanser ve servikal kanser gibi komplikasyonları içerirler (5). İhmal edilmiş vajinal pesser nedeni ile gelişen komplikasyonlar ile ilgili birçok vaka takdimi bulunmaktadır (19). Vajinal pesseri olan hastalar uygun şekilde takip edildiğinde, ciddi komplikasyon riski düşüktür (20). Bizim çalışmamızda da sadece 1 hastada intrauterin kavitede apse ile uyumlu görünüm mevcuttu.

Literatürde vajinal pesser kullanımında lokal antibiyoterapi önerilmekte olup[5], bizim çalışmamızda da hastaların tamamının lokal antibiyotik ve östrojenli kremler kullandığı ve bu uygulamanın olası enfeksiyonları önlemekte etkili olduğu gösterilmiştir. Bizim çalışmamızda da hastaların tamamı lokal antibiyotik ve östrojen kullanmaktaydı. Bu nedenle alınan vajinal kültürlerde anlamlı ölçüde patojen mikroorganizma tespit edilmemiştir.

Postmenapozal dönemde ultrasonografi ile intrauterin kavitede sıvı tespit edilen 1175 hastanın dahil edildiği bir çalışmada özellikle erken menapozal dönemde kullanılan Hormon replasman tedavisinin intrauterin kavitede sıvı gelişimini önlediği, ancak ileri yaş grubunda etkili olmadığı tespit edilmiş. Ayrıca ilerleyen yaş ile oblitere olmuş bir endometrial kanal da kavitede sıvı birikimine neden olabileceği (yaklaşık %14 hastada) savunulmuş (21). Postmenapozal dönemde asemptomatik olan ve sadece ulrtasonografide sıvı tespit edilen hastalarda yapılan çalışmada, tek başına sıvı birikiminin önemi olmadığı; endometrial kalınlığın ve karakterinin dikkate alınması gerektiği savunulmuştur (22).

Yine aynı çalışmada uzun menapozal süre ve ileri yaş ile birlikte sıklığın artmış olduğu gösterilmiştir. Bizim çalışmamızda da intrauterin sıvı kolleksiyonu anlamlı ölçüde (%27) yüksek tespit edildi. Bu durum hasta grubunun yüksek yaş ortalaması ve ortalama 27,5 yıl gibi uzun menopozal süreç, pesserin basısı, lokal östrojen kullanımı ve servikal mukus tıkacı ile açıklanabilir.

SONUÇ

Günümüzde konservatif yöntemler yerine cerrahi müdehaleler daha çok tercih edilmesi sonucunda pesser kullanım sıklığı oldukça azalmıştır. Kısıtlı hasta grubunda yapmış olduğumuz bu çalışma vajinal pesser kullanan hastalarda etken mikroorganizmaya yönelik uygulanan lokal antibiyotik ve doku hasarını önlemek için verilen lokal östrojenin yeterli tedaviyi sağladığını göstermektedir. Ancak hastaların hayat kalitesinin artırılması için kültürden ziyade vajinal muayene ile enfeksiyon varlığının gösterilmesinin daha kıymetli olduğu aşikârdır. Hasta eğitimi konusunda hassas davranılmalı, ultrasonografi takibi endometrial kalınlık ve karakterinin takibi ve ilerleyen enfeksiyonların önüne geçilmeli; patolojilerin zamanında tespiti yapılmalıdır.

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Vitamin D Levels And Affecting Factors In Healthy Children Between 2 – 12 Years Of Age

2–12 Yaş Arası Sağlıklı Çocuklarda D Vitamini Düzeyleri Ve Etkileyen Faktörler

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ABSTRACT

Objective: Although Turkey is sunny in the northern hemisphere's temperate climate zone, vitamin D deficiency is a common public health problem. Within the scope of this research, we aimed to elucidate vitamin D levels and the affecting factors in healthy children between the ages of two and twelve.
Method: This prospective survey was conducted with 600 children aged 2–12 who applied to the pediatrics outpatient clinic. The clinical examination was performed, and body mass indexes were calculated. In the prepared survey, the month of participation in the study, birth weight, gender, type of vitamin D use, and duration of vitamin D use in the first year after birth were questioned.
Results: The lowest vitamin D level was in the nine-twelve age group, and the highest was in the two-four age group. Vitamin D deficiency was more common in girls than in boys, with a statistical significance (X2 = 14.236; p=0.003). When the cut-off values and vitamin D levels of the cases are examined according to age, 73.5% of our cases in the two-four age group with a cut-off value of 23.40 ng/ml, 83% of cases in the five-eight age group with a cut-off value of 24.80 ng/ml and 88.5% of the cases in the nine-twelve age group with a cut-off value of 25.50 ng/ml had vitamin D insufficiency or deficiency. When the average cut-off value of all age groups was evaluated as 24.49ng/ml, it was determined that 82% had vitamin D deficiency or insufficiency.
Conclusion: It has been observed that vitamin D insufficiency and deficiency occur severely during childhood, and its prevalence increases with age. For this reason, adopting a lifestyle that prevents vitamin D deficiency in children and evaluating them in the interim periods may be beneficial in preventing possible complications.

Keywords: Vitamin D Deficiency, Childhood, Adolescents, Rickets, Calcium.

ÖZET

Amaç: Türkiye, kuzey yarımkürenin ılıman iklim bölgesinde güneşli olmasına rağmen D vitamini eksikliği yaygın bir halk sağlığı sorunudur. Bu araştırma kapsamında 2–12 yaş arası sağlıklı çocuklarda D vitamini düzeylerinin ve etkileyen faktörlerin aydınlatılması amaçlandı.
Yöntem: Bu prospektif araştırmada, çocuk hastalıkları polikliniğine başvuran 2–12 yaş arası 600 sağlıklı çocuk ile gerçekleştirildi. Çocukların klinik muayeneleri yapıldı ve vücut kitle indeksleri hesaplandı. Hazırlanan ankette çalışmaya katılım ayı, doğum ağırlığı, cinsiyet, D vitamini kullanım şekli ve doğumdan sonraki ilk yıl D vitamini kullanım süresi sorgulandı.
Bulgular: En düşük D vitamini düzeyi dokuz-on iki yaş grubunda, en yüksek D vitamini düzeyi ise iki-dört yaş grubundaydı. D vitamini eksikliği kızlarda erkeklere göre istatistiksel olarak anlamlı derecede daha yaygındı (X2 = 14.236; p=0.003). Vakaların yaşa göre eşik değerleri ve D vitamini düzeyleri incelendiğinde, D vitamini eksikliği tespit edilen olguların %73.5'i iki-dört yaş grubunda, eşik değeri 23.40 ng/ml, %83'ü beş-sekiz yaş grubundaki eşik değeri 24.80 ng/ml, dokuz-on iki yaş grubundaki olguların %88.5'inde eşik değeri 25.50 ng/ml olarak bulundu. Tüm yaş gruplarının ortalama eşik değeri 24,49ng/ml olarak değerlendirildiğinde %82'sinde D vitamini eksikliği veya yetersizliği olduğu belirlendi.
Sonuç: D vitamini yetersizliği ve eksikliğinin çocukluk çağında ciddi oranda ortaya çıktığı, yaşla birlikte görülme sıklığının arttığı görülmüştür. Bu nedenle çocuklarda D vitamini eksikliğini önleyecek bir yaşam tarzının benimsenmesi ve ara dönemlerde değerlendirilmesi olası komplikasyonların önlenmesinde faydalı olabilir.

Anahtar Kelimeler: D Vitamini Eksikliği, Çocukluk Çağı, Adölesan, Raşitizm, Kalsiyum.

INTRODUCTION

Vitamin D is a steroid vitamin that dissolves in fat tissue. Its most important effects are to keep calcium (Ca+2) and phosphorus (P+3) levels, along with parathyroid hormone (PTH), within the normal physiological range and thus ensure optimum bone mineralization. The main clinical finding of vitamin D deficiency is rickets in children and osteomalacia and osteoporosis in adults. Rickets occurs due to

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inadequate vitamin D intake, malabsorption, insufficient exposure to sunlight, and increased need during rapid growth. The most common type is nutritional rickets due to vitamin D and calcium deficiency (1). Rickets is a preventable disease, and in addition to many deformities in the skeletal structure, severe life-threatening findings such as tetany, convulsion, laryngospasm, muscle weakness, and dilated cardiomyopathy can be observed (2).

Vitamin D deficiency is common in our country. The prevalence of nutritional rickets, a problem in developing and developed countries, is reported to be 1.6–19% in Turkey (3). It is essential to provide vitamin D supplementation to babies from birth. Free vitamin D preparations are distributed to Family Health Centers within the scope of the 'Prevention of Vitamin D Deficiency and Protection of Bone Health Project' by the Ministry of Health, and 400 units (3 drops) of vitamin D support are provided to newborns starting from the first week for at least 12 months. In addition, 600 units of vitamin D per day are recommended for the period after age one (4). In national studies investigating vitamin D deficiency and insufficiency in children and adolescents, deficiency is between 10–80.3%, and insufficiency is 20–67.2% (5). In international studies, the prevalence of vitamin D insufficiency was reported to vary between 30–80% (6). However, due to differences in the geographic regions, lack of standardization in cut-off values, differences in patient groups and the seasons, and the origin of the research, whether it was hospital or community-based, outrageous differences have been observed in the outcomes of published studies (7).

Although Turkey is sunny in the northern hemisphere's temperate climate zone, vitamin D deficiency (VDE) is a common public health problem. Unfortunately, the support program provided with vitamin D drops free of charge from family health centers in the first year of life loses effectiveness after the second year. As is the case worldwide, changes in children's outdoor habits, use of sunscreens, clothing styles that reduce exposure to sufficient sunlight, insufficient physical activity, and limited consumption of seafood and dairy products are among the critical reasons for VDE. Hence, the vitamin D content in breast milk is insufficient (8).

In previous literature, the prevalence of vitamin D deficiency was reported as 8–21% in children and adolescents in Turkey. A study conducted in Erzurum in 2009 in the adolescent age group found that the rate of vitamin D deficiency was 17.7% and vitamin D insufficiency was 72% (9). This fact indicated our city's common vitamin D deficiency or insufficiency condition. Within the scope of this research, we aimed to elucidate vitamin D levels and the affecting factors in healthy children between the ages of two and twelve. In the second step, families could be informed about daily Ca+2 intake, the importance of nutrition, sunbathing, physical activity, and the long-term adverse effects of vitamin D deficiency or insufficiency.

METHOD

This prospective survey was conducted with 600 children aged 2–12 years who applied to the general pediatrics outpatient clinic of Erzurum Atatürk University. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Ethics committee approval has been granted from our institution, and informed consent has been obtained from all participants.

The weight and height of the subjects were measured using a sensitive scale, with their thick clothes removed and barefoot. Body mass indexes (BMI) were calculated. Five ccs of blood were taken from the participants into a Becton-Dickenson gel and vacuum biochemistry tube with a disposable sterile syringe No. 21 G.

In the prepared survey, the month of participation in the study, birth weight, gender, type of vitamin D use (regular/irregular), and duration of vitamin D use in the first year after birth were questioned. The duration and amount were determined if vitamin D and multivitamins were taken after one year of age. The three-day calcium amount was calculated from all food and drinks consumed during the day. Parental age, education level, economic income, time spent outdoors in winter and summer, sunbathing per day, physical activity outside, and time spent in front of TV and computer were recorded. The frequency of urinary tract infections (UTI) experienced by the cases per year and whether they had joint

disorders (bone pain, muscle pain, deformity in the legs, tremors in the hands, fractures, seizures) were questioned. The onset of complaints, age, duration, and frequency in which joint, if any, were recorded.

Children whose physical examination revealed signs of infection such as organomegaly, hepatomegaly, cough, fever, and vomiting, who had signs of rickets such as scoliosis, rachitic rosary, Harrisson's groove, and who had malnutrition were not included in this study. Additionally, those with chronic diseases (lung, liver, kidney, gastrointestinal system, and endocrine system) and those who use medications that affect serum vitamin D levels (anticonvulsants, cortisone, heparin) were excluded.

Statistical Analysis

Patient data collected within the scope of the study were analyzed with the IBM Statistical Package for the Social Sciences (SPSS) for Windows 26.0 (IBM Corp., Armonk, NY) package program. Frequency and percentage for categorical data and mean and standard deviation for continuous data were given as descriptive values. For comparisons between groups, the “Independent Sample T–test” was used for two groups, and the “Pearson Chi-Square Test” was used to compare categorical variables. The results were considered statistically significant when the p-value was less than 0.05.

RESULTS

This prospective survey was conducted with 600 children aged 2–12. The age distribution of the participants was n=200 for 2–4 years, n=200 for 5–8 years, and n=200 for 9–12 years (Table 1).

Table 1. Baseline Demographic Characteristics Of The Study Population

		n	%			n	%
Place of Residence	**Rural**	174	29.0	**Mother’s Educational Level**	**Illiterate**	36	6.0
	Urban	426	71.0		**Literate**	204	34.0
Sex	**Female**	279	46.5		**Primary and Secondary**	284	47.3
	Men	321	53.5		**University**	76	12.7
Vit D Taking Period first time in the 1st year	**No**	78	13.0	**Mother’s Employment Status**	**Housewife**	497	82.8
	Regularly	360	60.0		**Working**	103	17.2
	Irregularly	162	27.0	**Father’s Educational Level**	**Illiterate**	12	2.0
Vit D Taking Period after the 1st year	**No**	372	62.0		**Literate**	170	28.3
	Regularly	58	9.7		**Primary and Secondary**	288	48.0
	Irregularly	170	28.3		**University**	130	21.7
Does he/she take multivitamins?	**No**	440	73.3	**Monthly Income**	**750 TL**	85	14.2
	Regularly	26	4.3		**750-1500 TL**	250	41.7
	Irregularly	134	22.3		**More than 1500 TL**	265	44.2
Nursing Time	**6 Months**	117	19.5	**Time Spent at Home or Outdoors**	**Less than 15 minutes**	58	9.7
	6-12 Months	158	26.3		**15-60 minutes**	200	33.3
	More than 12 Months	325	54.2		**More than 60 minutes**	342	57.0
Drinking cow’s milk	**1 glass**	313	52.2	**Time Spent Outdoors in the Winter**	**Less than 15 minutes**	265	44.2
	More than 1 glass	89	14.8		**15-60 minutes**	229	38.2
	None	198	33.0		**More than 60 minutes**	106	17.7
Eating Yogurt	**1 bowl**	437	72.8	**Sun Exposure Time During Day**	**Less than 15 minutes**	157	26.2
	More than 1 bowl	59	9.8		**15-60 minutes**	217	36.2
	None	104	17.3		**More than 60 minutes**	226	37.7
Maternal Age	**Younger than 18 years**	2	0.3	**Usage of Sunscreen**	**Yes**	47	7.9
	18-30 years	200	33.3		**No**	551	92.1
	Older than 30 years	398	66.3	**Time Spent Outdoors**	**Less than 20 minutes**	134	22.3
					20-60 minutes	241	40.2
					More than 60 minutes	225	37.5

The vitamin D levels of the participants revealed statistically significant differences between the age groups (X2=25.735; p=0.000). Among those aged between two and four, 6% had severe vitamin D deficiency, 52% had vitamin D deficiency, 30.5% had vitamin D insufficiency, and 11.5% had normal vitamin D levels. It was observed that 1.5% of the five-eight-year-old group had severe vitamin D deficiency, 62.5% had vitamin D deficiency, 29% had vitamin D insufficiency, and 6.5% had vitamin

D within the normal range. In the third group, aged nine to twelve, these values were 10.5%, 63%, 21.5%, and 5.0%, respectively. When the subjects participating in the study were evaluated in terms of vitamin D levels according to their age groups, it was determined that the lowest vitamin D level was in the nine-twelve age group, and the highest vitamin D level was in the two-four age group.

