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CONTENTS

VALIDITY OF CLINICAL FEATURES IN THE DIAGNOSIS OF MITRAL VALVE PROLAPSE

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ABSTRACT

Background and objectives Mitral valve prolapse is a common primary valvular disorder with prevalence estimates generally ranging from 5 to 15 percent. Despite the wide range of symptoms attributed to it, most patients are asymptomatic. The diagnosis is based on the clinical presentation, physical examination, and two-dimensional echocardiography, the diagnostic gold standard for mitral valve prolapse. Aim of study is to assess the validity of clinical features in the diagnosis of mitral valve prolapse.

Methods A cross-sectional study was conducted at Azadi Teaching Hospital in Duhok city. Data were collected from January 15 to June 5, 2011. A consecutive sampling procedure was used to enroll 260 eligible patients who were interviewed by the researcher, examined clinically, and underwent two-dimensional echocardiography by an echocardiography specialist.

Results The mean age of the studied population was 28.1 years, with female preponderance (1.6:1). The most common clinical symptoms were palpitation (68%), dyspnea, and chest pain, while the most common signs were a late systolic murmur (12%), a single click, and a combination of click with murmur. The results indicated that palpitation, chest pain, and some auscultatory findings were closely associated with mitral valve prolapse as diagnosed by echocardiography (p-values of < 0.001).

Conclusions In symptomatic patients suspected of having mitral valve prolapse, different clinical features have variable levels of validity with the best correlates being palpitation, chest pain, and the auscultatory finding of single click and late systolic murmur.

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Key words: Mitral valve prolapse, Clinical features, 2D-Echocardiography, Iraq

Mitral valve prolapse (MVP) is a common primary valvular disorder associated with myxomatous degeneration of the mitral valve apparatus that results in systolic displacement of a portion or all of one or both mitral leaflets beyond the mitral annulus into the left atrium during systole and may be associated with mitral regurgitation (MR).[1,2] Mitral valve prolapse is the most frequently diagnosed cardiac valvular abnormality that affects more than 150 million people worldwide.[3] Most studies report that the prevalence estimates range from 5 to 15 percent. More recently, the Framingham Heart Study, identified MVP in only 2.4% of evaluated

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subjects.[4] MVP is a disease of the young but it is uncommon before the adolescent growth spurt occurs. Although it was once believed that MVP was more common in women, it is now believed that it affects men and women equally.[5]

In the majority of cases, MVP is harmless and does not cause symptoms nor does it need to be treated. When symptomatic, the most common complaints are palpitations, chest discomfort, and shortness of breath. Other clinical features include paroxysmal supraventricular tachycardia, presyncope, nocturnal dyspnea, and fatigue.[6] The most characteristic clinical finding is a midsystolic click and late systolic murmur detected on cardiac auscultation.

As electrocardiographic (ECG) findings, such as ST segment depression and supraventricular tachycardia, are nonspecific, two-dimensional echocardiography (2D-Echocardiography) remains the gold standard for the diagnosis of MVP, displaying one or both leaflets prolapsing behind mitral annulus and into left atrium in systole.[5,7]

Study Rationale

Abdulla[8] conducted a study in Hawler to assess the presentations of symptomatic patients with MVP. Intensive search by the author did not reveal any other study in Kurdistan Region thus raising the need for local studies to explore the problem.

The aim of the study was to assess the validity of clinical features in the diagnosis of MVP in Duhok city. Specifically, sensitivity, specificity, positive and negative predictive values (PPV and NPV), and likelihood ratios (LR) for the relevant presenting signs and symptoms.

METHODS

The study was conducted at the echocardiography unit of Azadi Teaching Hospital where data were collected from January 15 to June 5, 2011. A cross-sectional study design was adopted with a consecutive sampling procedure to enroll patients who presented for 2D-Echocardiography for clinically suspected MVP. Patients were referred from outpatient departments at Azadi Hospital, other hospitals and primary health care centers as well as from private clinics in Duhok. Eligible were those who were 15 to 40 years old. Patients with secondary MVP due to e.g. coronary artery disease, and younger children were not included in order to have a more uniform study population for more accurate data evaluation. Furthermore, patients with the following criteria were excluded: ischemic, rheumatic, or congenital heart disease, mitral valve repair, cardiomyopathy, severe left ventricular systolic dysfunction, and patients with an established diagnosis of mitral valve prolapse.

A questionnaire was designed to record pertinent data, which included demographic characteristics of the sample; duration of relevant symptoms, such as palpitations, dizziness, fatigue, dyspnea, and chest pain; auscultatory findings like single click, multiple clicks, late systolic murmur, pansystolic murmur, or click plus

murmur. Electrocardiographic data (namely ST-changes, arrhythmias, and conduction defects) and echocardiographic findings (mitral valve prolapse, involved leaflets in positive cases, mitral regurgitation, and myxomatous leaflet thickening) were recorded as well.

Data entry and analysis were carried out using Microsoft Excel 2003, SPSS16, and Open-Epi. Descriptive data analysis was carried out to describe the distribution of patients by age and sex.

RESULTS

The study sample included 260 patients, 100 (38.5%) men and 160 (61.5%) women with a mean age of 28.1 years (SD 7.3). Most of the patients (47.7%) were 21-30 years old and 38.1% were 31-40 years of age.

The most common clinical symptoms were palpitation, dyspnea, and chest pain. Auscultatory findings were less common than clinical symptoms, and included late systolic murmur, single click, and click with murmur. Electrocardiographic changes were mainly seen as ST-T changes and arrhythmias, as is shown in Table 1.

Less than half of the patients who were referred for clinical suspicion of MVP were echocardiographically confirmed where the anterior mitral leaflet was most commonly affected. Mitral regurgitation and myxomatous changes occurred in less than ten percent, as is demonstrated in Table 2.

While palpitation and chest pain had high sensitivity and negative predictive values, other symptoms were not as well correlated with echocardiographically confirmed MVP. Auscultatory findings showed high sensitivity and positive predictive values with positive likelihood ratios that correlated well with MVP. In case of an auscultatory single click, the positive likelihood ratio reached clinical significance. ECG changes did not show any statistically or clinically significant correlation, as is shown in Table 3.

Among patients with echocardiographically confirmed MVP, palpitation, chest pain, and dyspnea were the most prevalent symptoms and a late systolic murmur and a single click on auscultation the most common auscultatory findings, as is shown in Table 4.

DISCUSSION

Primary mitral valve prolapse is a genetic connective tissue disorder with an autosomal dominant inheritance resulting in anatomic abnormalities of the mitral valve apparatus with a prevalence estimate that ranges from less than 1% to 38%.[9] As the study population in this study represents referrals to the echocardiography unit at Azadi Teaching Hospital, this study cannot estimate the prevalence of MVP in Duhok.