When the vitamin D levels were examined according to gender, it was determined that cases of severe vitamin D deficiency and vitamin D deficiency were more common in girls, while cases of vitamin D deficiency and normal vitamin D levels were more common in boys and the differences were statistically significant (X2 = 14.236; p=0.003).

The participants' vitamin D levels and multivitamin usage rates were statistically significant (X2=16.994; p=0.009). A majority (86.1%) of those with severe vitamin D deficiency did not use multivitamins, and 13.9% used them irregularly. Additionally, 76.6% of those with vitamin D deficiency did not use it, 4.8% used it regularly, and 18.6% used it irregularly. It was observed that the rate of multivitamin use was higher in subjects with normal vitamin D levels. Of these cases, 58.7% were regularly using, 2.2% were using irregularly, and 39.1% were not using (Table 2).

Table 2. Vitamin D Levels And Status According To Age Groups

Vitamin D Levels	2-4 Years Old		5-8 Years Old		9-12 Years Old		P-value
	n	%	n	%	n	%	
<10ng/ml: Severe Vitamin D Deficiency	12	6	3	1.5	21	10.5	X^2=25.735 p=0.000
10-20ng/ml: Vitamin D Deficiency	104	52	125	62.5	126	63	
20-30ng/ml: Vitamin D Insufficiency	61	30.5	59	29.5	43	21.5	
>30ng/ml: Normal Vitamin D Level	23	11.5	13	6.5	10	5	

No statistically significant difference was detected between the laboratory values of Ca+2, P+3, and PTH in serum plasma levels. On the contrary, in osteocalcin correlation analysis, a negative significant relationship was found with vitamin D at 16.5%. The increased vitamin D levels were correlated with decreased osteocalcin levels. The osteocalcin value was highest in cases with severe vitamin D deficiency (99.0±48.4 ng/ml; F=6.064). While this was 89ng/ml in those with vitamin D deficiency, it was 79.6ng/ml in those with vitamin D insufficiency. In cases with normal vitamin D levels, serum osteocalcin was 75.8ng/ml (Table 3).

Table 3. Basic Laboratory Parameters Obtained From Blood Samples Of Participants

		2-4 years		5-8 years		9- 12 years		p-value
		n	%	n	%	n	%	
Ca	**Low** **Normal** **High**	2 196 2	1 98 1	0 200 0	0 100 0	0 200 0	0 100 0	X^2=8.054 p=0.090
PTH	**Low** **Normal** **High**	4 193 3	2 96.5 1.5	1 196 3	0.5 98 1.5	1 193 6	0.5 96.5 3	X^2=4.531 p=0.339
Osteocalcin	**Low** **Normal** **High**	1 16 183	0.5 8 91.5	2 12 186	1 6 93	0 4 196	0 2 98	X^2=9.492 p=0.050
P	**Low** **Normal** **High**	0 67 133	0 33.5 66.5	1 83 116	0.5 41.5 58	0 100 100	0 50 50	X^2=9.218 p=0.010

When the cut-off values and vitamin D levels of the cases are examined according to age, 73.5% of our cases in the two-four age group with a cut-off value of 23.40 ng/ml, 83% of cases in the five-eight age group with a cut-off value of 24.80 ng/ml and 88.5% of the cases in the nine-twelve age group with a cut-off value of 25.50 ng/ml had vitamin D insufficiency or deficiency. When the average cut-off value

of all age groups was evaluated as 24.49ng/ml, it was determined that 82% had vitamin D deficiency or insufficiency.

A significant correlation was found between symptoms such as bone pain, muscle pain, joint pain, numbness in hands, tremors in hands, convulsions, and Vitamin D levels. It was determined that 69.4% of the cases with severe Vitamin D deficiency had bone pain, 50% had muscle pain, and 47.2% had joint pain (Table 4).

Table 4. The Relationship Between Vitamin D Levels And Clinical Features

		Vitamin D (ng/ml)								
		Sev. Vit D Def. <10ng/ml		D Vit. 10-20ng	Insuff. /ml	Vit D Insuff. 20- 30ng/ml		Normal Vit D >30ng/ml		P-value
		n	%	n	%	n	%	n	%	
Bone Pain	**Yes**	25	69.4	99	27.9	20	12.3	5	10.9	X^2=58.744
	No	11	30.6	256	72.1	143	87.7	41	89.1	p=0.000
Muscle Pain	**Yes**	18	50.0	85	23.9	24	14.7	5	10.9	X^2=25.579
	No	18	50.0	270	76.1	139	85.3	41	89.1	p=0.000
Joint Pain	**Yes**	17	47.2	86	24.2	28	17.2	9	19.6	X^2=15.460
	No	19	52.8	269	75.8	135	82.8	37	80.4	p=0.001
Deformity in legs	**Yes**	6	16.7	31	8.7	9	5.5	1	2.2	X^2=7.536
	No	30	83.3	324	91.3	154	94.5	45	97.8	p=0.057
Numbness in hands	**Yes**	7	19.4	18	5.1	10	6.1	0	0	X^2=15.394
	No	29	80.6	337	94.9	153	93.9	46	100	p=0.002
Tremor and Spasm in Hands	**Yes**	5	13.9	10	2.8	3	1.8	0	0	X^2=16.885
	No	31	86.1	345	97.2	160	98.2	46	100	p=0.001
Convulsion	**Yes**	5	13.9	15	4.2	6	3.7	0	0	X^2=10.190
	No	31	86.1	340	95.8	157	96.3	46	100	p=0.017
Fracture	**Yes**	2	5.6	16	4.5	2	1.2	0	0	X^2=5.900
	No	34	94.4	339	95.5	161	98.8	46	100	p=0.117

DISCUSSION

Many studies have been conducted on vitamin D in recent years when its extra-bone effects were noticed, but there is no clear consensus on the definition of "deficiency." According to the American Academy of Pediatrics (APA) Guidelines, if 25 (OH) D3 levels are <5 ng/mL, it is called "severe deficiency". If it is <15 ng/mL, it is a "deficiency". If it is 15–20 ng/mL, it is "insufficiency;" if it is 20–100 ng/mL, it is called “sufficient;” if it is between 101–150 ng/mL, as “excess”, and >150 ng/mL as “toxic level” (10). In the 2015 report of the International Endocrine Society (IES), deficiency was defined as <30 nmol/mL (<12ng/mL), and insufficiency was defined as 30–50 nmol/mL (12–20 ng/mL). Adequacy was defined as >50 nmol/mL (>20ng/mL). The limit value of 30 nmol/mL = 12 ng/mL was considered the lowest value that "provides the prevention of nutritional rickets due to vitamin D deficiency" (1 ng/mL=2.5 nmol/L) (11). In a study published in 2017 from Korea, the cut-off value was defined as 18 ng/mL, and the peak value at which the PTH value did not increase in children (12). However, a study conducted with healthy children in the USA reported that a threshold value for 25 (OH) D cannot be determined in individuals who continue to grow. The cases should be evaluated together with PTH, and the diagnosis of deficiency should be made individually if there is an increase in PTH (13).

One of the essential findings of our study is that vitamin D deficiency increases with age, which creates a significant difference, especially in girls. These results, which are compatible with the literature, may have many reasons: During infancy and early childhood, physicians and families are more inclined to take vitamin supplements. Our study observed the lowest Vitamin D level in cases aged 9-12 years while the highest Vitamin D level was 2-4 years.

In the study of Yakarış et al., the rate of those with vitamin D deficiency was 9.0%, those with vitamin D deficiency was 22.9%, and those with vitamin D intoxication was 0.9%. Vitamin D deficiency and

insufficiency were statistically significantly lower in winter and spring than in summer and autumn, in girls compared to boys, and in the 2–12 age group compared to the 0–2 age group (14). Badem et al. conducted a study on 2672 adolescents; 84.9% of girls had vitamin D deficiency, and 12.1% had vitamin D insufficiency. These results were 59.5% and 31.4% for boys (15). Due to sociocultural reasons, this difference may be the closed clothing style and less time spent outdoors than men. Other research is needed to make more definitive interpretations of the cause.

Türe et al. conducted a study on 4153 children and adolescents regarding vitamin D cut-off values. In that study, they accepted levels below 20 ng/ml as a deficiency and levels below 30 ng/ml as a deficiency; 65.0% (n=2700) of the patients had vitamin D deficiency, and 23.1% (n=959) had vitamin D insufficiency (16). In previous research from Turkey, the rate of children with vitamin D deficiency was between 12.8% and 26.7%, and the rate of children with insufficiency was between 26.7% and 68.7% (17, 18). Considering the international literature, the rate of vitamin D deficiency in children and adolescents was between 12.8% and 26.7%, and insufficiency varied between 19–61%, while deficiency was between 7% and 68% (19). The main reasons for these studies' differences were geographical areas (latitude, longitude) and cut-off values. On the other hand, differences between countries were also caused by factors such as sociocultural differences, nutritional habits, and vitamin D prophylaxis programs. In our study, both vitamin D deficiency and vitamin D insufficiency were significantly higher in girls than in boys. This finding was compatible with the literature. Additionally, the vitamin D cut-off value was also similar to the previous literature.

In the guidelines and consensus reports prepared to prevent vitamin D deficiency and insufficiency, it is recommended that all babies be given 400 IU/day of vitamin D supplementation before the age of one, regardless of nutrition style (20, 21). In the program implemented in our country, all babies are given 400 IU/day of vitamin D supplementation starting from the 15th day until the age of one (4).

The balance between vitamin D, Ca+2, P, ALP, and PTH determines bone turnover and Ca–P balance. The inverse relationship between PTH and 25 (OH) D is known, but at what cut-off point and how many days PTH is triggered may vary geographically and individually. Ca2+ and PTH are reliable laboratory variables that help define this balance. However, P+3 and ALP are not as reliable and are highly affected by environmental conditions, especially hemolysis, a common condition in pediatric blood samples. “Adequate vitamin D level” is defined as “the threshold value that allows the PTH curve to plateau” (22). Our study found a significant difference between the age groups in the PTH and osteocalcin levels. In our cases, an increase in the serum ALP level with osteocalcin was determined. It was determined that the serum ALP level began to increase when the vitamin D level began to drop below 20 ng/ml. Serum osteocalcin level tends to increase depending on age. PTH level indicates the extent of osteonecrosis. However, the PTH level also represents bone development in cases at developmental age. In subclinical Vitamin D efficiency cases, PTH level can be within the normal range. Indeed, it would be appropriate to evaluate cases according to clinical examination findings. A negative correlation was found between the PTH and vitamin D levels. Our study determined significant differences between the PTH level, age, and the Vitamin D level. It was seen that the PTH level decreased as the Vitamin D level increased.

Vitamin D deficiency and lower calcium levels lead to numbness and cramps in extremities and overall weakness in the body. A correlation was found between the Vitamin D level in the children in the adolescent age group, cortical bone development, and muscle and bone joint complaints. It was determined that 13.9% of the cases in our study with tremors and spasms in the hands had severe Vitamin D deficiency. It was found that the cases with normal Vitamin D levels did not have numbness, spasms in their hands, convulsions, and fractures.

Although we are one of the countries in the world that rarely gets sun in all seasons throughout the year, we cannot effectively benefit from sunlight, which is our most important source of vitamin D, due to various cultural reasons such as our closed clothing habits, a diet poor in vitamin D, and spending too much time in closed areas. Spending more time outdoors in schools when sunny and weather conditions are suitable and giving importance to a diet rich in vitamin D and calcium in our nutritional sources are extremely important for healthy young generations. When we looked at our cases' vitamin D and cut-off values according to age groups, we observed that 73.5% of the two-four-year-olds, 83% of the five-

eight-year-olds, and 88.5% of the nine-twelve-year-olds had vitamin D insufficiency and/or deficiency. Considering the results of our literature review and our data, we recommend taking prophylactic vitamin D in chronic diseases and the childhood age group.

CONCLUSION

Regarding the outcomes of this research, it has been observed that vitamin D insufficiency and deficiency occur at a severe rate during childhood, and its prevalence increases with age. For this reason, adopting a lifestyle that prevents vitamin D deficiency in children and evaluating them in the interim periods may be beneficial in preventing possible complications.

DESCRIPTIONS

No financial support.

No conflict of interest.

Ethical Declaration: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Ethics committee approval has been granted from our institution. Informed consent was obtained from all participants.

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Evaluation of Compliance of Patients Admitted to Emergency Department By 112 Ambulances According to International 32 Emergency Parameters

Acil Servise 112 Ambulansı ile Getirilen Hastaların Uluslararası 32 Acil Durum Parametresine Uygunluğunun İncelenmesi

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ABSTRACT

Introduction: The inappropriate use of ambulances increases the workload of emergency services and adversely affects the economy.
Objective: We aimed to compare the compliance of the prediagnosis and the final diagnosis of cases brought to the emergency department by 112 ambulances with the World Health Organization (WHO) International 32 Emergency Parameter and investigate their possible inappropriate usage status.
Method: The compliance status of the prediagnosis and final diagnosis of the patients with the WHO International 32 Emergency Parameters were compared (n: 7521). Statistical analysis was conducted using MedCalc® Software and a value of 95% was used for confidence interval. This study is based on a specialization thesis.
Results: While the most frequent diagnosis group among the prediagnostically compliant ones was trauma (26.3%), the most frequent diagnosis group among the final diagnostically compliant ones was cardiovascular system diseases (20.1%). A significant difference was observed when comparing the compliance status with the indicators (McNemar Test, $p<0.05$).
Conclusion: In our study, in cases brought to the emergency department by 112 ambulances, the rate discrepancy of their final diagnoses was found to be higher compared to the prediagnosis group. This fact shows that even the cases that showed no compliance with the international parameters were referred to emergency departments via ambulance.

Keywords: Ambulance, Emergency Department, Urgency, 112.

ÖZET

Giriş: Ambulansların uygun olmayan şekilde kullanılması, acil servislerin iş yükünü artırır ve ekonomiyi olumsuz etkilemektedir.
Amaç: Acil servise ambulans ile getirilen vakaların ön ve son tanılarının, Dünya Sağlık Örgütü (DSÖ)'nün Uluslararası 32 Acil Durum Parametresi'ne olan uygunluklarını karşılaştırarak, olası uygunsuz kullanım durumunu araştırmak amaçlandı.
Yöntem: Hastaların ön ve son tanılarının, DSÖ'nün Uluslararası 32 Acil Durum Parametresi'ne uygunluk durumu karşılaştırıldı (n: 7521). İstatistiksel analizler için MedCalc programı ve güven aralığı ölçütü olarak %95 değeri kullanıldı. Çalışmamız, bir uzmanlık tezinden kaynaklanmaktadır.
Bulgular: Ön tanı uygunluğu saptananlarda en sık tanı grubu travma (%26.3) iken, son tanı uygunluğu saptanan grupta ise kardiyovasküler sistem hastalıkları (%20.1) idi. Parametrelere uygunluk durumu karşılaştırıldığında anlamlı fark saptandı (McNmar Test, $p<0.05$).
Sonuç: Çalışmamızda, ambulans ile acil servise getirilen vakaların son tanılarına göre uygunsuzluk oranları, ön tanılara göre daha yüksek saptandı. Bu durum, uluslararası parametrelere göre uygunluk taşımayan vakaların da, ambulans ile acil servislere nakledildiğini göstermektedir.

Anahtar Kelimeler: Aciliyet, Acil Servis, Ambulans, 112.

INTRODUCTION

Every day, tens, or even hundreds of patients are transferred to emergency departments via ambulances, and this situation contributes to the present crowdedness of emergency departments.

Using the emergency ambulance systems inappropriately is one of the modern health system's problems. Inappropriate usage of ambulances increases the workload of pre-hospital systems and of the emergency services and negatively influences the national economy. This improper usage is a very subjective, variable and retrospective assessment. There is no consensus on reliably determining patients with no

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requirement to carry with ambulance in the literature, thus there are challenges in evaluating these circumstances (1). In this study, we retrospectively assessed the prediagnoses and final diagnoses of cases brought to our emergency department by 112 emergency medical services (EMS).

We aimed to compare the compliance of these diagnoses with the World Health Organization (WHO) International 32 Emergency Parameters and investigate their possible inappropriate usage status (2).

METHOD

Our study was conducted retrospectively in an adult emergency department of a tertiary training and research hospital with a mean monthly ambulance enter count of 2000. For this study, it was predicted to scan data of approximately 10000 cases, and since this number was reached in the first four months of 2016, the study period was accepted as 1st January – 30th April 2016. Data of all adult that were brought by ambulace from the scene of accident or another healthcare organization and all trauma cases aged under 18 years in this period were investigated (n: 9734). Patients information were achieved from the computer system and the ambulance referral forms. Non-traumatic pediatric cases, cases brought to the pediatric emergency service and the gynecology emergency department, cases with no prediagnosis by the 112 team and duplicate cases were excluded (n: 2213). The time of arrival, age, gender, laboratory test demand status, radiologic imaging demand status, consultation demand status and outcome status data of the patients were recorded (n: 7521). Of these cases, the compliance of their prediagnosis by 112 teams and their final diagnosis by the emergency department evaluation with the World Health Organization International 32 Emergency Parameters (Table 1) were analyzed and compared.

The hospital's ethical committee approved the study. MedCalc Statistical Software version 12.7.7 was used for statistical analysis. When evaluating the study data, definitive statistical methods (mean, standard deviation, median, frequency, percentage) were used. Statistical significance level was set at 0.05 and a value of 95% was used for the confidence interval.

Table 1. 32 Emergencies Parameter by the World Health Organization (WHO) (2)

1	Drowning	17	Myocardial infarction, arrythmia, high blood pressure
2	Traffic accidents	18	Caisson disease
3	Terror, sabotage, gunshot, stabbing, fight, etc.	19	Asthma attack, lower respiratorial problem
4	Suicide attempt	20	Unconsciousness
5	Rape	21	Sudden strokes
6	Falling from height	22	Severe disturbances at general health status
7	Serious occupational accident	23	High fever
8	Electric shock	24	Diabetic, uremic coma
9	Freezing, frostbite	25	Dialysis patient associated with severe disturbances at general health status
10	Heat stroke	26	Acute abdomen
11	Severe burns	27	Acute massive bleeding
12	Severe eye injuries	28	Menengitis, encephalitis, brain abscess
13	Intoxication	29	Renal colic
14	Severe allergy, anaphylaxis	30	Migraine or vomiting, headaches associated with unconsciousness
15	Vertebra and lower extremity fractures	31	Acute psychotic disorders
16	Neonatal coma	32	Onset of labor (fluid leakage)

RESULTS

The mean age of the patients was 54.7±23.1 years. The patients' age ranged between 1 and 99 years. 3385 (45%) of the patients were male, 4136 (55%) of them were female.

While the prediagnosis by 112 teams showed 89.5% compliance with the 32 emergency parameters, the final diagnoses were found to 65.1% compliant (Table 2). When comparing these compliance statuses, a statistically significant difference was found (McNemar Test p<0.05) (Table 3).

Table 2. Compliance with Parameters of the Prediagnosis and Final Diagnosis Groups

Prediagnosis group	N	%	Final Diagnosis Group	N	%
Compliant	6732	89,5	**Compliant**	4897	65,1
Noncompliant	789	10,5	**Noncompliant**	2624	34,9
Total	7521	100,0	**Total**	7521	100,0

Table 3. Comparison of Compliance of Prediagnosis and Final Diagnosis of Patients with the International 32 Emergency Parameters

WHO Compliance Of Final Diagnosis		Noncompliant	Compliant	p
WHO Compliance Of Prediagnosis	**Noncompliant %**	558 (70.7)	231 (29.3)	<0.05*
	Compliant %	2066 (30.7)	4666 (69.3)	

* McNemar Test p

In the prediagnostically compliant group, the most common diagnosis was trauma with 26.3%. In non-trauma cases, the most common diagnosis group were cardioavascular diseases with 19.6%. The most common diagnosis in the group whose final diagnosis was compliant was cardiovascular diseases with 20.1%. In the prediagnostically noncompliant group, aside from the "others" option, the most common diagnosis was gastrointestinal (GIS) diseases (38.5%), while in the group whose final diagnosis were noncompliant, trauma was the most common diagnosis with 36% (Table 4).

Table 4. Distribution of Prediagnostically and Final Diagnostically Compliant Patients According to Diagnosis Group

Diagnosis Group	Prediagnostically Compliant, n (%)	Final Diagnostically Compliant, n (%)
Respiratory system diseases	1102 (16.4)	867 (17.7)
Cardiovascular system diseases	1316 (19.6)	985 (20.1)
Gastrointestinal system diseases	313 (4.7)	155 (3.2)
Neurological diseases	728 (0.8)	566 (11.6)
Urinary system diseases	75 (1.1)	67 (1.4)
Infectious diseases	204 (3.0)	66 (1.3)
Metabolic and Endocrine diseases	163 (2.4)	238 (4.9)
Trauma	1768 (26.3)	800 (16.3)
Intoxications	389 (5.8)	346 (7.1)
Gynecologic and Obstetric diseases	2 (0.1)	5 (0.1)
Psychiatric diseases	475 (7.0)	479 (9.7)
Others	197 (2.9)	323 (6.6)
TOTAL	**6732 (100.0)**	**4897 (100.0)**

When comparing the prediagnostically and the final-diagnostically compliant group according to age, the 0-17 years group achieved the highest compliance at 97.5%. In the same age group, the compliance of the final diagnoses reached 52%. While the prediagnostical compliance status in the 18-64 years group was 90%, this rate was 61.3% in the final diagnoses. The compliance status of prediagnoses and final diagnoses for the 65 years and above group was 87.9% and 71.6%, respectively.

While the median age in the prediagnostically compliant group was 57 years, this value was 62 in the noncompliant group. The median age of the final diagnostically compliant cases was 61 years, while this value was 50 in the noncompliant ones. A significant difference was found in prediagnosis and final

diagnosis groups in age distribution according to compliance with the parameters (Mann-Whitney U test, $p<0.05$).

In the prediagnosis group, 89% of women were compliant, while this rate reached 90% in men. In the final diagnosis group, 65.3% of women were compliant, while this ratio was 64.9% in men.

The outcome according to compliance of prediagnosis and final diagnosis was also investigated in our study. Accordingly, it was seen that the discharge rate and the number of cases that refused therapy or left without permission was higher in the group whose prediagnosis by ambulance staff were compliant to the parameters and that – according to their final diagnosis in the emergency department – noncompliant patients had a higher discharge rate and no exitus has been detected in this group.

DISCUSSION

Inappropriate usage of emergency ambulance systems and the intensivity of EDs negatively influences patient satisfaction, service quality and the national economy (1,3-5). The increased demand for ambulance may delay the arrival of life-threatening cases with ambulance, resulting in potentially undesirable mortality and morbidity. Studies found that 11-52% of calls for emergency ambulances are nonserious problems (6,7). Brown et al. reported that up to 40-50% of the total ambulance usage in USA, Canada, Sweden and England was noncompliant (8). Morris et al. found that the emergency status of the ambulance cases was with 51.7% inappropriate and 10.2% were questionable (9). Gardner determined that 61.9% of the cases were unsuitable. Palazzo et al. evaluated ambulance calls in London and identified a noncompliance rate of 53.7% (11).

In the literature, the definition of noncompliant usage is based on different criteria with different triage scales being generally used in determining the criteria (11-14). In our study, thus, we used the International 32 Emergency Parameter by WHO. In one study, the urgency of patients brought by 112 ambulances were compared with the parameters, and 37.7% of the patients didn't show compliance and were assessed as non-urgent requests (2). The noncompliance rates were lower in our study. When investigating the prediagnoses of patients brought by ambulance staff, we identified a noncompliance rate of 10.5%, while this rate was 34.9% in the final diagnoses made in the emergency department. When these compliance rates were compared, a statistically significant difference was found (McNemar Test $p < 0.05$). Therefore, we observed that the ambulance staff brought 89.5% of the 7521 patients with a prediagnosis compliant to the international parameters, while only 65.1% were compliant in the final diagnosis. Hence, according to this fact, we consider that the ambulance staff considering triage before the arrival at the hospital may choose the most critical diagnosis at that time and unnecessarily prediagnose the patient as "urgent" in order to stay on the safe side.

In our study, there was also a significant difference between age groups according to compliance of prediagnoses with the international parameters (Mann-Whitney U $p<0.05$). The median age of the cases that were brought by ambulance and did not show compliance with the parameters was found to be higher. In the study by Yaylacı et al., the mean age of the compliant and noncompliant cases was found as 54.31±23.74 years and 38.07±22.77 years, respectively, and the mean age of the noncompliant ones has been found to be significantly high. In our study, the mean age of final diagnostically compliant group was found 56.8±22.7 years, while this value was 50.8±23.1 in the noncompliant group. The mean ages of the compliant and noncompliant cases have been found to be higher in our study. Considering that the mean age of the noncompliant group was higher, patient referral rates may have increased as the number and age of patients brought by ambulance staffs increased. It must be noted that the high number of patients included to this study may have influenced the results.

When investigating the outcomes of our patients, it was found the rates of discharge and therapy denial were higher in the prediagnostically compliant group. In contrast, it was seen that the discharge rates of patients with a noncompliant final diagnosis were higher and in this group, no exitus was observed. In the study by Yaylacı et al., the hospitalization rates of emergency cases were significantly high (2). The fact that the discharge and therapy refusal or unpermitted leave rates are high in the group with compliant prediagnosis supports our consideration that these cases actually may not be urgent. Even in the literature, high discharge rates are seen as one of the inappropriate ambulance usage criteria (15).

Kawakami et al. reported in their study that 60% of total ambulance calls were discharged at the ED (16). In a study in our country, the discharge rate was 82.7% (17).

When assessing the mortality rates in our study, it was seen that the cases noncompliant with the WHO parameters had a lower mortality rate. This fact contributes our consideration that this group was not urgent.

In our study, there were high therapy refusal and unpermitted leave rates for noncompliant cases in both groups. Many studies reported that the most common reason for patients leaving after application without getting examined was the long waiting period and that this patient group was usually considered as "partially urgent" and "not urgent" (18-21). We concluded that the high therapy refusal or unpermitted leave rates in our study showed that these cases were not urgent.

Our single center study was conducted in a tertiary hospital. We suggest that conducting a multicenter study including all secondary and tertiary hospitals will increase the value of the results.

CONCLUSIONS

In our study, the discrepancy rates of cases brought to the emergency department by 112 ambulances according to final diagnoses was very high. This fact shows that even the cases that showed no compliance with the international parameters were referred to emergency departments via ambulance. In order to prevent inappropriate usage of 112 emergency health care and emergency departments by our citizens, adding modules about emergent medical situations to the primary and secondary school curriculums and organizing public educations may make a contribution. In our country, large-scale researches aimed at decreasing redundant usage of ambulances and health policy developments according to their results are necessary. In service training are essential for 112 staff to identify emergent cases more feasibly and accurately and to make appropriate triage decisions.

DESCRIPTIONS

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No conflict of interest.

Ethics Approval: Emraniye Training and Research Hospital Ethics Committee (24/05/2016 - Decision No: 71).

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Effect of Sodium Nitroprussıde in Patients With Detrussor Overactivity

Detrüsör Aşırı Aktivitesi Olan Hastalarda Sodyum Nitroprussid'in Etkisi

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ABSTRACT

Introduction: Detrusor instability is a common cause of urgency and urge incontinence in neurologically normal patients. Nitric oxide, relaxes the smooth muscles of the detrusor, prostate, and urethra.
Aim: We aimed to explain the therapeutic effects of sodium nitroprusside on detrusor overactivity in patients with detrusor overactivity.
Methods: A total of 21 patients with detrussor overactivity have been enrolled in this research. The patients were divided into 3 groups according to their sodium nitroprusside dosage, as low-dose, medium-dose, and high-dose. Hydrostatic pressure in the bladder was measured and at the same time, intra-abdominal pressure was measured with a catheter inserted into the rectum. Cystometry results have been evaluated in terms of sensation (first sensation, first desire, strong desire), detrusor compliance, maximal detrusor pressure, maximal cystometric bladder capacity and instability index parameters.
Results: No statistical significance has been achieved between nitroprusside groups in terms of first sensation, first desire, and strong desire values ($p>0.05$). When the patients' maximal detrusor pressure, maximal cystometric bladder capacity and compliance values were interpreted, no significant difference was found between the isotonic and SNP groups and their doses. There was no significant difference between the groups in the duration of contractions. Additionally, no difference has been observed between the groups in the blood pressure values of the patients at the end of the study compared to the baseline.
Conclusion: This study indicated that SNP did not exhibit any positive or negative effects in individuals with detrussor overactivity. The reason for this could be stated as: first, the urothelium acts as a barrier to the passage of sodium nitroprusside and prevents it from reaching the detrusor and the latter may be due to the lack of effect of sodium nitroprusside on detrusor function.