About two thirds of all cases in this study who were referred for suspected MVP complained of palpitations, chest pain, and dyspnea, which compares roughly with a study done by Orhan[10] who found that 64% of patients with clinical suspicion of MVP complained of

Table 1. Clinical and ECG findings of the study sample by gender

Findings	Men (100)		Women (160)		Total (260)	
	No.	(%)	No.	(%)	No.	(%)
Palpitation	61	(61)	114	(71.3)	175	(67.3)
Dyspnea	52	(52)	118	(73.8)	170	(65.4)
Chest Pain	69	(69)	98	(61.3)	167	(64.2)
Dizzy Spells	35	(35)	69	(43.1)	104	(40)
Fatigue	30	(30)	58	(36.3)	88	(33.8)
Late Systolic Murmur	15	(15)	16	(10)	31	(11.9)
Single Click	11	(11)	10	(6.3)	21	(8.1)
Click with Murmur	3	(3)	7	(4.4)	10	(3.8)
Pansystolic Murmur	3	(3)	3	(1.9)	6	(2.3)
Multiple Clicks	0	(0)	0	(0)	0	(0)
ST-Changes	20	(20)	43	(26.9)	63	(24.2)
Arrhythmias	13	(13)	14	(8.8)	27	(10.4)
Conduction Defects	2	(2)	4	(2.5)	6	(2.3)

Table 2. Echocardiographic findings of the study sample by gender

ECHO-Findings	Men (100)		Women (160)		Total (260)	
	No.	(%)	No.	(%)	No.	(%)
MVP	44	(44)	62	(38.7)	106	(40.8)
AML	25	(25)	44	(27.5)	69	(26.5)
PML	11	(11)	10	(6.3)	21	(8.1)
Bileaflet	8	(8)	8	(5)	16	(6.2)
Mitral Regurgitation	6	(6)	15	(9.4)	21	(8.1)
Myxomatous Changes	9	(9)	9	(5.6)	18	(6.9)

Table 3. Validity of clinical and ECG findings with echo as gold standard

Findings	Snsty (%)	Spcfy (%)	PPV (%)	NPV (%)	pos. LR	neg. LR
Palpitation**	98.1	53.9	59.4	97.7	2.13	0.04
Chest Pain**	96.2	57.8	61.1	95.7	2.28	0.07
Dyspnea	61.3	31.8	38.2	54.4	0.90	1.22
Dizzy Spells	36.8	57.8	37.5	57.1	0.87	1.09
Fatigue	33.0	65.6	39.8	58.7	0.96	1.02
Late Systolic Murmur**	33.3	95.4	77.4	75	7.19	0.70
Single Click**	29.4	99.3	95.2	75	42.65	0.71
Click with Murmur**	17.2	100	100	75	undef.	0.82
Pansystolic Murmur*	7.7	98.6	66.7	75	5.62	0.94
ST-Changes	38.7	87.0	67.2	67.3	2.98	0.70
Arrhythmias	8.5	88.3	33.3	58.4	0.73	1.04
Conduction Defects	` 0.9	96.8	16.7	58.7	0.29	1.02

*p < 0.05, **p < 0.001

Snsty = sensitivity, Spcfy = specificity, PPV = positive predictive value, NPV = negative predictive value, pos. LR = positive likelihood ratio, neg. LR = negative likelihood ratio, un-def. = undefined

Table 4. Clinical and ECG findings by gender of echocardiographically confirmed cases of MVP

Findings	Men (44)		Women (62)		Total (106)	
	No.	(%)	No.	(%)	No.	(%)
Palpitation	43	(97.7)	61	(98.4)	104	(98.1)
Chest Pain	43	(97.7)	59	(95.2)	102	(96.2)
Dyspnea	19	(43.2)	46	(74.2)	65	(61.3)
Dizzy Spells	11	(25)	28	(45.2)	39	(36.8)
Fatigue	11	(25)	24	(38.7)	35	(33)
Late Systolic Murmur	11	(25)	13	(21)	24	(22.6)
Single Click	10	(22.7)	10	(16.1)	20	(18.9)
Click with Murmur	3	(6.8)	7	(11.3)	10	(9.4)
Pansystolic Murmur	3	(6.8)	1	(1.6)	4	(3.8)
ST-Changes	16	(36.4)	26	(41.9)	42	(39.6)
Arrhythmias	4	(9.1)	5	(8.1)	9	(8.5)
Conduction Defects	0	(0.0)	1	(1.6)	1	(0.9)

palpitations, 73% reported atypical chest pain and 59% dyspnea.

The rate of chest pain in this study's population of confirmed MVP was 96%. Rayan et al.[11] found this rate to be 71%, while Levy[12] (58%), Zouridakis et al.[13] (53%), and Abdulla[8] (22%) reported lower rates.

While 67% of the study sample presented with palpitations, this percentage rose to 98% when only those patients were taken into consideration in whom MVP was echocardiographically confirmed, which is a higher rate when compared to Rayan et al.[11] who found palpitations in 88%, Zouridakis et al.[13] (79%), as well as Levy[12] and Abdulla[8] who report only 38% and 27%, respectively.

The difference in the rates of palpitations and chest pain when compared with previous studies, is, however, striking. A possible explanation might be that physicians in Duhok tend to refer almost all patients with palpitations for ruling out MVP. Conversely, clinically asymptomatic patients with MVP do not get referred and thus remain undiagnosed. It is therefore very likely that a substantial portion of patients in Duhok who have MVP were not seen in this study, thus shifting the percentage of those with palpitations and/or chest pain in this study population to almost 100%.

In this study a single click, a late systolic murmur, click with late systolic murmur, and a pansystolic murmur were found at 8%, 12%, 4%, and 2%, respectively, when considering the entire study sample. In his study Orhan[10] reported 14% of the population with suspected MVP to have had a systolic click and 23% a late systolic murmur. Differences in auscultatory findings might possibly be due to different patient positions when performing the physical exam. A single click and late systolic

murmur can usually be heard most clearly with the patient standing up from the sitting position. Conversely, they cannot be heard as clearly or cannot be heard at all when the patient is sitting, squatting, or lying down in a supine position.

In regard to the validity of clinical features of MVP, this study found chest pain to have a sensitivity of 96%, NPV of 96%, and negative LR of 0.07. Clinically, this means that in patients without chest pain, MVP can be ruled out with more than 95% probability.

In patients with palpitations the sensitivity in this study sample is high with 98%, as is the NPV (98%) with a very good negative LR of 0.04. This means that a patient can be ruled out to have MVP with a probability of almost 98% if he or she does not have palpitations.

When palpitations and chest pain are combined, the accuracy reaches almost 88% with highly significant results. The sensitivity and NPV are 94% and 96%, respectively, yet, even the specificity (83%) and PPV (79%) are reasonably good. Clinically, the absence of the combination of palpitations and chest pain can be used to rule out MVP with more than 95% probability, while its presence gives an indication that MVP may be present.

In regard to clinical signs, an auscultatory single click on physical examination is very specific (99%) for the diagnosis of MVP where the PPV (95%) is also very good and the positive LR very high (42.7). Clinically, this means that a single click on auscultation can be used to rule in MVP with a probability of more than 95%; however, the absence of a single click does not rule out MVP.

Yet, these numbers are not generalizable, particularly not to the primary health care setting, because the study sample comprised a selected number of patients, thus is limited by referral bias.

Different clinical symptoms and signs have variable levels of validity with the best correlates being palpitation and chest pain and the auscultatory finding of single click and late systolic murmur.

Symptomatic patients presenting with palpitation, chest pain, single click, and late systolic murmur, singularly or in combination, should alert the physician to the need for follow up investigations to verify the high probability of MVP. Further studies are needed to assess the prevalence of MVP in the region and especially to define the groups of asymptomatic individuals with a high probability of a positive yield.

AUTHORSHIP AND CONSENT FORM

This manuscript is an unpublished work, which is not under consideration elsewhere in the record. The author's estimated contribution in the study is as follows:

Dr. Amjed S. Fares: developing the design of the study; conducting the patient interviews; collecting and interpreting the data; translation of abstract into Kurdish and Arabic

Dr. Lars A. Peschke: assisting in data processing, statistical analysis; interpretation of the results ; writing of this journal article manuscript

Dr. Qayser S. Habeeb original idea of the study; guidance and input along the study
None of the authors have any competing interests in the study. The authors themselves did not receive any funds for conducting the study.