Keywords: Detrussor Overactivity, Bladder, Sodium Nitroprusside.

ÖZET

Giriş: Detrüsör instabilitesi nörolojik açıdan normal hastalarda sıkışma ve sıkışma inkontinansının yaygın bir nedenidir. Nitrik oksit, detrüsör, prostat ve üretranın düz kaslarını gevşetmektedir.
Amaç: Detrüsör aşırı aktivitesi olan hastalarda sodyum nitroprussidin detrüsör aşırı aktivitesi üzerindeki terapötik etkilerini açıklamayı amaçladık.
Yöntem: Bu araştırmaya detrüsör aşırı aktivitesi olan toplam 21 hasta dahil edildi. Hastalar sodyum nitroprussid dozajına göre düşük doz, orta doz ve yüksek doz olmak üzere 3 gruba ayrıldı. Mesanedeki hidrostatik basınç ölçüldü ve aynı zamanda rektuma yerleştirilen kateter ile karın içi basınç da ölçüldü. Sistometri sonuçları duyu (ilk duyum, ilk istek, güçlü istek), detrusor kompliyansı, maksimum detrüsör basıncı, maksimum sistometrik mesane kapasitesi ve instabilite indeksi parametreleri açısından değerlendirildi.
Bulgular: Nitroprussid grupları arasında ilk duyum, ilk istek ve güçlü istek değerleri açısından istatistiksel olarak anlamlı bir fark bulunamadı ($p>0,05$). Hastaların maksimum detrüsör basıncı, maksimum sistometrik mesane kapasitesi ve kompliyans değerleri yorumlandığında izotonik ve SNP grupları ve dozları arasında anlamlı fark bulunamadı. Kasılma süreleri açısından gruplar arasında anlamlı fark yoktu. Ayrıca hastaların çalışma sonundaki kan basıncı değerlerinde başlangıca göre gruplar arasında bir fark gözlenmedi.
Sonuç: Bu çalışma SNP'nin detrüsör aşırı aktivitesi olan bireylerde herhangi bir olumlu ya da olumsuz etki göstermediğini göstermiştir. Bunun nedeni; öncelikle ürotelyumun sodyum nitroprussidin geçişine engel olarak etki ederek detrüsöre ulaşmasını engellemesi, ikincisi ise sodyum nitroprussidin detrüsör fonksiyonu üzerine etkisinin olmamasından kaynaklanabilir.

Anahtar Kelimeler: Detrüsör Aşırı Aktivitesi, Mesane, Sodyum Nitroprussid.

INTRODUCTION

Detrusor overactivity (instability), can be defined as the involuntary and abnormal activity of the bladder muscle other than the micturition process, is one of the problems that bother physicians in urology and gynecology practice due to the clinical manifestations (1). Detrusor instability is a common cause of

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urgency and urge incontinence in neurologically normal patients. Urinary incontinence (stress incontinence, urgency incontinence, incontinence after prostatectomy), enuresis point and other micturition disorders, when undiagnosed or overlooked, jeopardizes the results of medical and surgical treatment (2).

The etiology is unknown but it has been associated with congenital causes, aging, stress incontinence, and bladder outlet obstruction. Diagnosis relies on a urologic history and physical examination, a voiding diary, and a urodynamic evaluation. Detrusor overactivity is a diagnosis that can only be made after urodynamic evaluation (3). The clinician or the surgeon should avoid from directly including patients with urgency and urge incontinence symptoms in this group. Treatment is primarily pharmacologic and behavioral, with surgical options being reserved for selected patients (4).

It is stated that approximately 22% of female incontinence patients with symptoms suggestive of detrusor overacitivity have true stress incontinence. On the other hand, detrusor instability was found in 11 – 16% of women who only had symptoms suggestive of stress incontinence (5). Bladder instability at very young ages is physiological as the complete development of cortical inhibition of the voiding reflex varies from 2 to 3 years of age. The success of toilet training may depend on the maturation of the relevant neurological pathways and the voluntary control of this reflex (6).

Nitric Oxide (NO) has been identified as the main inhibitory transporter that causes smooth muscle relaxation during urinary excretion. NO – mediated smooth muscle relaxation is due to increased production of intracellular cyclic guanosine monophosphate (cGMP). It has been shown that NO level decreases with age (7). It is thought that when NO decreases, contractility occurs in the smooth muscles in the prostate stroma and capsule and in the muscles in the bladder tissue, and storage and excretion symptoms increase due to the subsequent obstruction (8).

The inability to completely inhibit detrusor contractions with anti-cholinergic agents suggested the presence of non-adrenergic non-cholinergic (NANC) receptors. Those that can be stimulated by ATP (adenosine triphosphate) of NANC receptors are called purinergic. ATP release is mediated by mechanical stress and electrical stimulation and plays an important role in initiating detrusor contraction and micturition. The cholinergic system ensures the continuation of contraction and micturition (7 – 9).

Another neurotransmitter that plays a role in the stimulation of NANC receptors is nitric oxide (NO), which has been defined as the main inhibitor that relaxes the urethral smooth muscles during urination. Mechanical signals that occur as the bladder begins to fill lead to the activation of CB2 (Cannabinoid receptors) receptors and transient receptor potential channels (TRP channels) in sensory neurons. This leads to the release of nitric oxide, which eventually relaxes the smooth muscles of the detrusor, prostate, and urethra (8, 10, 11).

Sodium Nitroprusside (SNP) is a potent releaser of NO. SNP exerts its action at the vascular system by augmented vascular capacitance and coronary vasodilatation. SNP is a rapid-acting intravenous vasodilator that has been widely used clinically in hypertensive crises for decades (11).

In this study we aimed to elucidate the treatment effects of sodium nitroprusside in detrusor overactivity in an open label, controlled, prospective study.

METHOD

A total of 21 patients with detrussor overactivity who have admitted to Kartal Research & Training Hospital Urology Outpatient Clinic have been enrolled in this research. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Ethics committee approval has been granted from our institution and informed consent has been obtained from all participants.

International Continence Society (ICS) criteria were taken into account in the urodynamic evaluation (12). After the patient had voided before the procedure, a 7F two-way urodynamic catheter was placed into the bladder transurethrally under sterile conditions. Residual urine measurement was performed. After the balloon rectal catheter was placed to measure the intraabdominal pressure, all the catheters

were connected to the urodynamic device. Surface electrodes placed in the perianal region were used for electromyography (EMG) measurement in the anal sphincter working in combination with the external sphincter. While the catheter application was active, the measuring system was calibrated. The patients were also followed- up for blood pressure values.

The patients were divided into 3 groups according to their sodium nitroprusside dosage, as low-dose, medium-dose, and high-dose. During the cystometric study, the patients were in the supine position and the procedure was started by administering saline at a rate of 30 - 75 ml per minute through one lumen of the perfusion catheter at room temperature. Hydrostatic pressure in the bladder was measured and at the same time, intra-abdominal pressure was measured with a catheter inserted into the rectum. The device automatically recorded the difference between the 2 pressures, that is, the actual detrusor pressure, together with the other pressures on the monitor. During the procedure, the patient coughed frequently and the catheter in the bladder was moved, while the patient was listened to the sound of water to cause detrusor overactivity. Afterwards, the bladder was completely emptied and the cystometric examination was repeated with 5% dextrose solution prepared using sodium hydroxide. In the low-dose group, 120 milligrams in 500 c 5% dextrose, in the SNP medium-dose group 360 milligrams in 5% dextrose at 500 c, in the snp and high-dose group, it was repeated. In 500 c 5% dextrose, 1080 milligrams SNP was used.

Patients who had detrusor hyperreflexia, urethral stricture, bladder stones, bladder tumors, and patients who had undergone bladder and urethral surgery were not included in the study. Systemic and urological examinations of all patients were performed in detail.

Statistical Analysis

Patient data collected within the scope of the study were analyzed with the IBM Statistical Package for the Social Sciences (SPSS) for Windows 23.0 (IBM Corp., Armonk, NY) package program. Frequency and percentage for categorical data, mean and standard deviation for continuous data were given as descriptive values. Mann Whitney U – Test and Wilcoxon Test was utilized for comparisons. The results were considered statistically significant when the p value was less than 0.05

RESULTS

A total of 21 patients have been enrolled within the scope of this study. The mean age of patients (n=7, male/female = 4/3) in the low dosage group was 53±8 years, 60±12 years in the medium dosage group (n=7, male/female = 5/2), and 45±7 years in the high dosage group (n=7, male/female = 3/4). The etiology of all patients was idiopathic and the demographic findings were denoted in Table 1. There was no statistically significant difference between the groups in terms of mean age.

Table 1. Baseline Demographics of the Patients

	n	Female/male	Median Age (years)	Etiology
Low Dose SNP	7	3/4	53±8	idiopathic
Medium Dose SNP	7	2/5	60±12	İdiopathic
High Dose SNP	7	4/3	45±7	idiopathic
Total	21	9/12	51±5	

SNP: Sodium Nitroprusside

Cystometry results have been evaluated in terms of sensation (first sensation, first desire, strong desire), detrusor compliance, maximal detrusor pressure, maximal cystometric bladder capacity and instability index parameters. No statistical significance has been achieved between the nitroprusside groups in terms of first sensation, first desire, and strong desire values (p>0.05) (Table 2).

Table 2. Patients' sensation values

	isotonic			SNP		
Groups	First Sensation	First Desire	Strong Desire	First Sensation	First Desire	Strong Desire
Low Dose SNP	153.5±3.5	249.0±7.0	361.0±67.0	162.5±205	319.0±87.0	357.5±114.5
Medium Dose SNP	112.7±24.6	196.0±21.4	334.0±35.1	115.7±9.9.	187.0±23.7	224.7±28.6
High Dose SNP	95.0±13.6	159.2±12.7	279.9±36.8	111.8±23.7	184.8±29.1	294.0±37.0

SNP: Sodium Nitroprusside

When the patients' maximal detrusor pressure, maximal cystometric bladder capacity and compliance values were interpreted, no significant difference was found between the isotonic and SNP groups and their doses.

The number, duration and amplitude values of uninhibited contractions detected in the cystometric evaluation of the patients were examined. There was no significant difference between groups in the duration of contractions. Likewise, the number, amplitude and activity index scores were similar between the groups (Table 3).

Table 3. Evaluation of number, duration, amplitude and overactivity of uninhibited contractions

	isotonic				SNP			
Groups	n	Time (minutes)	Amplitude (cmH_20)	Overactivity index	n	Time (minutes)	Amplitude (cmH_20)	Overactivity index
Low Dose SNP	5.3±0.9	7.8±3.3	372.3±126.7	2.2±1.5	5.7±1.8	3.8±1.7	240.7±25.8	1.6±0.8
Medium Dose SNP	13.3±4.9	15.6±1.5	985.3±435.6	4.2±2.0	6.7±3.4	6.2±3.1	605.0±311.6	2.8±1.4
High Dose SNP	2.4±0.6	11.6±7.9	156.6±68.2	0.5±0.2	1.8±0.7	2.6±1.9	143.8±58.8	0.4±0.2

SNP: Sodium Nitroprusside

Additionally, no difference has been observed between the groups in the blood pressure values of the patients at the end of the study compared to the baseline.

DISCUSSION

Smooth and striated muscles of the bladder, urethra and external urethral sphincter coordinate the storage and periodical release of urine. The hemodynamics principle acts quite logical according to the pressure level of the bladder thus reflecting it to the kidneys even stopping the glomerular filtration and damaging renal cells due to increased capillary pressure. A healthy urine flow requires simultaneous contraction of the smooth muscle and a rapid increase in intravesical pressure empty the bladder. Smooth muscles of the urethra and bladder display characteristic patterns of spontaneous contractile activity in the filling phase of micturition cycle (13). Urinary symptoms of frequency and urgency are common with problem of bladder over activity. In absence of any pathological factors, bladder over activity may be with or without urge incontinence. Voiding dysfunction results either from failure to store urine, or from failure to empty (14).

Although urodynamics is the only investigation to explore detrusor underactivity (DU) or detrusor overactivity (DO), this method has some limitations, such as being invasive and time consuming (14).

Since detrusor overactivity mimics stress incontinence very well, corrective surgery in stress incontinence cases without revealing whether there is instability with cystometric examination is doomed to fail. In fact, the micturition complaints of the patients increase even more after the operation (13). Detrusor overactivity is also a factor in enuresis nocturna cases. Therefore, in the treatment of enuresis, bladder education, which is one of the general treatment principles of detrusor instability, can be used in cases with overactive bladder. In addition, it is among the literature information that urgency incontinence, which is quite common after protatectomy in urology clinics, is a result of detrusor overactivity due to infravesical obstruction (12). However, most of the cases with this type of complaint can mimic real incontinence and do not show any residual adenoma or external sphygmolar lesion in the clinical evaluation. As a matter of fact comprehensive treatment apprach is necessary for treatment success (13, 14).

Detrusor contraction and relaxation is mediated via different neurotransmitters hence nitric oxide (NO) is one of them (15). Three different isoforms of nitric oxide synthase (NOS) have been identified as: endothelial NOS (eNOS), inducible NOS (iNOS), and neuronal NOS (nNOS). In previous literature it was elaborated that NOS isoforms demonstrated variable effects on detrussor functions. Selective inhibition of iNOS was related to a decrease in bladder capacity (15), where an increase in nNOS and eNOS expression was detected in DO associated with BOO (16) and a decrease in eNOS expression has

been observed in BOO (17). Conversely, the inhibition of all 3 NOS isoforms has been reported to increase nonvoiding con¬tractions and to decrease the bladder capacity (18), there by worsening the bladder function. Other studies have shown that anticholinergics that can decrease the frequency of urination could increase nNOS expression and decrease iNOS expression in the bladder wall. The results suggested that nNOS is related to detrusor contractility, however these cannot be applied to actual clini¬cal practice as the role of NO in bladder dysfunction has been mainly investigated only in a few animal studies (19).

Bladder filling causes a minimal increase in intravesical pressure, followed by inhibition of parasympathetic activity, secondary to a stimulus in sympathetic activity, NO synthesis and bladder relaxation, This process is conducted via desensitization of calcium-sensitive contractile elements in the detrusor muscle via protein kinase G (20).

NOS enzyme was demonstrated in the lower urinary tract and nitric oxide was observed as a neurotransmitter in non-adrenergic non-cholinergic (NANC) receptors. Therefore, nitric oxide can play a relaxing role in the lower urinary tract, as in many smooth muscles. Andersonn et al. (21) reported that NOS-deficiency could lead to hypertrophy of bladder smooth muscle and decreased detrusor relaxation. Ozawa et al. (22) published that bladder instability might occur due to irritation and could be suppressed by NO. Hennenberg et al. (2014) elaborated that mechanical signals that occur as the bladder begins to fill lead to the activation of CB2 (Cannabinoid receptors) receptors and transient receptor potential channels (TRP channels) in sensory neurons. This leads to the release of nitric oxide, which eventually relaxes the smooth muscles of the detrusor, prostate, and urethra (23).

It is interesting to note that most of these studies have been to investigate the function of NO on smooth muscle. On the other han done should bear in mind that, it is possible that striated muscle may also take part along with urethral smooth muscle in NO – dependent neurogenic relaxation in different species (24).

Both animal and human studies suggest that nitric oxide mediates urethral sphincter relaxation. Nitric-oxide-synthase staining neurons have been identified in very high density in the urethral sphincters of a variety of animals and in human beings. Relaxation of the urethral sphincter is abolished by inhibitors of nitric oxide synthase and enhanced by nitric oxide donors (25 – 27).

In this research we have utilized sodium nitroprusside, an available nitric oxide donor to deliver nitric oxide to the detrussor muscle. The irregular detrussor contractions mostly originate from the exit region of bladder thus indicating the increased afferent activity could could be a result of nitric oxide insufficiency (28, 29).

CONCLUSIONS

The outcomes of our study indicated that SNP did not exhibit any positive or negative effects in individuals with detrussor overactivity. The reason for this could be stated as: first, the urothelium acts as a barrier to the passage of sodium nitroprusside and prevents it from reaching the detrusor and the latter may be due to the lack of effect of sodium nitroprusside on detrusor function. As a matter of the fact that no changes were detected in the arterial blood pressure of the patients suggesting that sodium nitroprusside did not enter the systemic circulation.

DESCRIPTIONS

No financial support.

No conflict of interest.

Ethical Declaration: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Ethics committee approval has been granted from our institution. Informed consent was obtained from all participants.

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Evaluation of Preeclampsia Patients – 3 Years of Data

Preeklampsi Hastalarının Değerlendirilmesi – 3 Yıllık Veri

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ABSTRACT

Introduction: Preeclampsia is the most important cause of maternal, fetal, and neonatal morbidity and mortality worldwide, affecting approximately 4% of all pregnancies.
Objective: Patients admitted to our clinic and diagnosed with non-severe preeclampsia, severe preeclampsia, HELLP syndrome, and eclampsia were retrospectively examined, and the demographic, clinical, and laboratory data obtained from these patients were compared with the diagnostic groups.
Method: A total of 156 patients, including 63 with non-severe preeclampsia, 84 with severe preeclampsia, 6 with HELLP syndrome, and 3 with eclampsia, who were followed up and treated in our center, were evaluated. Patient characteristics were classified by comparing the groups regarding delivery methods, demographic characteristics, and clinical and laboratory parameters.
Results: In terms of maternal complications, peripartum hemorrhage and placental abruption were more common in the eclampsia and severe preeclampsia groups. At the same time, DIC was more common in the patient group diagnosed with HELLP syndrome, and these results were found to be statistically significant ($p<0.05$). When demographic, clinical, and laboratory data were compared with whether maternal complications developed, the rate of maternal complications was found to be significantly higher in patients with elevated AST and ALT. No maternal mortality occurred in any of the patient groups.
Conclusion: The higher rate of maternal complications in patients with elevated AST and ALT suggested that follow-up of this patient group in the intensive care unit will be beneficial in reducing maternal morbidity and mortality.

Keywords: Preeclampsia, Risk Factors, Disease Severity.

ÖZET

Giriş: Preeklampsi tüm gebeliklerin yaklaşık %4'ünü etkileyen, dünya çapında anne, fetus ve neonatal morbidite ve mortalitenin en önemli nedenidir.
Amaç: Kliniğimize başvuran ve gebeliğin hipertansif bozuklukları arasında yer alan, şiddetli özellik göstermeyen preeklampsi, şiddetli özellik gösteren preeklampsi, HELLP sendromu ve eklampsi tanısı alan hastaları retrospektif olarak incelenerek bu hastalardan elde edilen demografik, klinik ve laboratuvar verilerinin tanı grupları ile karşılaştırması yapılmıştır.
Metod: Merkezimizde takip ve tedavisi yapılan 63 şiddetli özellik göstermeyen preeklampsili, 84 şiddetli özellik gösteren preeklampsili, 6 HELLP sendromlu, 3 eklampsili olmak üzere toplam 156 hasta değerlendirildi. Doğum şekilleri, demografik özellikleri, klinik ve laboratuvar parametreleri açısından gruplar arasında karşılaştırma yapılarak hasta özellikleri sınıflandırıldı.
Bulgular: Maternal komplikasyonlar açısından peripartum hemoraji ve plasenta dekolmanı, eklampsi ve şiddetli özellik gösteren preeklampsi grubunda daha sık görülürken, DİC, HELLP sendromu tanılı hasta grubunda daha sıktı ve bu sonuçlar da istatistiksel olarak anlamlı bulundu ($p<0,05$). Maternal komplikasyon gelişip gelişmediği ile demografik, klinik ve laboratuvar verileri kıyaslandığında, AST ve ALT yüksekliği olan hastalarda maternal komplikasyon gelişme oranı anlamlı derecede yüksek bulundu. Hasta gruplarının hiçbirinde maternal mortalite gelişmedi.
Sonuç: AST ve ALT yüksekliği olan hastalarda maternal komplikasyon gelişme oranının daha yüksek bulunması, bu hasta grubunun yoğun bakım ünitesinde takibinin, maternal morbidite ve mortaliteyi azaltmak açısından faydalı olacağını düşündürmektedir.

Anahtar Kelimeler: Preeklampsi, Risk Faktörleri, Hastalık Şiddeti.

INTRODUCTION

Preeclampsia is the most important cause of maternal, fetal, and neonatal morbidity and mortality worldwide, affecting approximately 4% of all pregnancies. It is one of the few pathological conditions specific to pregnancy. Definitionally and nominally, it is a precursor to eclampsia, a potentially more severe disease, but itself can be fatal. The main treatment for centuries has been birth. It has not changed and is still the same. Its incidence has increased in recent decades even in developed countries (1).

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Preeclampsia is a part of hypertensive disorders of pregnancy, and other disorders can be listed as gestational hypertension, chronic hypertension, and preeclampsia developing based on chronic hypertension. Hypertensive disorders during pregnancy cause clinically serious and complex complications and constitute a significant burden of disease in both developed and underdeveloped countries. Eclampsia (seizures associated with preeclampsia) and HELLP (hemolysis, elevated liver enzymes, low platelet value) Syndrome are other serious disorders of pregnancy that can develop without or before hypertension (2, 3).

In early-onset disease, premature and defective placental development occurs. In late-onset preeclampsia, underlying metabolic and cardiovascular risks cause endothelial dysfunction due to over-activated systemic inflammation. Its multifactorial pathogenesis, which can occur in different phenotypes, has not yet been fully explained, and it is still impossible to predict and prevent the disease (4). Symptomatic clinical management should be aimed at preventing maternal morbidity (e.g., eclampsia) and mortality. In early-onset preeclampsia, approaches to continue pregnancy aimed at improving perinatal outcomes should not cause incorrect timing of birth, which is the only definitive treatment method. Preeclampsia increases the incidence of cardiovascular and metabolic diseases later in life, thus necessitating lifestyle education and research for the post-illness period (5).

Within the scope of this research, we aimed to elucidate the status of the patients who applied to our clinic with diagnoses of non-severe preeclampsia, severe preeclampsia, and HELLP syndrome to determine which data can be utilized as signs of maternal and fetal mortality and morbidities.

METHOD

In our study, the demographic and clinical data of 156 pregnant women diagnosed with severe preeclampsia, non-severe preeclampsia, and HELLP syndrome who had delivery at Kahramanmaraş Sütçü İmam University Health Practice and Research Hospital Gynecology and Obstetrics Clinic, were evaluated retrospectively.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Ethics committee approval has been granted from our institution with protocol number 14/465-18, and informed consent has been obtained from all participants.

For the diagnosis of preeclampsia, systolic blood pressure ≥140 mmHg or diastolic blood pressure of ≥90 mmHg measured at least 4 hours apart, systolic blood pressure ≥160 mmHg and diastolic blood pressure ≥110 mmHg in a single measurement in emergency situations; additionally urinary protein excretion of 300 mg or more in 24 hours or detection of ≥ +1 proteinuria by dipstick and development of hypertension after the 20th week of gestation in a previously normotensive patient were used as criteria. Patients who did not meet the criteria were not included in the study. Patients were evaluated for thrombocytopenia, renal failure, liver dysfunction, pulmonary edema, and cerebral or visual disorders that indicate systemic involvement.

The patients were divided into four groups: preeclampsia without severe features, preeclampsia with severe features, HELLP syndrome, and eclampsia. In the preeclampsia group with severe features, detection of blood pressure ≥160 mmHg systolic or ≥110 mmHg diastolic in at least two measurements with an interval of 4 hours, thrombocytopenia (platelet count <100,000/μL), impaired liver functions (2-fold increase in liver enzymes) were considered. The patients were examined for the presence of persistent right upper quadrant/epigastric pain unresponsive to medication, progressive renal insufficiency (serum creatinine >1.1 mg/dL or doubling of creatinine level without another renal disease), pulmonary edema, cerebral or visual disturbances. Patients who met one of these criteria but were not evaluated as HELLP or eclampsia were included in the 'severe preeclampsia' group. Patients who did not have these features and were not evaluated as HELLP or eclampsia were also included in the 'non-severe preeclampsia' group. In patients evaluated with HELLP syndrome. They met the criteria of elevated liver enzymes [AST (Aspartate aminotransferase) and/or ALT (Alanine aminotransferase) ≥ 80 IU/L], thrombocytopenia (<100000 μ/L) and hemolysis [LDH (Lactate dehydrogenase ≥ 600 IU/L). While creating the eclampsia patient group, the patients were included according to the presence of

seizures that were not caused by a different etiology and meeting the preeclampsia criteria. According to these criteria, the patients were evaluated and: 63 patients had preeclampsia without severe features, 84 patients had preeclampsia with severe features; a total of 156 patients, six patients with HELLP syndrome and three patients with eclampsia, were included in the study.

Demographic and clinical data were obtained from the patient's files. Maternal age at the time of admission, week of gestation when preeclampsia was diagnosed, gravida and parity values, whether or not they smoked, height (m) and weight (kg), systolic and diastolic blood pressure values, and BMI were determined. As laboratory data, maternal hemoglobin (g/dL) level, platelet count (μ/L), AST (IU/L), and ALT (IU/L) values were recorded before and after birth. Week of birth, systolic and diastolic blood pressure values, newborn weight (g), newborns' 5th-minute birth weight. APGAR scores, mode of delivery, postpartum transfusion need [erythrocyte, FFP (Fresh frozen plasma), platelet], intensive care unit hospitalization rates of mothers, maternal-fetal mortality, and complications were determined. In our study, the height and weight values of 41.3% of the non-severe preeclampsia group, 53.6% of the severe preeclampsia group, 33.3% of the HELLP syndrome group, and 33.3% of the eclampsia group could be reached, and BMI values were reached. could be calculated. BMI was calculated by dividing the patient's weight in kg by the square of their height in m. Based on the classification determined by WHO according to BMI, those with a BMI of 30 (kg/m2) or above are considered obese. In addition, those with a BMI below 18.5 were classified as underweight, those with a BMI between 18.5 and 24.9 were classified as normal, and those with a BMI between 25 (kg/m2) and 29.9 (kg/m2) were classified as overweight. Hospitalization times were calculated in hours.

Patients were evaluated for fetal complications according to the parameters of prematurity, fetal distress, oligohydramnios, IUGR (Intra-uterine growth retardation), intrauterine death, and early neonatal death. In terms of maternal complications, DIC was evaluated according to postpartum hemorrhage, placental abruption, AKI (Acute renal failure), ICH (Intra cranial hemorrhage), ARDS (Adult respiratory distress syndrome), and maternal mortality parameters.

Statistical Analysis

Patient data collected within the scope of the study were analyzed with the IBM Statistical Package for the Social Sciences (SPSS) for Windows 26.0 (IBM Corp., Armonk, NY) package program. Frequency and percentage for categorical data and mean and standard deviation for continuous data were given as descriptive values. For comparisons between groups, the “Independent Sample T–test” was used for two groups, and the “Pearson Chi-Square Test” was used to compare categorical variables. The results were considered statistically significant when the p-value was less than 0.05.

RESULTS

There were 156 pregnant women diagnosed with severe preeclampsia, non-severe preeclampsia, eclampsia, and HELLP syndrome who had delivery in our clinic. The patients were examined in 4 groups: 40.4% (n=63) of these patients had non-severe preeclampsia, 53.8% (n=84) had severe preeclampsia, 3.8% (n=6) had HELLP syndrome, 1.9% (n=3) had eclampsia. No statistically significant difference was observed between the groups in terms of BMI, mean gravida, and parity values. The average diagnosis week in the severe preeclampsia group was found to be higher than the other groups (mean=36.6±3). The average week of diagnosis in the HELLP syndrome and eclampsia groups was lower than in the other groups (mean=31.4±1.9, mean=32.1±3.3, respectively). The average week of birth was found to be high (mean=37.6±1.8) in the non-severe preeclampsia group. The mean week of birth was 34.6±3.6 in the severe preeclampsia group, 31.5±1.9 in the HELLP group, and 32.2±3.4 in the eclampsia group (Table 1).

When the mean platelet counts were compared, a significant statistical difference was detected between the non-severe preeclampsia and HELLP syndrome groups ($p<0.001$). Likewise, a statistically significant difference was found between the preeclampsia and HELLP syndrome groups regarding platelet counts ($p<0.001$). Platelet counts in HELLP syndrome patients were significantly lower than in both groups (Table 2). The AST value in the HELLP syndrome patient group was statistically significantly higher than that of the non-severe preeclampsia group ($p<0.001$). When the severe

preeclampsia group and the HELLP group were compared, the AST values of the HELLP syndrome group were statistically significantly higher (p<0.001). The AST values of the HELLP syndrome group were statistically significantly higher (p=0.03). The ALT values of the HELLP syndrome group were statistically significantly higher (p=0.001). ALT values were significantly higher in the HELLP syndrome group (p<0.001).