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REFERENCES

1. Stouffer GA, Sheahan RG, Lenihan DJ. Mitral Valve Prolapse: A Review of the Literature. Am J Med Sci. 2001;320(6):401-10.
2. Rosas-Munive E, Valenzuela-Flores AG, Valenzuela-Flores AA. Mitral valve prolapse. A review. Circulation. 2004;72(5):415-20.
3. Avierinos JF, Inamo J, Grigioni F, Gersh B, Shub C, and Maurice Enriquez-Sarano M, et al. Sex Differences in the Morphology and outcomes of mitral valve prolapse. Ann Inter Med 2. 2008;149(11):787-95.
4. Freed LA, Levy D, Levin RA, Larson MG, Evans JC, Fuller DL, et al. Prevalence and clinical outcome of MVP. N Eng J Med. 1999;341:1-7.
5. Sims JM, Miracle VA. An Overview of Mitral Valve Prolapse. Dimens Crit Care Nurs. 2007;26(4):145-9.
6. Tamam L, Nurgul O, Mustafa SB. Association of Idiopathic Mitral Valve Prolapse and Panic Disorder. Croat Med J. 2000;41(4):410-6.
7. McLachlan J, Reddy PC, Ratts TE. Mitral valve prolapse. A common cardiac diagnosis in women. J La State Med. 1998;150(2):92-6.
8. Abdulla AA. A Study on Presentations of Symptomatic Patients with Mitral Valve Prolapse in Erbil City. [Higher Diploma in Internal Medicine Dissertation]. University of Salahaddin, College of Medicine. Erbil, Iraq. 1999.
9. Theal M, Sleik K, Anand S, Yi Q, Yusuf S, Lonn E. Prevalence of MVP in ethnic groups. Can J Cardiol. 2004;20(5):511-5.
10. Orhan AL, Sayar N, Nurkalem Z, Uslu N, Erdem I, Erdem EC, et al. Assessment of autonomic dysfunction and anxiety levels in patients with mitral valve prolapse. Turk Kardiyol Dern Arş - Arch Turk Soc Cardiol. 2009;37(4):226-33.

11. Rayan M, Samir S, Nagwa E, Fouad M. In Mild Mitral Valve Prolapse, Sticking to 2D Rules is the Rule, a 3D Echocardiographic Study. Heart Mirror J. 2010;4(2):200-4.
12. Levy S. Arrhythmias in the mitral valve prolapse syndrome: Clinical significance and management. PACE (Pacing Clin Electrophysiol). 1992;15:1080-8.
13. Zouridakis EG, Parthenakis FI, Kochiadakis GE, Kanoupakis EM and Vardas PE. QT dispersion in patients with mitral valve prolapse is related to the echocardiographic degree of the prolapse and mitral leaflet thickness. Europace. 2001;3:292-8.

پوختە

هەلسەنگاندنا بکێرهاتنا نیشانێن کلینیکی بو دەستنیشانکرنا شۆربوونا دەرگرتەیێ کولاڤی

پێشەکی و ئارمانج: ژ مشەترین نەخوشییێن دەرگرتەییێن دلی نە کو رێژا وێ شۆربوونا دەرگرتەیێ کولاڤی دناڤبەرا 5 هەتا 15 ژسەدێ یە. سەرەرای رێژەکا گەلەك ژنیشانێن وێ بەلێ پرانیا نەخوشان دبێ نیشانن. دەستنیشانکرنا قێ نەخوشییێ بریکا نیشانێن کلینیکی و فەحسا کلینیکی و ئیکو یا دلی یە کو ژمێژە دهێتە هژمارتن وەك تاقیکرنا سەرەکی بو دەستنیشانکرتێ. ئەف ڤەکولینە هاتە رێکخستن ژبو دیارکرنا گرنگیا نیشانێن کلینیکی بێن جورەوجور بو دەستنیشانکرنا شۆربوونا دەرگرتەیێ کولاڤی یێ دلی. ئارمانج هەلسەنگاندنا بکێرهاتنا نیشانێن کلینیکی بو دەستنیشانکرنا شۆربوونا دەرگرتەیێ کولاڤی.

ریکێن ڤەکولینێ: ڤەکولینا برگەیی هاتە ئەنجامدان. نەخوش هاتنە وەرگرتن بریکا نمونێن ئێك لدویف ئێك کو 260 نەخوش هاتنە وەرگرتن لدویف ساخلەتا بەری فەحسا ئیکو. ئەڤ نەخوشە هاتنە فەحسکرن پشتی چاڤپێکەفتنێ ژلایێ ڤەکولەری ڤە لدویف پرسنامەکا رێکخستی. لدویفدا بو هەر ئێکی فەحسا ئیکو دهاتە کرن ژلایێ تایبەتمەندەکێ ئیکویێ.

ئەنجام: تێکرایێ ژیێ نەخوشان 28.1 سال بوو و مێ پتر بوون (1ز1:6). مشەترین نیشان لدەف نەخوشان دلقوتان بوو (68٪) ولدویفدا بێهنتەنگی و ئێشانا سنگی. و مشەترین نیشانێن کلینیکی دەنگێ زێدە یێ گویرو یێ دلی بوو (12٪) و لدویفدا سفکە دەنگ و تێکەلبوونا هەردووا. هەلسەنگاندنا بکێرهاتنێ دیارکر کو بکێرهاتنێن جیاواز هەبوون دگەل نیشانێن جیاواز. بگشتی ئەنجاما دیارکر کو دلقوتانێ و ئێشانا سنگی و هندەك نیشانێن گوهلێبوونا دلی پەیوەندیەکا موکم هەبوو دگەل دەستنیشانکرنا نەخوشیێ کو بریکا ئێکویێ هاتیە کرن.

دەرئەنجام: نەخوشێن شۆربوونا دەرگرتەیێ کولاڤی بێن نیشان هەین, نیشانێن کلینیکی بێن جیاواز ئاستێن جیاواز بێن بکێرهاتنێ هەبوون و پەیوەندیا موکم دگەل دلقوتان و ئێشانا سنگی و دەنگێن زێدە بێن دلی هەبوو.

الخلاصة

مصداقية الاعراض و العلامات السريرية فى تشخيص تهدل الصمام الاكليلى

خلفية واهداف البحث: ان تهدل الصمام الاكليلي من امراض الصمامات الاولية الشائعة ، وعموما يقدر معدل شيوعة بنسبة تتراوح بين 5% و 15%. بالرغم من اتساع نطاق الاعراض التي تعزى اليه الا ان اغلب المرضى لا يعانون من اى اعراض. ان التشخيص يعتمد على الاعراض والعلامات السريرية وفحص صدى القلب ثنائي الابعاد الذي يعتبرالفحص المرجعى المعتمد . لقد صممت هذه الدراسة لتقصي مدى الاعتماد على مختلف الاعراض و العلامات السريرية فى تشخيص تهدل الصمام الاكليلى. الهدف من البحث هو تقصي مصداقية الاعراض والعلامات السريرية فى تشخيص تهدل الصمام الاكليلى.

طرق البحث: دراسة مقطعية اجريت فى مستشفى ازادى العام التعليمى/ وحدة صدى القلب فى مدينة دهوك خلال الفترة من 15 كانون الثانى الى 5 حزيران من عام 2011. استخدمت طريقة الاعتيان المتعاقب لضم 260 مريض من المحالين لفحص صدى القلب واللذين استوفوا ضوابط الادخال للدراسة . تم فحص الجميع سريريا بعد مقابلتهم من قبل الباحث وفقا لاستمارة الاستبيان المعدة خصيصا لغرض الدراسة. بعدها اجري لهم جميعا فحص صدى القلب ثنائى الابعاد من قبل اختصاصي فحص صدى القلب.

النتائج: اظهرت الدراسة ان معدل العمرللمرضى 28.1 سنة ، اغلبيتهم من الاناث (1.6:1) . وان أكثر الاعراض السريرية شيوعا هي الخفقان 68% يليه ضيق التنفس والم الصدر بينما كانت اكثر العلامات السريرية شيوعا هي النفحة الانقباضية المتاخرة (12%)، تليها صوت الطقة المنفردة single click ثم الطقة مع النفحة الانقباضية المتاخرة (click with murmur .كما اظهرت الدراسه تفاوت في درجات مصداقية الاعراض والعلامات السريرية المختلفة.وبشكل عام بينت الدراسة وجود ترابط بين الخفقان و الم الصدر وبعض اصوات القلب بالنتائج الموجبة لفحص صدى القلب ثنائي الابعاد بدليل احصائي معنوي.