Table 1. Comparison of Patient's Demographic and Clinical Parameters

	Non-severe preeclampsia	Severe preeclampsia	HELLP Syndrome	Eclampsia
	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Age (years)	29 ± 8	31 ± 7	30 ± 5	33 ± 9
Height (m)	162 ± 5	159 ± 6	158 ± 4	158 ± -
Weight (kg)	82 ± 15	82 ± 15	73 ±	80 ± -
Body Mass Index (kg/m^2)	32,3 ± 5,4	32,5 ± 5	30,7 ± 2,5	32 ± -
Gravidy	3 ± 2	3 ± 2	3 ± 1	4 ± 3
Parity	2 ± 2	2 ± 2	2 ± 1	2 ± 2
Week of Diagnosis	36,6 ± 3	34,1 ± 3,8	31,4 ± 1,9	32,1 ± 3,3
Week of Delivery	37,6 ± 1,8	34,6 ± 3,6	31,5 ± 1,9	32,2 ± 3,4

From the perspective of peripartum hemorrhage development, a statistically significant increase was found in the severe preeclampsia group compared to the HELLP syndrome group (10.7% vs. 0.0%, p=0.013). From the perspective of detachment, a statistically significant increase was found in the eclampsia group compared to the non-severe patient group (33.3% vs. 0.0%, p=0.005). When the eclamptic and severe patient groups were compared regarding detachment, a statistically significant increase was detected in the eclampsia group (33.3% vs. 3.6%, p = 0.014). When the eclampsia patient group and the HELLP syndrome patient groups were compared in terms of detachment, the detachment rate was statistically higher in the eclamptic patient group (33.3% vs. 0.0%, p = 0.026). When the patient groups were compared in terms of DIC, a statistically significant increase in the incidence of DIC was detected in the HELLP syndrome group compared to the non-severe preeclampsia group (50.0% vs. 0.0%, p<0.001). When the HELLP syndrome group and the severe preeclampsia group were compared in terms of DIC, the incidence of DIC was significantly higher in the HELLP syndrome group (50.0% vs. 1.2%, p<0.001). When the HELLP syndrome group was compared with the eclampsia group, the rate of DIC was statistically significantly higher in HELLP syndrome (50.0% vs. 0.0%, p<0.001).

Table 2. Comparison of Laboratory Parameters

	Non-severe preeclampsia	Severe preeclampsia	HELLP Syndrome	Eclampsia	Total		
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	F	p-value
Prenatal Hemoglobin	11,96±1,40	12,48±1,77	12,72±1,72	13,13±0,85	12,29±1,63	1,650	0,180
Postpartum Hemoglobin	10,77±1,40	11,06±1,51	10,67±1,28	11,13±0,68	10,93±1,45	0,578	0,630
Platelet Count	254523±72306^{c}	229428±87949^{c}	81500±33170^{a,b}	203000±42320	233365±85981	8,660	**0,001***
AST	22,02±5,51^{c}	56,50±138,60^{c}	266,00±144,69^{abd}	56,67±55,73^{c}	50,63±114,73	9,879	**0,001***
ALT	17,83±10,31^{c}	50,14±143,98^{c}	227,00±118,75^{ab}	60,67±66,00	44,10±115,13	6,959	**0,001***

** The difference is statistically significant; a:0.05; Pots-hoc; Scheffe test, Tukey Test; Tamhane T2 test; a The difference with the non-severe preeclampsia group is statistically significant; b The difference with the preeclampsia group with severe features is statistically significant; c The difference with the HELLP group is statistically significant; d The difference with the eclampsia group is statistically significant*

From the perspective of peripartum hemorrhage development, a statistically significant increase was found in the severe preeclampsia group compared to the HELLP syndrome group (10.7% vs. 0.0%, p=0.013). From the perspective of detachment, A statistically significant increase was found in the eclampsia group compared to the non-severe patient group (33.3% vs. 0.0%, p=0.005). When the eclamptic and severe patient groups were compared regarding detachment, a statistically significant increase was detected in the eclampsia group (33.3% vs. 3.6%, p = 0.014). When the eclampsia patient group and the HELLP syndrome patient groups were compared in terms of detachment, the detachment

rate was statistically higher in the eclamptic patient group (33.3% vs. 0.0%, p = 0.026). When the patient groups were compared in terms of DIC, a statistically significant increase in the incidence of DIC was detected in the HELLP syndrome group compared to the non-severe preeclampsia group (50.0% vs. 0.0%, p<0.001). When the HELLP syndrome group and the severe preeclampsia group were compared in terms of DIC, the incidence of DIC was significantly higher in the HELLP syndrome group (50.0% vs. 1.2%, p<0.001). When the HELLP syndrome group was compared with the eclampsia group, the DIC rate was statistically significantly higher in HELLP syndrome (50.0% vs. 0.0%, p<0.001).

The patient groups were compared according to the development of the need for follow-up in intensive care, and the results were statistically significant (p<0.001). The need for postpartum intensive care follow-up developed in 83.3% of HELPP Syndrome patients and 66.7% of eclampsia patients.

Classification of patient groups according to 5th Minute APGAR scores was statistically significant (p<0.05). The mean APGAR score of the non-severe preeclampsia group was statistically significantly higher than the severe preeclampsia group (9.32 ± 1.2 vs. 8.37 ± 2.4, p<0.05). No statistically significant difference was detected between the other groups.

Statistically significant data were also obtained when comparing the postpartum blood product transfusion of patients and patient groups. The rate of receiving Fresh Frozen Plasma and Platelet transfusion in patients diagnosed with HELLP syndrome was found to be statistically significantly higher compared to other groups (p<0.01).

Table 3. Comparison of Demographic, Clinical and Laboratory Data According to the Presence of Maternal Complications

	Complications			
	No	Yes		
	Mean±SD	Mean±SD	t	p-value
Age	30,15 ± 6,930	31,18±8,010	0,416	0,685
Gravidy	2,96 ± 1,947	2,73±1,272	0,569	0,579
Parity	1,65 ± 1,656	1,45±1,293	0,478	0,641
Fetal Birth Weight (gr)	2491,10±879,912	1906,36±581,038	3,074	0,008
Week of Diagnosis	35,218±3,6166	33,318±3,8561	1,580	0,141
Systolic Blood Pressure	159,15±13,255	168,18±16,624	-1,759	0,106
Diastolic Blood Pressure	99,57±9,171	107,73±13,297	-1,997	0,072
Postpartum Hemoglobin Value	11,039±1,3736	10,118±1,6916	1,761	0,106
Prenatal Hemoglobin Value	12,376±1,4908	11,209±2,7869	1,373	0,198
AST	44,26±112,771	141,18±127,021	2,456	0,031*
ALT	38,77±115,097	118,64±115,523	2,209	0,048*
Platelet Count	237645±78783	192636±154470	0,957	0,360

**The difference is statistically significant*

The highest blood pressure values were found in the eclampsia group (mean = 196.6±5.7). Then, patients diagnosed with HELLP syndrome (mean = 175±13.7), severe patient group (mean = 166.8±9.4), and non-severe patient groups (mean = 147.8±6.8) were listed. Statistically significant differences were detected when comparing the groups in terms of mean systolic and diastolic blood pressures. Systolic blood pressure values were statistically significantly lower in the non-severe preeclampsia group compared to all other groups (p<0.05). When the eclampsia group was compared with the other groups, a statistically significant increase in systolic blood pressure values was detected in the eclampsia patient group compared to all three groups (p <0.05). When the HELLP syndrome patient group was compared with the other groups, systolic blood pressure values were statistically significantly higher in the HELLP syndrome patient group than in the non-severe patient group (p<0.05).

When the patient groups were compared according to fetal birth weights, it was seen that babies born from mothers diagnosed with HELLP syndrome had the lowest birth weights and were generally born below 2000 grams. The results in patients with eclampsia were also similar to those with HELLP syndrome. Babies with the highest birth weights were born to patients with non-severe preeclampsia.

When comparing patient groups according to the presence of maternal complications, the probability of developing complications was statistically significantly higher in patients with elevated AST and ALT ($p<0.05$) (Table 3). In patients who developed complications, the average AST value was 141.18±127.021, and the average ALT value was 118.64±115.523. In the patient group without complications, the average AST value was 44.26±112.771, and the average ALT value was 38.77±115.097. No significant statistical difference was detected between the patient groups regarding age, gravida, and parity values, systolic and diastolic blood pressures, prenatal and postpartum hemoglobin values, platelet counts, and complications.

The premature birth rate was 27% (n=17) in the non-severe preeclampsia group, 73.8% (n=62) in the severe preeclampsia group, 100% (n=6) in the HELLP Syndrome group, and 100% (n=3) in the eclampsia group. When comparing the HELLP and eclampsia groups with the other groups, premature birth rates were found to be statistically significantly higher in the HELLP and eclampsia groups ($p<0.01$) (Table 4).

Tablo 4. Comparison of Patient Groups According to Premature Birth Rates

		Non-severe preeclampsia	Severe preeclampsia	HELLP Syndrome	Eclampsia	p-value
Premature	n	17	62	6	3	**0,01***
	%	27,0	73,8	100,0	100,0	
Term	n	46	22	0	0	
	%	73,0	26,2	0	0	

DISCUSSION

Although the incidence of preeclampsia corresponds to 3% of pregnancies, the rate of all hypertensive disorders during pregnancy varies between 5% and 10%. The incidence of eclampsia was 2.7 per 10.000 births in the United Kingdom in 2005, 5.7 per 10,000 births in Canada in 2007, 5 per 10.000 births in Denmark, Norway and Sweden between 1998 and 2000, and 5 per 10.000 births in the Netherlands in 2007. It was 6 in 10.000 births and 8.2 in 10.000 births in the USA between 1996 and 2004 (3). In studies conducted in Turkey, the incidence of preeclampsia was 2.9% and the incidence of eclampsia was 0.4% (6).

During the course of this study, there were 5.707 births in our clinic. We found the rate of hypertensive disease during pregnancy to be 2.7% (156 patients). The frequency of preeclampsia without severe features was 1.1% (63 patients), the frequency of preeclampsia with severe features was 1.47% (84 patients), the frequency of HELLP syndrome was 0.1% (6 patients), the frequency of eclampsia was 0.05% (3 patients). In our study, no significant difference was found between maternal age and patient groups with severe preeclampsia, non-severe preeclampsia, HELLP syndrome, and eclampsia. In a study conducted by Yıldırım et al., it was concluded that patients with HELLP syndrome had a higher maternal age than patients with severe preeclampsia and eclampsia. Again, in this study, gravida and parity values were found to be high in HELLP syndrome. The rate of birth by cesarean section was found to be high in the eclampsia group (7). However, we did not detect such a difference in our study. We did not detect a statistically significant difference in comparing patient groups with maternal age, gravida values, parity values, and delivery methods ($p>0.05$).

In a study conducted by Shao et al., it was stated that high pre-pregnancy BMI increased the risk of preeclampsia, but this risk was close to each other in terms of preeclampsia subgroups (8). In our study, no statistically significant difference was found when hypertensive pregnant patient groups were compared with their BMIs. Obesity rates were 61.5% in the non-severe preeclampsia group, 69.6% in the severe preeclampsia group, 50% in the HELLP syndrome group, and 100% in the eclampsia group.

In our study, as mentioned in the definition of HELLP syndrome, the frequency of liver enzyme elevation and thrombocytopenia was statistically significantly higher in the HELLP syndrome patient group. We also concluded that elevated AST and ALT levels may be predictive of maternal complications.

In a study conducted in the USA, it is stated that there is a 3-fold increase in preeclampsia and a 25-fold increase in eclampsia in terms of maternal complications (9). In a study conducted in our country, placental abruption was 10.5% and DIC was 7% in pregnant women diagnosed with preeclampsia. In the same study, the rate of abruption was 37.5%, and the DIC rate was 25% in eclamptic patients, while placental abruption was 32% and DIC was 16% in HELLP syndrome (10). Another study conducted by Azman et al. reported that in patients with severe preeclampsia, the rate of detachment was 2.1%, DIC was 4.2%, and hemorrhage was 6.3%. In the same study, it was reported that detachment was encountered in 25% of eclamptic patients. It has been reported that DIC develops at a rate of 28.5%, and AKI develops at a rate of 14.2% in patients with HELLP syndrome (11). In a USA-based study, hypertensive diseases during pregnancy are responsible for 15% of pregnancy deaths and are reported to be the 2nd most common cause of maternal mortality (12). In Turkey, these diseases constitute 25% of maternal mortality and are among the top 3 most important causes (183). There was no maternal mortality event among the patients in our study.

In a study, early neonatal mortality rates in severe preeclampsia and eclampsia were 13% (13). In the study conducted by Azman et al., early neonatal death rates were reported as 28.5% among patients with HELLP syndrome and 4.3% among patients described as severe preeclampsia (11). As a result of our study, we detected early neonatal death and intrauterine death only in the preeclampsia group with severe features. We determined that the early neonatal death rate was 4.8% in this patient group, while the intrauterine death rate was 3.6%. We found that the rates of oligohydramnios, IUGR, and fetal distress, which we determined as perinatal complications, did not have any statistical significance between the patient groups—the 5th minute APGAR score was statistically significantly higher than the severe preeclampsia group.

In a study conducted by Sibai et al., it was reported that the rate of cesarean section in patients with HELLP syndrome varied between 63% and 96% (14). Some studies rate this as 40% in HELLP syndrome and 70% in preeclampsia and eclampsia patient groups (15). In the study conducted by Azman et al., the rate of birth by cesarean section was 68% in preeclampsia, 85.8% in HELLP syndrome, and 100% in eclampsia (11). In our study, we found the cesarean section rate to be 83% in the non-severe preeclampsia group, 95% in the severe patient group, and 100% in the HELLP syndrome and eclampsia groups. These high rates are due to our clinic serving as a tertiary health institute; therefore, many patients are in poor clinical and laboratory conditions.

None of the patients in the HELLP syndrome group had previously had a pregnancy with preeclampsia. In the eclampsia group, preeclampsia history was positive at a rate of 33.3%. We found that 12.2% of the total number of patients had a history of preeclampsia, 3.2% had a history of gestational hypertension, and 2.6% had a history of chronic hypertension. When the parameters were compared, no statistically significant difference was detected between patients with a history of hypertensive disease and the patient groups. Although it is stated in the literature that having a history of preeclampsia in your medical history increases the likelihood of preeclampsia occurring again, we did not detect a significant statistical difference in whether it affects the severity of the disease.

No statistically significant difference was detected when the patient groups were compared according to the methods of conception. We concluded that the method of conception did not affect disease severity. In our study, 25 patients (16%) required postpartum blood product transfusion. When the patient groups were compared with FFP and platelet transfusion practices, we found a significant statistical increase in the rate of receiving FFP and platelet transfusion in patients followed by a diagnosis of HELLP syndrome and eclampsia. We concluded that patients with these diagnoses should be followed more carefully, considering the need for FFP and platelet transfusion may develop. We found that the rates of erythrocyte transfusion requirement were high in the severe preeclampsia group (10.7%). Additionally, postpartum hemorrhage developed at the same rate in this group (10.7%). We concluded that these patients should be closely monitored for bleeding.

No statistically significant difference was detected between the patient groups regarding distribution when the patients were evaluated according to their nulliparity status. Therefore, we concluded that nulliparity cannot be used to determine disease severity. When the patient groups were compared by evaluating the duration of hospitalization, the group with the longest average hospitalization period was

the group diagnosed with HELLP syndrome. As a result of this evaluation, we concluded that close follow-up of this group of patients is necessary regarding maternal complications that prolong hospitalization. We determined that the minimum duration of hospitalization was in the eclampsia group that did not show severe features in accordance with their clinical condition. When premature birth rates in patients are compared, The premature birth rate was 27% (17 newborns) in the non-severe preeclampsia group, 73.8% (62 newborns) in the severe preeclampsia group, and 100% in the HELLP (6 newborns) and eclampsia (3 newborns) patient groups. When comparing the HELLP and eclampsia groups with the other groups, premature birth rates were found to be statistically significantly higher in the HELLP and eclampsia group ($p<0.05$).

When postpartum intensive care hospitalization needs were considered, we saw that 83.3% of patients diagnosed with HELLP syndrome and 66.7% of eclampsia patients required postpartum intensive care. Therefore, we concluded that these two patient groups' birth should be performed in an intensive care unit center. In addition, since it was observed that fetal weight and birth week data in these patient groups had lower values than other patient groups, we determined that perinatal mortality and morbidity should be predicted. The patients should be followed up and treated in appropriate centers. No statistically significant difference was found when comparing patient groups according to the patient's smoking status. Therefore, we concluded that smoking cannot be used as a parameter to determine disease severity.

CONCLUSION

As a result, hypertensive diseases of pregnancy are disorders with high rates of both fetal and maternal mortality and morbidity. The fact that no maternal mortality was detected in our clinic can be explained by the fact that our hospital is a tertiary-level hospital, we have a blood center for blood and blood products, and we have a 3rd level intensive care unit. Therefore, the results of our clinic support the need to follow pregnant women with hypertensive disease during pregnancy in hospitals with tertiary intensive care units and blood centers. The higher rate of maternal complications in patients with elevated AST and ALT suggests that follow-up of this patient group in the intensive care unit will be beneficial in reducing maternal morbidity and mortality. The high rate of premature birth in the severe preeclampsia, HELLP syndrome and eclampsia groups shows that hypertensive diseases of pregnancy are one of the important causes of premature birth today.

DESCRIPTIONS

No financial support.

No conflict of interest.

Ethical Declaration: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Ethics committee approval has been granted from our institution. Informed consent was obtained from all participants.

Note: This study was produced from a thesis.

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The Prognostic Role of Biomarkers in Pulmonary Contusion

Akciğer Kontüzyonlarında Biyobelirteçlerin Prognostik Rolü

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ABSTRACT

Objective: Within the scope of this research, we aimed to elucidate the treatment and follow-up of pulmonary contusion patients by revealing the prognostic role of biomarkers. All parameters in total blood samples taken from the cases at the first admission were analyzed as biochemical biomarkers.
Method: A total of 482 patients aged 18 and over admitted to our institution due to thoracic traumas were examined. Among the cases admitted to the emergency department with injuries accompanied by blunt thoracic trauma, cases with radiologically proven pulmonary contusion were included in the study.
Results: WBCs, neutrophil, and lymphocyte count, neutrophil-lymphocyte ratio (NLR), ALT, AST, and LDH values were significantly higher in the group with pulmonary contusion ($p<0.05$). The lymphocyte levels were significantly lower in pulmonary contusion patients ($p<0.05$). The rate of complications, intensive care unit stay, requirement for mechanical ventilation, and mortality rate were significantly higher in the group with pulmonary contusion ($p>0.05$). The univariate analysis found that WBC, neutrophil and lymphocyte count, NLR, ALT, AST, and LDH parameters denoted a statistically significant difference between the two groups ($p>0.05$). WBC, neutrophil count, NLR, ALT, AST, and LDH values were significantly elevated in the group with lung contusion>50% ($p<0.05$).
Conclusion: In this study, WBC, neutrophil and lymphocyte count, NLR, ALT, AST, and LDH were predictive biomarkers. Additionally, age, motor vehicle accidents, falls, impact trauma mechanism, pneumothorax, injury site, and number of rib fractures were other contributing predictors that allow a wider range of clinical application and decision-making.

Keywords: Pulmonary Contusion, Biomarker, Prognosis.

ÖZET

Amaç: Bu araştırma kapsamında biyobelirteçlerin prognostik rolünü ortaya koyarak hastaların tedavi ve takibini aydınlatmayı amaçladık. Olgulardan ilk başvuruda alınan toplam kan örneğindeki tüm parametreler biyokimyasal biyobelirteçler olarak analiz edildi.
Yöntem: Kurumumuza göğüs travması nedeniyle başvuran 18 yaş ve üzeri toplam 482 hasta incelendi. Künt toraks travmasının eşlik ettiği yaralanmalarla acil servise başvuran olgulardan radyolojik olarak akciğer kontüzyonu kanıtlanmış olgular çalışmaya dahil edildi.
Bulgular: Akciğer kontüzyonu olan grupta BKH, nötrofil ve lenfosit sayısı, nötrofil-lenfosit oranı (NLO), ALT, AST ve LDH değerleri anlamlı derecede yüksekti ($p<0,05$). Akciğer kontüzyonu olan hastalarda lenfosit düzeyleri anlamlı derecede düşüktü ($p<0,05$). Pulmoner kontüzyonu olan grupta komplikasyon oranı, yoğun bakımda kalış süresi, mekanik ventilasyon gereksinimi ve mortalite oranı anlamlı olarak daha yüksekti ($p>0,05$). Tek değişkenli analizde WBC, nötrofil ve lenfosit sayısı, NLO, ALT, AST ve LDH parametrelerinin iki grup arasında istatistiksel olarak anlamlı farklılık gösterdiği bulundu ($p>0,05$). Akciğer kontüzyonu >%50 olan grupta BKH, nötrofil sayısı, NLO, ALT, AST ve LDH değerleri anlamlı derecede yüksekti ($p<0,05$).
Sonuç: Bu çalışmada BKH, nötrofil ve lenfosit sayısı, NLO, ALT, AST ve LDH öngörücü biyobelirteçlerdi. Ek olarak yaş, motorlu araç kazaları, düşmeler, darbe travma mekanizması, pnömotoraks, yaralanma bölgesi ve kaburga kırıklarının sayısı, daha geniş bir klinik uygulama ve karar verme aralığına izin veren katkıda bulunan diğer belirleyicilerdir.

Anahtar Kelimeler: Akciğer Kontüzyonu, Biyobelirteç, Prognoz.

INTRODUCTION

Pulmonary contusion is a common form of injury due to thoracic trauma. Pulmonary contusion is detected in 17 – 70% of major injuries. Although it can be seen with both blunt and penetrating injuries, it is more common, especially in in-vehicle traffic accidents, as a result of the chest hitting the steering wheel or door. It can also be seen with falls from a height, blast-style injuries, and high-velocity bullets (1). While pulmonary contusion occurs as isolated injuries in children, it is accompanied by other organ injuries in adults, and the mortality rate varies between 14 – 40% depending on the extent and severity of the contusion and other accompanying injuries. The thorax of children is extremely flexible because

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the ribs are elastic, the costal cartilages are not yet sufficiently ossified, and the ligaments are soft. Additionally, the mobility of mediastinal organs in children is greater than in adults. The flexibility allows them to be stretched excessively without breaking and causes energy to be directly transmitted to the underlying lung parenchyma. For this reason, children develop pulmonary contusions twice as often as adults in high-energy traumas (2).

Many changes occur in the lung parenchyma after contusion. Among these are hemorrhage, edema, and consolidation that cause deterioration of ventilation-perfusion ratio (VPR), hypoventilation, and decreased compliance resulting in hypoxia. Intra-alveolar hemorrhage (IAH) and interstitial edema are observed in localized areas in small-scale injuries. In more severe traumas, more widespread interstitial edema and hemorrhage occur in both alveolar and interstitial spaces. In adjacent lung areas that are not confused, increased mucus secretion, filling of the bronchial tree with blood and fluid, and surfactant concentration are observed (3).

Pulmonary contusion is the most common complication of blunt thoracic trauma (BTT). However, only approximately one-third of cases can be diagnosed in the acute phase. These types of injuries may result in the need for intensive care and mechanical ventilation (MV) as a result of hypoxia-hypoxemia. It is also an important risk factor for lung contusion, pneumonia, and acute respiratory complications. It is one of the main causes of Acute Respiratory Distress Syndrome (ARDS) in trauma patients. Additionally, approximately 25% of lung contusions are an independent risk factor for mortality in cases with thoracic trauma (4).

Pulmonary contusions are a type of injury that often accompanies blunt thoracic trauma. Non-surgical methods provide follow-up and treatment. Since it is a clinical condition that does not require surgical intervention, its existence is often ignored in practice. The requirement for mechanical ventilation increases in patients who do not receive a correct diagnosis and appropriate treatment, and it causes pulmonary complications that can reach ARDS (5).

Within the scope of this research, we aimed to elucidate the treatment and follow-up of patients by revealing the prognostic role of biomarkers based on our four-year experience. As biochemical parameters, all parameters in the complete diagnostic count studied from blood samples taken from the cases at the time of first admission were analyzed.

METHOD

A total of 482 patients aged 18 and over admitted to our institution between May 2019 and November 2023 due to thoracic traumas were examined. Among the cases admitted to the emergency department with injuries accompanied by blunt thoracic trauma, cases with radiologically proven pulmonary contusion were included in the study.

All procedures followed were in accordance with the cal standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Ethics committee approval has been granted from our institution with protocol number, 05.12.2023 /06 and informed consent has been obtained from all participants.

Cases with and without pulmonary contusions were compared in terms of age, gender, additional organ injuries, and tissue damage (such as rib fractures, lung contusion, hemothorax, abdominal organ injuries, head & neck injuries, pelvis and extremity injuries), severity contusion, intensity, type of treatment, trauma-related lung contusion from other clinics. The consultation rates, duration of hospital stay, complications, mechanical ventilation and intensive care unit (ICU) requirement, and mortality rates were investigated.

Statistical Analysis

Patient data collected within the scope of the study were analyzed with the IBM Statistical Package for the Social Sciences (SPSS) for Windows 28.0 (IBM Corp., Armonk, NY) package program. Frequency and percentage for categorical data and mean and standard deviation for continuous data were given as descriptive values. For comparisons between groups, the “Independent Sample T–test” was used for two

groups, and the "Pearson Chi-Square Test" was used to compare categorical variables. The results were considered statistically significant when the p-value was less than 0.05.

RESULTS

A total of 482 patients with radiology-confirmed pulmonary contusion diagnoses were included in this study. The age of the patients in the group with pulmonary contusion was significantly ($p<0.05$) lower than those without pulmonary contusion. Gender distribution did not differ significantly ($p>0.05$) between the groups. The motor vehicle trauma rate in the group with lung contusion was significantly higher ($p<0.05$). The rate of non-vehicular traffic accidents in the group with pulmonary contusion was significantly higher ($p<0.05$). The rate of pneumothorax, hemothorax, clavicle, scapula, head, vertebra, pelvis, abdominal organ, and extremity injuries in the group with lung contusion was significantly higher ($p<0.05$) (Table 1).

Table 1. Comparison of Effective Factors in Pulmonary Contusion Prognosis

		Pulmonary Contusion (-)		Pulmonary Contusion (+)		p-value
		Mean±SD/n-%	Median	Mean±SD/n-%	Median	
Age		53.9 ± 18.5	55.0	48.6 ± 18.8	48.0	***0.003*** [m]
Gender	Female	45 26.5%		65 20.8%		0.159 [X²]
	Male	125 73.5%		247 79.2%		
Vehicle trauma	(-)	97 57.1%		133 42.6%		***0.002*** [X²]
	(+)	73 42.9%		179 57.4%		
Vehicle trauma						
In-Vehicle Traffic Accident		53 31.2%		116 37.2%		0.187 [X²]
Fall		72 42.4%		94 30.1%		***0.007*** [X²]
Motorcycle accident		10 5.9%		30 9.6%		0.156 [X²]
Non-Vehicular Traffic Accident		7 4.1%		28 9.0%		***0.050*** [X²]
Work accident		9 5.3%		19 6.1%		0.721 [X²]
Being trapped under rubble		3 1.8%		15 4.8%		0.092 [X²]
Assault		7 4.1%		2 0.6%		***0.007*** [X²]
Animal Butting		6 3.5%		3 1.0%		***0.047*** [X²]
Tractor Accident		3 1.8%		5 1.6%		0.894 [X²]
Type of Injury						
Pneumothorax		12 7.1%		129 41.3%		***0.000*** [X²]
Hemothorax		10 5.9%		57 18.3%		***0.000*** [X²]
Rib Fracture		151 88.8%		269 86.2%		0.414 [X²]
Number of Rib Fractures		2.6 ± 1.6	3.0	4.8 ± 2.5	5.0	***0.000*** [m]
Clavicle		7 4.1%		58 18.6%		***0.000*** [X²]
Sternum		24 14.1%		30 9.6%		0.134 [X²]
Scapula		3 1.8%		78 25.0%		***0.000*** [X²]
Head		20 11.8%		102 32.7%		***0.000*** [X²]
Vertebra		16 9.4%		92 29.5%		***0.000*** [X²]
Pelvis		10 5.9%		68 21.8%		***0.000*** [X²]
Abdominal Organ		7 4.1%		53 17.0%		***0.000*** [X²]
Extremity		19 11.2%		81 26.0%		***0.000*** [X²]

[m] Mann-Whitney-U test / [X²] Chi-square test

White blood cells (WBC), neutrophil, neutrophil-lymphocyte ratio (NLR), ALT (Alanine aminotransferase), AST (Aspartate aminotransferase), and LDH (Lactate dehydrogenase) values were

significantly higher in the group with pulmonary contusion ($p<0.05$). The lymphocyte count was significantly lower in pulmonary contusion patients ($p<0.05$) (Table 2).

Table 2. Injuries in the Group With and Without Pulmonary Contusion

		Pulmonary Contusion (-)			Pulmonary Contusion (+)			p-value	
		Mean±SD/n-%		Median	Mean.±SD/n-%		Median		
WBC		8.8 ± 3.5		8.2	17.5 ± 6.4		16.3	***0.000***	m
Neutrophil		5.9 ± 3.1		5.0	14.7 ± 7.6		13.8	***0.000***	m
Neutrophil %		63.6 ± 13.8		63.1	80.4 ± 13.7		85.0	***0.000***	m
Lymphocyte		2.46 ± 4.37		1.87	2.49 ± 5.27		1.40	***0.000***	m
Lymphocyte %		25.4 ± 11.5		25.0	11.4 ± 9.5		8.0	***0.000***	m
NLR		3.8 ± 5.5		2.5	12.2 ± 10.0		10.4	***0.000***	m
ALT		42.9 ± 179.5		21.0	91.5 ± 125.6		48.0	***0.000***	m
AST		40.6 ± 128.3		22.0	126.3 ± 224.7		62.5	***0.000***	m
LDH		229.0 ± 168.3		195.5	604.1 ± 667.9		475.0	***0.000***	m
Complication	(-)	169	99.4%		250	80.1%		***0.000***	X^2
	(+)	1	0.6%		62	19.9%			
Intensive Care Unit	(-)	149	87.6%		114	36.5%		***0.000***	X^2
	(+)	21	12.4%		198	63.5%			
Hospitalization	(-)	4	2.4%		3	1.0%		0.222	X^2
	(+)	166	97.6%		309	99.0%			
Duration of Hospitalization		4.0 ± 3.6		3.0	9.0 ± 6.5		7.0	***0.000***	m
Requirement for Mechanical Ventilation	(-)	161	94.7%		250	80.1%		***0.000***	X^2
	(+)	9	5.3%		62	19.9%			
Duration in Mechanical Ventilation		1.00 ± 0.00		1.00	1.23 ± 1.11		1.00	0.503	m
Outcome	Discharged	167	98.2%		291	93.3%		***0.017***	X^2
	Deceased	3	1.8%		21	6.7%			

[m] Mann-Whitney-U test / [X^2] Chi-square test

The rate of complications, intensive care unit stay, requirement for mechanical ventilation, and mortality rate were significantly higher in the group with pulmonary contusion. Still, the hospitalization rate did not differ significantly ($p>0.05$).