الاستنتاجات: ان الاعراض والعلامات السريرية المختلفة لدى المرضى المشتبه اصابتهم بتهدل الصمام الاكليلى لها درجات مصداقية مختلفة الا ان اكثرها ارتباطا بالنتائج الموجبة لفحص صدى القلب هي الخفقان، الم الصدر والبعض من اصوات القلب (الطقة المنفردة single click والطقة مع النفحة الانقباضية المتاخرة (click with murmur).

PULMONARY HYDATID CYST IN DUHOK PROVINCE

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ABSTRACT

Background and objectives Thoracic surgery unit in Duhok was established in 2006 since then the majority of our thoracotomy was for treating pulmonary hydatid cysts and its complications. It is evident that pulmonary hydatid cyst is major problem in Duhok province. Hydatid cyst disease is known to be endemic in many parts of Iraq and Duhok province is one of them. As pulmonary hydatid cyst are common in Duhok, the study aims to discuss its incidence , the way they present and the variation of symptoms from being asymptomatic to severe complications of ruptured cysts , beside the methods used for treatment.

Methods Duhok is the centre of the province and is the only place in the province where thoracic surgery is available, nearly all cases of pulmonary hydatid cysts from all over the province are referred to Duhok centre. These cases are studied and evaluated before and after surgical management in order to find what is the best way of treating them. The types of surgery used in these cases are discussed as well as their complications. It's a retro and prospective study including 100 cases of pulmonary hydatid cyst operated upon January 2007 and April 2011. The study include the age of the patient the size of cyst ,the compliant of the patient and whether the cyst was complicated or not, the types of surgery performed with its morbidity and mortality.

Results Hundred patients had been operated by the authors in hospitals of Duhok province (public and private). Majority of patients is aged between 11-40 years, all of them through thoracotomy incision, cyst(s) removed with preserving lung tissue in 86 % where resection done in 14 % of cases, re exploration in 2% and no mortality recorded.

Conclusions Surgical management is only proved curable therapy for pulmonary hydatid, multiplicity of cysts is not uncommon surgery is highly successful with no or very low mortality rate.

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Key words: Hydatid cyst, Pulmonary , Albendazole, Thoracotomy

The genus Echinococcus contain three species for which humans are host to larval stage, or hydatid.[1] The adult tape warm lives in the gut of dogs and other carnivores (as a definitive host). The ova of these warms contaminate the grass and vegetables in the fields. Man is accidentally infected when he/she eats improperly washed vegetables and uncooked green leaves contaminated by the eggs of the tape warm as (intermediate host). The ova will hatch in the sheep and human intestine and pass through the portal system to the liver where it is the first filter (the commonest site for hydatid cyst disease).[2] If the parasite is able to pass

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this filter, it will reach the pulmonary circulation where it is trapped in the second capillary system (the lung is the second commonest site),hydatid cyst of the lung grows faster than that of the liver as the surrounding lung tissue is softer and spongy in comparison to that of liver, symptoms of the patient vary according to the size and site of the cysts and whether there are any complications.[3]

Diagnosis of pulmonary hydatid cyst is generally based on clinical and radiological findings, which vary according to the state of the cyst. Uncomplicated cyst seen as a rounded or oval opaq lesions in plane chest X-Ray while infection or rapture changes the radiological appearance. Computed tomography (CT) may be helpful in establishing the diagnosis, exclude other pathology , guiding the surgeon for the surgical approach. Although several clinical laboratory studies including fiber optic bronchoscope, Casoni's intradermal test , and the indirect hemaglutination test are not used routinely for diagnosis. Ultra sound of abdomen to detect or exclude the presence of cysts in the abdominal cavity (e.g. liver), especially in cases of right pulmonary hydatid cyst as both can be dealt with during the same surgery.[4]

Early attempts to treat hydatid cyst with Mebendazole (Vermox) was used in the Medical City in Baghdad in 1970s without much benefit (personal communications). Albendazole was recently used in treating hydatid cyst disease. It is helpful and effective in treating hepatic hydatid cysts.[5]

In the case of pulmonary hydatid cyst the condition is completely different, preoperative use of Albendazole may enhance rupture of the cyst, possibly due to Interference with cyst wall and / or Interference with the intracystic pressure.[6]

As it is one of the rare helminthes infections, which has not benefited from progress in chemotherapy. Definitive treatment still remains surgery although there had always been a need for medical treatment when the cyst ruptured with chances of dissemination. Albendazole has been used with promising results.[7]

METHODS

Since the establishment of the cardiothoracic unit in Duhok early 2007, till April 2011, Hundred patients with pulmonary hydatid cysts are dealt with.

Diagnosis made mainly by chest X-ray (2 views) is the item relied on diagnosing the cases. Uncomplicated pulmonary hydatid cyst will appear as a rounded or an oval opacity surrounded by the normal blackish appearance of the lungs. Figure (1 & 2) Complicated hydatid cyst shows a different appearance according to the type of complication and its state, Intrabronchial ruptured cyst might show fluid level, water lily appearance (Figure 3) or appears as lung abscess (Figure 4). Rapture of he cyst to the pleural space leads to hydropnaemothorax.

CT scan done but not as a routine investigation, it is used to show more details (Figure 5, 6) of the cyst. Serological tests done only on limited number of patients where it was done before admission to the surgical unit as they are only suggestive and not

diagnostic.

Routine investigations like complete blood picture, blood sugar, urea and creatinine are done in all cases.

No treatment with Albendazole given pre-operatively because of its possible complications, but used post operatively especially if there is any suspicion of spillage of hydatid fluid during surgery.

After opening the chest cavity, the area of cyst is isolated by surrounding it by packs soaked with scolicidal solution (Povidone or Hibitane).The cyst punctured by a wide bore needle which is already connected to negative pressure suction to evacuate as much as possible of the fluid to reduce the pressure inside it, then the cyst opened between two clamps, the suction is completed, the endocyst removed by sponge forceps (Figure 7).

Surgical treatment of pulmonary hydatid cysts included the removal of the cyst, closure of the bronchial holes and then conserving as much as possible of the lung and obliterating the space.

Figure 1. Round homogenous opacity PA view

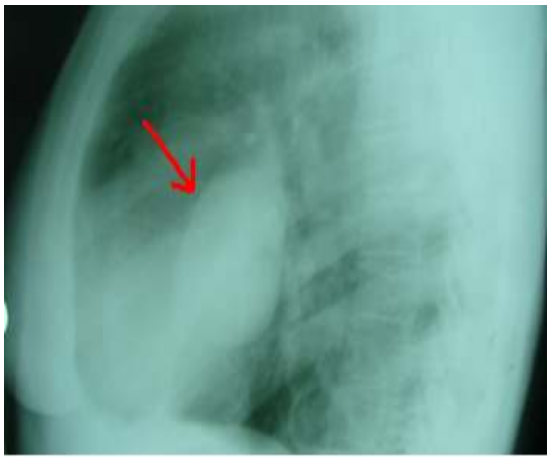

Figure 2. Round homogenous opacity - lateral view

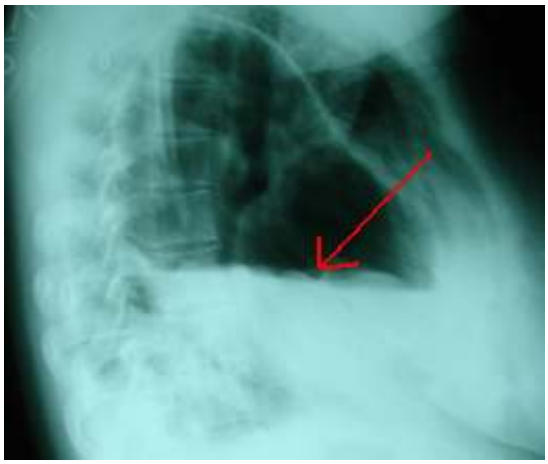

Figure 3. ruptured hydatid cyst water Lelly sign chest X-ray lateral view

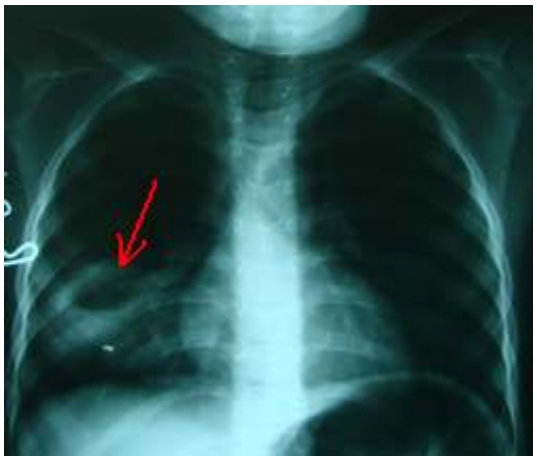

Figure 4. Lung abscess chest X-ray P-A view

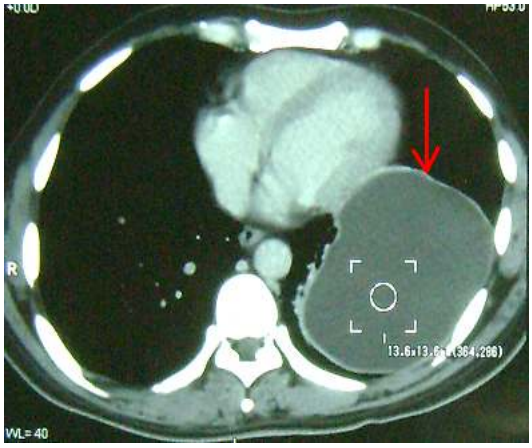

Figure .5 CT scan sagital view cystic lesion in Left posterior lower lung zone

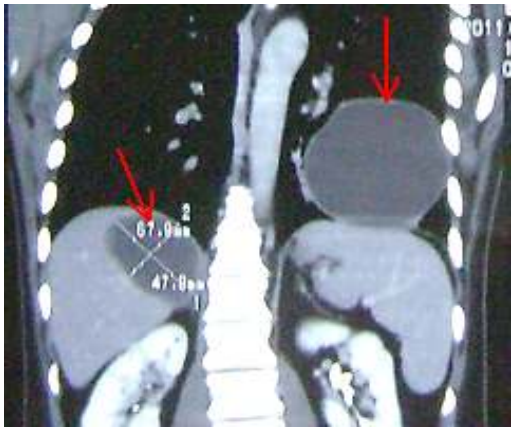

Figure 6. CT scan coronal view cystic lesion in: 1. Left lung (lower zone). 2. hydatid cyst in liver.

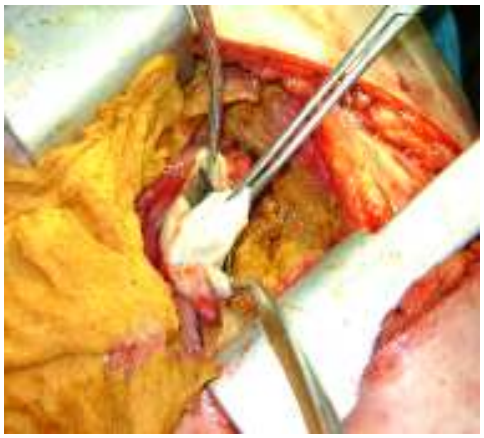

Figure 7. Endocyst removal through thoracotomy

RESULTS

Forty one cases were in the right lung, fifty six patients had the cyst in the left lung, and three patients had cysts in both lungs (Figure 8).

Multiplicity of hydatid cyst recorded in 17 patients and it was in the fallowing form Figure 9: eight of them multiple in one lung; three had cysts in both lungs. Five patients had hydatid cysts in the liver as well as the pulmonary cysts. One had cysts in the spleen besides the left pulmonary cyst. Sex distribution is shown in Figure 10.

The youngest patient was four years old boy with a large cyst in the right lung (Figure 11).

The oldest patient was 70 years old man presented as a suspected mass in the chest, diagnosed as a cyst during thoracotomy.

Most of the patients were below the age of 20 years (53 out of 100) as shown in table 1; the mean age for all the patients was 24.2 years.

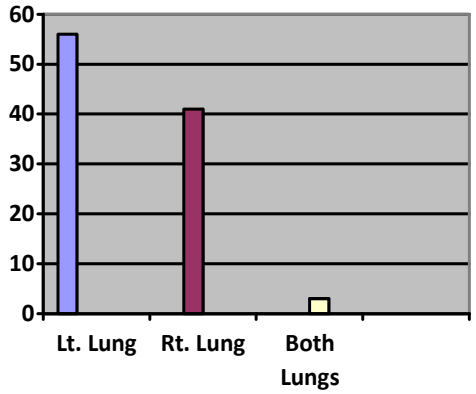

Figure 8. Distribution of hydatid cyst by lung side

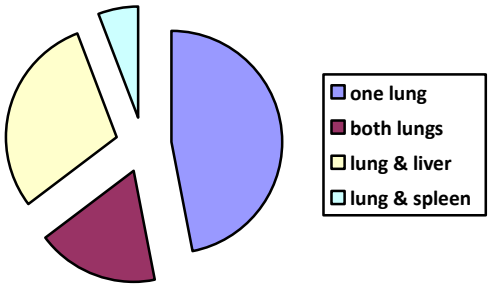

Figure 9. Distribution of cysts in the body organs (8 one lung, 3 both lung, 5 lung & liver, 1 Lung & spleen)

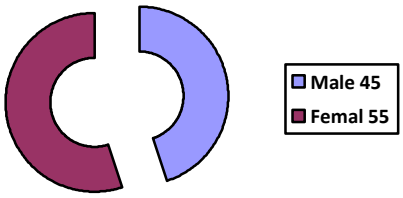

Figure 10. Gender distribution of hydatid cyst patients

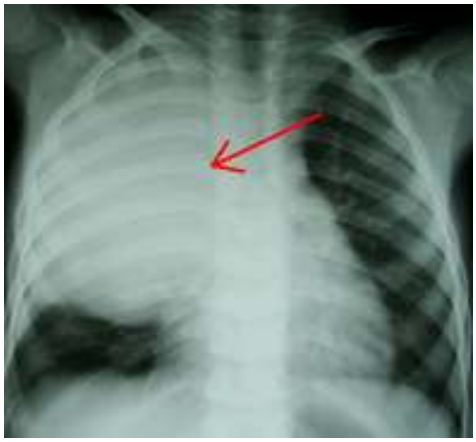

Figure 11. Four years old boy with a large cyst in the right lung

Table 1. Age distribution of the of the participant.