The univariate analysis found that WBC, neutrophil and lymphocyte count, NLR, ALT, AST, and LDH parameters denoted a statistically significant difference between the two groups ($p>0.05$). Additionally, age, motor vehicle accidents, falls, impact trauma mechanism, pneumothorax, injury site (hemothorax, clavicle, scapula, head, vertebra, pelvis, abdominal organ), and number of rib fractures were also different ($p<0.05$) (Table 3).

The multivariate analysis revealed a significant and independent effect of pneumothorax, injury site, number of rib fractures, WBC, and lymphocyte count in distinguishing patients with and without pulmonary contusion ($p<0.05$) (Table 3).

The rate of pneumothorax, hemothorax, clavicle, scapula, head, vertebra, pelvis, abdominal organ, and extremity injuries in the group with lung contusion>50% was significantly higher than in the other group ($p<0.05$).

Complications, requirements for mechanical ventilation, duration of mechanical ventilation, length of hospital stay, intensive care unit admission, and mortality rate were also significantly higher ($p<0.05$).

WBC, neutrophil count, NLR, ALT, AST, and LDH values were significantly elevated in the group with lung contusion>50% (p<0.05) (Table 4).

Table 3. The Effective Factors in Pulmonary Contusion Prognosis Via Univariate And Multivariant Analysis

	Univariant Analysis			Multivariant Analysis		
	OR	95% CI	p-value	OR	95% CI	p-value
Age	0.985	0.975 - 0.995	***0.004***			
Vehicle trauma	1.788	1.226 - 2.609	***0.003***			
Mechanism of Trauma						
Non-Vehicular Traffic Accident	2.296	0.981 - 5.373	0.055			
Fall	0.587	0.398 - 0.866	***0.007***			
Assault	0.150	0.031 - 0.731	***0.019***			
Animal Butting	0.265	0.066 - 1.075	0.063			
Pneumothorax	9.281	4.950 - 17.403	***0.000***	4.986	1.904 - 13.053	***0.001***
Hemothorax	3.576	1.775 - 7.205	***0.000***			
Number of Rib Fractures	1.690	1.489 - 1.920	***0.000***	1.465	1.222 - 1.757	***0.000***
Clavicle	5.317	2.369 - 11.935	***0.000***			
Scapula	18.556	5.758 - 59.792	***0.000***			
Head	3.643	2.159 - 6.146	***0.000***			
Vertebra	4.025	2.278 - 7.113	***0.000***			
Pelvis	4.459	2.230 - 8.918	***0.000***			
Abdominal Organ	4.765	2.115 - 10.735	***0.000***			
Extremity	2.787	1.624 - 4.782	***0.000***			
WBC	1.542	1.423 - 1.670	***0.000***	1.444	1.310 - 1.593	***0.000***
Neutrophil	1.584	1.455 - 1.724	***0.000***			
Neutrophil %	1.088	1.070 - 1.107	***0.000***			
Lymphocyte	1.001	0.964 - 1.039	0.966			
Lymphocyte %	0.893	0.874 - 0.912	***0.000***	0.937	0.910 - 0.964	***0.000***
NLR	1.311	1.235 - 1.390	***0.000***			
ALT	1.007	1.003 - 1.010	***0.000***			
AST	1.014	1.009 - 1.020	***0.000***			
LDH	1.008	1.007 - 1.010	***0.000***			
Requirement for Mechanical Ventilation	4.436	2.145 - 9.175	***0.000***			

Logistic Regression (Forward LR)

DISCUSSION

Thoracic trauma usually results in injuries accompanied by high morbidity and mortality. It plays an important role in the causes of death in the first four decades. Chest trauma is seen in 70% of blunt traumas that occur as a result of motor vehicle accidents. When evaluating a patient with thoracic trauma, attention should be paid to the neck veins, the patient's appearance, chest wall movement, chest area palpation and percussion, and respiratory pattern (4,5). Effective treatment in critically ill patients depends on rapid diagnosis and application of aggressive treatment without delay. In the initial evaluation phase, knowing the mechanism of injury, radiological findings, the location of major injury, and vital signs should be evaluated together, and appropriate treatment should be selected (6). The most common finding in thoracic traumas is rib fractures. It is most commonly observed in 4th – 9th ribs after blunt thoracic trauma. Complications such as pneumothorax, hemothorax, and rib fracture may accompany lung contusion. Chest traumas are of great importance, as injuries to the esophagus, heart, diaphragm, and large vessels may occur in addition to the rib cage and lungs. In thoracic traumas with

high mortality and morbidity, knowing the cause and mechanism of trauma during the diagnosis and treatment phase is important for the correct guidance. Lung contusion, which is quite common in blunt thoracic trauma, may accompany pneumothorax, hemothorax, and rib fractures (7). In our study, complications, requirements for mechanical ventilation, duration of mechanical ventilation, length of hospital stay, intensive care unit admission, and mortality rate were significantly higher, and WBC, neutrophil count, NLR, ALT, AST, and LDH values were significantly elevated in the group with lung contusion>50%.

Table 4. Injuries in the group with and without 50% pulmonary contusion

		Pulmonary Contusion <50%		Pulmonary Contusion >50%		p-value
		Mean±SD/n-%	Median	Mean±SD/n-%	Median	
WBC		15.1 ± 5.2	14.3	20.0 ± 6.6	19.0	***0.000*** [m]
Neutrophil		13.0 ± 8.4	12.1	16.6 ± 6.0	15.9	***0.000*** [m]
Neutrophil %		78.4 ± 14.9	83.5	82.4 ± 12.1	85.7	***0.003*** [m]
lymphocyte		2.70 ± 6.30	1.34	2.25 ± 3.90	1.46	0.410 [m]
Lymphocyte %		12.2 ± 9.4	8.9	10.6 ± 9.6	7.3	***0.033*** [m]
NLR		11.2 ± 10.6	9.4	13.2 ± 9.1	11.3	***0.010*** [m]
ALT		65.7 ± 91.9	34.0	119.1 ± 149.1	68.0	***0.000*** [m]
AST		79.5 ± 99.7	46.0	176.3 ± 298.7	90.0	***0.000*** [m]
LDH		466.6 ± 301.3	390.0	750.7 ± 886.6	597.0	***0.000*** [m]
Complication	(-)	144 89.4%		106 70.2%		***0.000*** [X²]
	(+)	17 10.6%		45 29.8%		
Intensive Care Unit	(-)	88 54.7%		26 17.2%		***0.000*** [X²]
	(+)	73 45.3%		125 82.8%		
Hospitalization	(-)	2 1.2%		1 0.7%		1.000 [X²]
	(+)	159 98.8%		150 99.3%		
Duration of Hospitalization		7.0 ± 4.9	6.0	11.1 ± 7.4	9.0	***0.000*** [m]
Requirement for Mechanical Ventilation	(-)	148 91.9%		102 67.5%		***0.000*** [X²]
	(+)	13 8.1%		49 32.5%		
Duration in Mechanical Ventilation		2.08 ± 2.29	1.00	1.00 ± 0.00	1.00	***0.001*** [m]
Outcome	Discharged	158 98.1%		133 88.1%		***0.000*** [X²]
	Deceased	3 1.9%		18 11.9%		

[m] Mann-Whitney-U test / [X²] Chi-square test (Fischer test)

In previous literature, the predictive indicators and biomarkers were not investigated sufficiently. A majority of the published data were focused on the diagnosis, imaging, treatment, and surgery outcomes. Within the scope of this study, we tried to explore and emphasize the importance of biomarkers in the development of pulmonary contusion. Additionally, the clinical significance of several findings was elaborated (8– 10). In our study, the rate of complications, intensive care unit stay, requirement for mechanical ventilation, and mortality rate were significantly higher in the group with pulmonary contusion.

Li et al. reported that IL-17 could be used as a potential biomarker to predict the severity of pulmonary contusion. In their study, they tried to find the association between IL-17 and IL-22 in blunt-force thoracic trauma. Their research revealed that IL-17 was strongly associated with pulmonary contusion volume. Additionally, IL-17 was significantly associated with pro-inflammatory complications in pulmonary contusion patients and could be used as a biomarker for predicting in-patient outcomes of patients with pulmonary contusion (11). Hoth et al. elaborated that blunt chest injury resulting in pulmonary contusion primes innate immunity for an exaggerated TLR4 response. Once triggered, TLR4

signaling activates innate immune mechanisms, resulting in NFκB activation and expression of a number of proinflammatory mediators, including IL-1β, IL-6, and IL-8 (12). As biomarkers, we have investigated WBCs, neutrophil, NLR, ALT, AST, and LDH values and found that they were significantly higher in the group with pulmonary contusion, while the lymphocyte count was lower.

The scoring systems for evaluating injury severity in patients with pulmonary contusions include the chest abbreviated injury scale (AIS) and injury severity score (ISS). However, because these scoring systems are obtained through anatomical abnormalities, they have limitations in representing functional impairment or predicting prognosis (13–15). Quantifying pulmonary contusion volume using initial computerized tomography (CT) in patients with chest trauma allows early identification of patients at high risk of delayed respiratory complications, such as pneumonia. Moreover, it can improve the treatment effect in patients with chest trauma by preventing complications (16).

Pulmonary contusions are perceived as severe and fatal cases in thoracic trauma patients. The requirements for mechanical ventilation and intensive care unit admissions are extremely high. These individuals are at risk of developing respiratory complications, such as pneumonia and ARDS. Early identification of cases, concomitant risk factors, and probable complications are essential regarding these facts. In previous studies, the Glasgow Coma Scale (GCS), LDH levels, and the ratio of pulmonary contusion volume/total lung volume were utilized by clinicians (17).

Some physicians investigated the reliability of the Thoracic Trauma Severity Score (TTSS) and stated that it was useful to predict ARDS in chest traumas. This scoring system is mainly based on the PaO2 /FiO2 ratio. However, hypoxemia is not always observed during the initiation of ARDS. Some authors utilized the Yang Index and reported positive outcomes to evaluate pulmonary contusions. Last but not least, the Yang Index is linearly correlated with volume reconstruction. The number of fractured rib(s) and the Yang Index were two independent risk factors for respiratory failure. Other objective indicators that can be collected at admission, such as the severity of rib fracture and severe comorbid fracture(s) (spine, pelvis, and/or femur), can also be used in predicting pulmonary complications. This model can identify high-risk patients at an early stage (18). In our study, age, motor vehicle accidents, falls, impact trauma mechanism, pneumothorax, injury site, number of rib fractures, WBC, and lymphocyte count were significantly different in patients with pulmonary contusion.

CONCLUSION

A prognostic model or established biomarkers is an unmet need for patients with pulmonary contusion. Identification of high-risk patients and initiating treatment in the window of opportunity phase with supportive therapy. In this study, WBC, neutrophil and lymphocyte count, NLR, ALT, AST, and LDH were predictive biomarkers. Additionally, age, motor vehicle accidents, falls, impact trauma mechanism, pneumothorax, injury site, and number of rib fractures were other contributing predictors that allow a wider range of clinical application and decision-making.

DESCRIPTIONS

No financial support.

No conflict of interest.

Ethical Declaration: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Ethics committee approval has been granted from our institution. Informed consent was obtained from all participants.

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LETTER TO THE EDITOR
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How Can Treatment for Alcohol and Drug Addiction Be More Effective?

Alkol ve Uyuşturucu Bağımlılığının Tedavisi Nasıl Daha Etkili Olabilir?

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Dear Editor,

The aim of this letter is to highlight the low success rate in alcohol and substance addiction treatment in psychiatric clinics and to initiate a brief discussion about whether there are other treatment options. Addiction is a significant public health concern due to the harm it causes. Addictive substances not only affect the user, but they also destroy family and society harmony, with a variety of effects. When we look at our country's crime figures, we can see that alcohol and drugs account for 60–75% of them. İt is critical to be open to many types of argumentation and rehabilitative models in treatment. In studies conducted in Turkey, it was reported that 81.2% of alcohol and substance addicts discharged from AMATEM clinics experienced relapse within 1 year (1). In another study conducted on inpatients in AMATEM clinics, 72.4% of the addicts believed that it was inconvenient for them to be together and that this situation led to getting to know different substances and making new friends (2). Both the low success rate and the risk of making new friends for substance use clearly show that there is a need for alternative treatment and rehabilitation programs in AMATEM clinics. On the other hand, some associations working independently from AMATEM clinics are reported to have a very high success rate. Psychiatric clinics in the Western world have been working in coordination with associations for years (3). Many studies have shown that individuals who participate in the Alcoholics Anonymous (AA) program, which is based on the foundations of the Christian religion, have high rates of staying clean and that AA has a positive impact on drug treatment (4). While hundreds of studies emphasize the importance of spiritual and religious support for the treatment of substance addiction (5), this situation is still ignored in psychiatric clinics in our country.In our country, the rehabilitation practices of spirituality-based associations are not recognized by psychiatric clinics. Although these associations work independently of psychiatric clinics, their success rates are quite high. For example, it has been reported that the success rate of the Liman Sober Living Association, which operates in our country as a voluntary organization, is around 65% with rehabilitation practices based on spirituality in the light of scientific data (6). It has been reported that spiritual support can be an integral part of coping with substance abuse in relation to both prevention and recovery (7). Philosophy and the religious sciences have presented a spirituality-based approach for the rehabilitation of alcohol and substance addiction, which psychiatric clinics are unaware of (8). Working in collaboration with spirituality-centered and volunteer groups that are approved by the Turkish Psychiatric Association and the Ministry of Health, overseen by the Presidency of Religious Affairs, is essential to improving patients' rehabilitation following medical treatment and lowering the incidence of relapse.

In conclusion, in order to increase the success rate in the treatment of alcohol and substance addiction and to reduce the frequency of relapse, it would be an appropriate approach for psychiatric clinics to work in coordination with associations by leaving all prejudices aside. Best regards.

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