Age	Number of cases (total = 100 cases)
< 10 years	17
11-20 years	38
21-30	18
31-40	14
41-50	6
> 51	7

Lung resection (lobectomy) was needed in fourteen cases (14 %) where the lobe looked unhealthy, unlikely to inflate properly after removing the cyst. Re thoracotomy due to air leak only done in 2 patients (2 %). No mortality was recorded in this study (0%). Five patients had hydatid cysts in the liver as well as the pulmonary cysts. One of them through a separate subcostal incision and the others through the diaphragm. One had cysts in the spleen besides the left pulmonary cyst, dealt with through the diaphragm

DISCUSSION

Diagnosis of hydatid cyst is suspected by noticing a single or multiple rounded or oval homogenous lesions in the chest[7] especially if the lesion is detected in young age patient. These are uncomplicated cysts. CT may be helpful in establishing the diagnosis of a hydatid cyst whether they are complicated or not.[4] It shows the contents of the cyst in differentiation from solid masses and the relation of the cyst to the surrounded structure in complicated ones. Sensitivity of diagnostic serological methods varies significantly in different centers.[2-4] So they are regarded as

suggested as not diagnostic. Cysts might rupture and become complicated cysts. Rupture might be intrabronchial and the cyst will appear as a cavity with fluid level or even water lelly and might convert to lung abscess. Cyst might rupture to the pleural cavity and ends as hydro-pneumothorax, there is no report of major anaphylactic shock after rupture.[6] Chemotherapy alone is not reliable[6] though some reported that no viable proto-scolices was found after six weeks treatment with Albendazole.[5] Chemotherapy in chest hydatid cysts has its limitations.

Treatment of pulmonary hydatid cysts will increase the rate of rupture and this means converting the single non complicated cyst into a complicated one with higher rate of mortality and complications.

Gerilol reported that all his six cases of pulmonary hydatid cysts ruptured within two weeks of starting the Albendazole therapy.[6]

We did not use Albendazole treatment preoperatively but we used it post operatively especially if there was fluid spillage during surgery to prevent or reduce the risk of recurrence.

Management by PAIR method were aspiration, injection and wash out has very limited use in pulmonary hydatid cyst as it leads to perforation to the pleura which might lead to implantation of scolices in the pleural cavity.[7] Beside the possibility of pnaemothorax unless the visceral pleura is adherent to chest wall. Operation is the treatment of choice for pulmonary hydatid cyst.[4] The technique after opening the chest cavity, the area of the cyst is isolated by surrounding it by packs soaked with scolicidal agents (Povidone or Hibitane). The most evident area of the cyst which usually appears as "white patch" is punctured by a wide bore needle connected to suction, when the intracystic pressure has been lowered the cyst opened from the upper-most part of the cyst, the whole contents are removed. Air leak was secured and the lung tissue was dealt with in a very conservative way. The main principle followed was that no cure for hydatid cyst of the lung till all the contents of the cavity were removed and the air leak was secured.

The space of the cyst might be left open waiting for the lung tissue to expand and refill the space or the space is obliterated during the surgery if it comes easily without affecting lung expansion.

Small cysts less than 2-3 cm in diameter may regress completely after rupture especially when they are in the upper zone where gravity will help in postural drainage.

Generally we don't report major complication post operatively only 2 patients need re-exploration and no intra operative or post operative (hospital stay period) death.

Recommendations for prevention or for reducing the incidence of the disease:

- Education of the public through the media and schools to properly wash all the uncooked vegetables.
- Prevention of slaughtering animals outside proper slaughter houses to prevent the dogs from eating the infected organs.

- Get rid of all the stray dogs and treatment of the owned dogs against the tape worm.

REFERENCES

1. Markell EW, John DT, Kratoski WA. Markell and Voge's medical parasitology. 8th ed. Philadelphia, USA: W.B. Saunders Company; 1999.
2. Russell RC, Williams NS, Bulstrode CJ, editors. Baily and Love's short practice of surgery. 24th ed. Hoder Arnold.
3. Mirshemirani AS, Razavi S, Sadeghian S. Surgical treatment of pulmonary hydatid cyst in 72 children. 2009 NRITLD, National Research Institute of Tuberculosis and Lung Disease, Iran. Tanaffos. 2009;8(1):56-61.
4. Hacibrahimolu G, Çelik M, Fienol C, Orki A, Urek F, Arman B. Surgical treatment of complicated hydatid cysts of the lung. Turkish Respiratory Journal. 2003; 4(3).
5. Morris DL, Clarkson MJ, Stallbaumer MF, Pritchard J, Jones RS, Chinnery JB,. Albendazole treatment of pulmonary hydatid cysts in naturally infected sheep: Thorax. 1985 Jun;40(6):453-8.
6. Koul PA, Kanjwal MK. Albendazole induced rupture of pulmonary hydatid cysts. The Internet Journal of Pulmonary Medicine. 2006; 6(1).
7. Lt Col SP Rai, Nmkum R, Panda B, Bharadwaj CR. Pulmonary hydatid: diagnosis and response to hypertonic saline irrigation and albendazole. Medical Journal of Armed Forces India. 2005; 61(1).

پوختە

ئێشا کیسێت ئاڤێ ل کوئەندامێ هەناسی ل دهوکێ

پێشەکی و ئارمانج:

هەر ژ سالا 2006 ز دەمێ دەستپێکرنا نشتەرگەریێت ڤەکرنا سنکی، باراپتر ژ ڤان نشتەرگەریا بۆ جارەسەرکرنا کیسێت ئاڤێ بێت پشێ و مزاعفات یێت ژئەگەرێ تووشبوونا پشێ بوان بوون، کو خویا ببوو کو ئەڤ نساخیە کێشەکا تەندروستیە ل پارێزگەها دهوکێ. ئێشا کیسێت ئاڤێ یا پشێ ئێشەکا بەربەلاڤە ل هندەك جهان ل عیراقێ، دهوك ئێك ژوان جهانە. وەکی هاتیە گووتن، ئێشا کیسێت ئاڤێ یا پشێ ئێشەکا بەربەلاڤە ل پارێزگەها دهوکێ، ئەڤ ڤەکولینە هەول ددەت ریژا تووشبوونێ وچاوانیا دیاربوونا گازندێ ژڤێ ئێشێ، وباشترین ریکێت جارەسەریێ بدەت زانین. شێوێ نەخۆش بێ دئێتە دیتن یێ جورەوجورە، ژ دەستنیشانکرنا نەخۆشیێ ژ نیشکەکێ ڤە کو نەخۆشی چ ئازار نەبن، بۆ (مچاعفات)یێت کەلەك دژوار ژ ئەگەرا پەقینا کیسێ ئاڤێ.

ریکێن ڤەکولینێ: دهوك، وەك سەنتەرێ پارێزگەهێ، ئەو جهـ بوو ئەڤێ نشتەرگەریێت سنکی لێ دئێنە کرن، لەوما (ب نێزیکی) هەمی نەخۆشێت تووشی کیسێت ئاڤێ بێت پشێ بووین بۆ دهاتنە رەوانەکرن. ئەڤ نەخۆشە دهاتنە ڤەکولین بەری وپشتی نشتەرگەری بۆ وان دهاتنە کرن، دا خواندنا باشترین ریکێت چارەسەریێ بێتە کرن. جورێ نشتەرگەریا دهاتە کرن بۆ نەخۆشان هاتە گەنگەشەکرن، هەروەها (مچاعفات) ژی. چ دەرمانێت ژیاندژ نەهاتنە بکارئینان بەری نشتەرگەریێ، هەرچەندە (کورس)ەك هاتبوو دان بۆ چەند نەخووشان پشتی نشتەرگەریێ. ل دویماهیێ، ئاموزگاری بۆ ژبنبرنا نەخووشیێ، یان– ب کێمی– کێمکرنا ریژا تووشبوونێ یا سالانە هاتە گەنگەشەکرن. ئەو نەخۆشێن ئێشا کیسێت ئاڤێ هەی ئەوێن هاتینە چارەسەرکرن بریکا نشتەرگەریێ، هەر ژ سالا 2007ێ زاینی تا هەیڤا نیسانا سالا 2011ێ، هاتنە ڤەکولینێ. د ڤێ ڤەکولینێ دا ژیێ نەخۆشی، جهێ کیسێ ئاڤێ، ئازارا نەخۆشی ژنەخۆشیێ ددیت، هەروەها ئایە کیسێ ئاڤێ یێ ب (مچاعفات) بوو یان نە، ئەڤ هوکارە هەمی هاتنە وەرگرتن.

ئەنجام: شرووڤەکرن و دویڤچوونا ریکوردێت 100 نەخۆشان هاتە کرن، بەری وپشتی نشتەرگەریێ، ئەڤ نەخۆشە بێت هەمی نەخۆشخانێت پارێزگەها دهوکێ بوون. بارا پتریا نەخوشا د ژیێ 11–40 سالی دابوون. بو هەمیا نشتەرگەریا سنگی هاتە کرن و کیسك هاتە راکرن ل 86٪ و ئەندامێ هەناسی هاتە راکرن ل 14٪. و ل 2٪ ژ نەخوشا نشتەگەری دووبارە و چێ حالەتێن مرنێ ناهتنە تومارکرن.

دەرئەنجام: چارەسەریا کیسکێن ئاڤێ ل کوئەندامێ هەناسی ب ریکا نشتەرگەریێ باشترێن ریکە.

الخلاصة

الاكياس المائية الرئوية في محافظة دهوك

خلفية واهداف البحث: منذ عام 2006 عندما بوشرت عمليات فتح الصدر في دهوك اغلبية الحالات المرضية التي اجري لها فتح الصدر كانت لمعالجة الاكياس المائية الرئوية والمضاعفات الناتجة عن الاصابة بها حيث لوحظ انه مشكلة مرضية في محافظة دهوك مرض الاكياس الرئوية المائية هو مرض مستوطن في بعض أجزاء العراق . محافضة دهوك واحدة من هذه المناطق. كما ذكر ان الاكياس الرئوية المائية هو مرض مستوطن في محافظة دهوك , تبغي الدراسة لمعرفة نسب الاصابة وكيفية ظهور اعراض المرض والطرق الافضل للعلاج , اعراض المرض تتراوح من كونه غير ظاهر (يكتشف بالصدفة) الى المضاعفات الشديدة التي تتبع انفجار الكيس . دهوك مركز المحافضة المكان التي تتم فيه جراحة الصدر ولهذا تقريبا كل حالات الاكياس المائية في المحافظة يتم احالتها الى المركز , هذه الحالات تمت دراستها وتقييمها قبل وبعد التداخل الجراحي لتقييم افضل طرق العلاج, انواع التداخل الجراحي المتبعة نوقشت مع المضاعفات , لم تستعمل مضادات الطفيليات قبل العملية ولكن استعملت بعد العملية في بعض الحالات, أخيرآ نوقشت التوصيات لاستئصال او على الاقل لتقليل الاصابة بهذا المرض.

طرق البحث: هذه الدراسة لحالات الاكياس المائية في محافضة دهوك التي تم علاجها جراحيآ في الفترة ما بين كانون الثاني 2007 ونيسان 2011 , الدراسة تضمنت العمر مكان الاصابة في الرئة , الشكوى الرئيسية للمريض وكون الكيس بسيط او مع اختلاطات.

النتائج: تم اجراء التداخل الجراحي ل 100 مريض وتضمن الحالات الموجودة في كافة مستشفيات دهوك , معظم المرضى بعمر ما بين 11–40 سنة , كل المرضى تم علاجهم عن طريق فتح الصدر , الكيس (أو ألاكياس) استئصلت مع الحفاظ على النسيج الرئوي في 86% وتم الاستئصال في 14% من الحالات , أعادة فتح الصدر في 2% من المرضى مع عدم تسجيل اي حالة وفاة.

الاستنتاجات: العملية الجراحية هو الحل الوحيد المثبت للشفاء من الاكياس المائية الرئوية , تعدد الاكياس ليس بغير شائع, التداخل الجراحي ناجح بنسبة كبيرة مع نسبة معدومة أو قليلة جدا للوفاة.

ANGIOGRAPHIC VARIATIONS OF RENAL ARTERY AMONG DONORS OF KIDNEY IN DUHOK CITY

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ABSTRACT

Background and objectives Renal artery variations are not uncommon. It can be investigated by many means; so far renal conventional angiography is dependable in the disclosure of the anatomical variations of the renal artery. In order to take all the steps of successful transplantation, the kidney of potential donor should be studied thoroughly mainly its function and anatomy. From our side, we tried to study the prevalence of anatomical variations of renal artery by angiography in donors of kidney in Duhok city.

Methods Case-series study involved eighty three (83) kidney donors; aged between 18- 47 years (24+-2.1), 76 of them were males, referred from Duhok transplantation unit and assumed to be healthy after screening for any medical illness. In Cath-Lab of Azadi Heart Center in Duhok renal artery angiograms were obtained. Each angiogram consists of right and left renal artery images with a central aortogram. The data were collected from the 1st of January 2010 to 1st of July 2011. This study was approved by the Scientific Review Committee at Duhok College of Medicine.

Results Fifty four 54(65.1%) of them had normal single right and left renal arteries, but the remaining 29(34.9%) of supposed donors had anatomical variations of renal artery. Right renal artery: 14(16%) out of 83 showed variations (Double was 11,Trifurcate was 3 cases). Left renal artery: 21(25%) out of 83 had variations (Double was 17, Trifurcate was 4 cases. 5(6%) were bilateral. Main right and left renal artery originated mainly between L1 and L2 in 97.5%, 99% respectively.

Conclusions The results of this study indicated that the anatomical variations of renal artery is common and the anatomy of renal artery ultimately is necessary to be known prior of transplantation.

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Key words: Kidney, Renal artery variations, Kidney donors, Angiography

The anomalies of the kidneys; both structural and vascular are various and the congenital variations of urogenital system are relatively higher when compared to other systems, because the developmental stages of this system are more complicated. Some of these anomalies do not even cause clinical symptoms and don't require treatment. However some of them are predisposing to some pathological disorders because of the decrease in the blood supply or urine

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flow.[1]

Renal artery variations are common in the general population and the prevalence of these variations shows social, ethnic and racial differences. The frequency of multiple renal arteries shows variability from 9% to 76%, and is generally changes between 28 and30%.[2]

Renal angiography is dependable in the disclosure of this anatomical variation of the renal artery. By successful renal transplantation the course of chronic renal failure, which is common in our area and its cardiovascular sequels will be changed and even might reverse to normal. In order to take all the steps of successful transplantation, the kidney of donor should be studied thoroughly mainly its function and anatomy, so that, from our side, we tried to study the prevalence of anatomical variation of renal vasculature by angiography in donors of kidney in Duhok city. Up to our knowledge studies on renal artery variation in our area are absent.

METHODS

The study involved eighty three (83) kidney donors; aged between 18- 47 years (24+-2.1), 76(91.5%) of them were males,7(8.5%) were females; referred from Duhok Transplantation Unit and assumed to be healthy after screening for any evidence of medical illness and those who were not healthy deferred from the donation of kidney. In the Cathlab of Azadi Heart Centre the interventional cardiologist prepared the patient and through trans femoral approach, renal artery angiography were obtained. Each angiogram consists of right and left renal artery images with a central aortogram image; in order not to miss any anatomical variation of renal artery then documenting the results of renal angiography by reports and sending the patients to the transplant unit. The data were collected from the 1st of January 2010 to 1st of July 2011. The angiogram reports and images were archived in the Cath-Lab unit as a document. The anatomical characteristics of renal arteries and their distribution according to their originating levels to vertebrae were studied.

RESULTS

Fifty four 54 (65.1%) of them had normal single right and left renal artery supplying kidneys, but the remaining 29 (34.9%) supposed donors had anatomical variation of renal artery. 5(6%) bilateral renal artery variations. Right renal artery: {(double= 11 persons, 7 of them were of separate origin from aorta & 4 were of single origin), (Trifurcate right= 3 persons, two of them from separate origin, one was of single origin)}. Left renal artery: {(double=17, 10 of them were of separate origin, 7 were of single origin), (Trifurcate=3, two of them from separate origin, one was of single origin)} as shown in figure 1 and 2.

Right renal artery origins: In 97.5% of the patients, main renal artery originated between the L1 and the L2 vertebrae. Right main renal artery originated at the level of the L1 vertebra in 23%, from the level of the L1-L2 intervertebral disc in 66%, and at the level of the L2 vertebra in

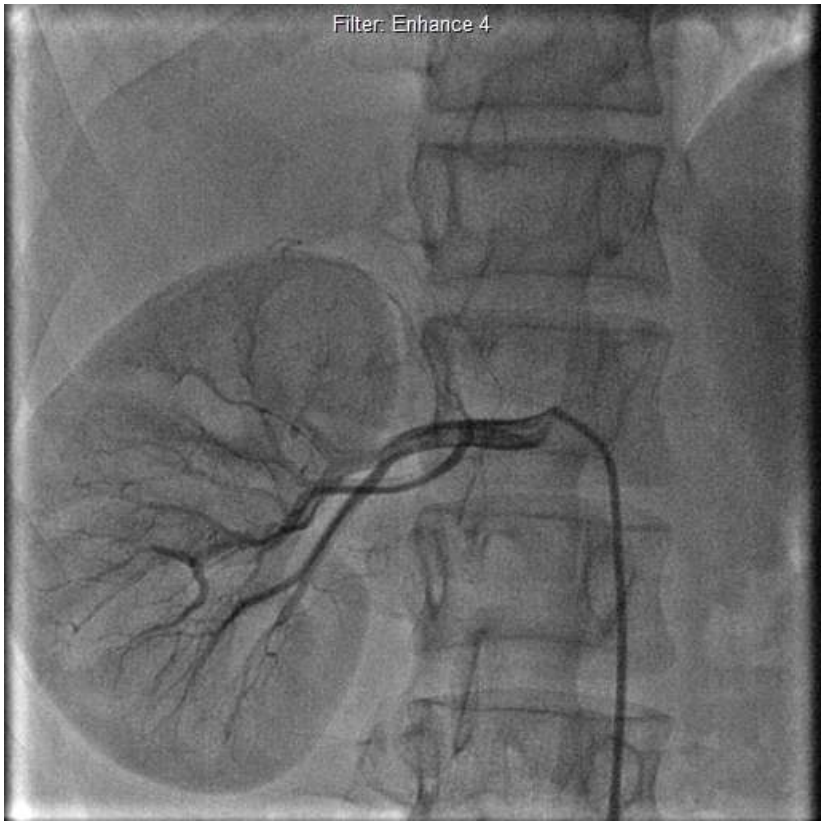

Figure 1. Renal angiogram with single main renal artery

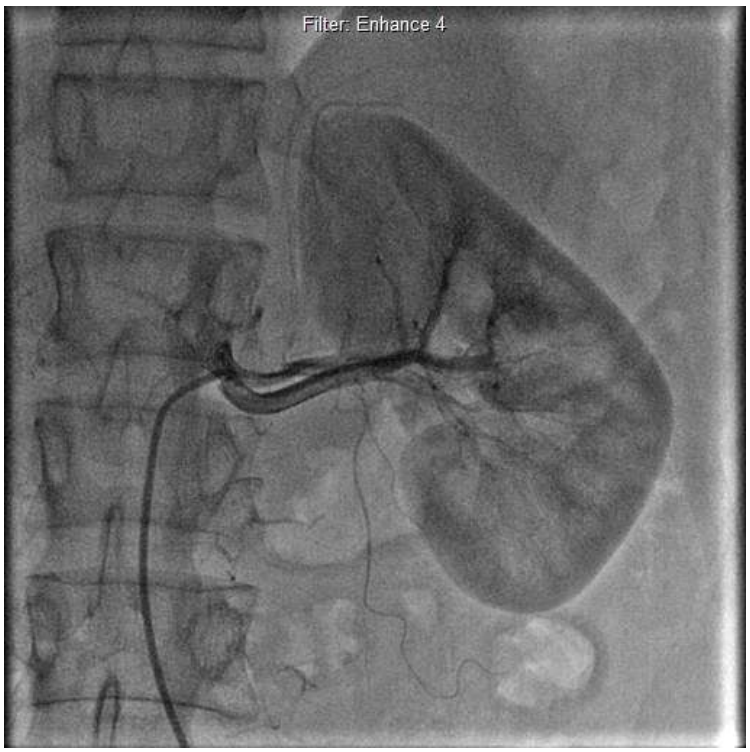

Figure 2. Renal angiogram with double separated renal artery

Table 1. Characters of right renal artery

Characters	Number	Single origin	Separate origin
Single	45+15= (69)*	54+15= (69)	0
Double	11	3	8
Trifurcate	3	2	1
Total	83	74	9

*15 indicated unilateral single renal artery (right side)

Table 2. Characters of left renal artery

Characters	Number	Single origin	Separate origin
Single	54+9= (63)*	63	0
Double	17	7	10
Trifurcate	3	1	2
Total	83	72	11

*15 indicated unilateral single renal artery (right side)

about 8.5% of the patients, and about 2.5% at the level of others. The extra renal artery (ERA) in right side originating at lower rate than main renal artery at intervertebral disc level.

Left renal artery origins: In 99% of the patients, main renal artery originated between the upper margin of L1 and the lower margin of L2 vertebrae. Main renal artery originated at the level of L1 vertebra in 20% of the cases, from the level of the L1-L2 intervertebral disc in 60% of the patients and from the level of the L2 vertebra in 19% of the cases. The extra renal artery in left side commonly originated at the levels of L1and L2 more than at the level of disc between them.

DISCUSSION

Renal artery variations are common and a knowledge of the variations of the renal vasculature anatomy has importance in the exploration and treatment of successful renal transplantation, reno vascular hypertension, renal trauma and in interventional radiology. Renal vasculature had been examined and studied by using several methods; at earlier time cadaver dissections are widely used to determine anatomical variations. At time radiological examination is the best way to determine the vascular variations and to evaluate their incidences.[3] Conventional renal angiography has been accepted as the gold standard for the assessment of renal vasculature in renal transplant donors.

Table 3. Renal artery distribution according to vertebral level of origin

Renal artery	L1 level No. (%)	L1-2 level No. (%)	L2 level No. (%)	Other levels No. (%)
Right side	19(23)	55(66)	7(8.5)	2(2.5)
Right ERA	4(28.5)	3(21.5)	4(28.5)	3(21.5)
Left side	17(20)	49(60)	16(19)	1(1)
Left ERA	6(30)	4(20)	6(30)	4(20)

However in recent years it is being replaced by computed tomographic angiography and MR angiography since it is an invasive technique.[3-5]

Kidney transplantation is the treatment of choice for the vast majority of patients with end stage renal disease, but many current challenges with donor grafts are present; some of them are the results of anatomic variants; of these variants multiple renal arteries are the most common and the rate of post-surgical complications like arterial thrombosis, renal artery stenosis in transplanting a kidney with multiple arteries is higher compared to single artery graft.[6]

In this study the main findings were normal and single both right and left renal arteries in about (65%) of population originating from abdominal aorta mainly at the level of L1 and L2 vertebrae. This is nearly in consistence with other anatomical reference regarding the renal artery variation and level of origin. Glass referred in grey anatomy to 70% of general population has single bilateral renal artery originating from aorta at level of L1-L2 vertebrae.[7]

Kadir declared that in 75% of the general population, main renal artery originate from the level of the L1-L2 intervertebral disc and the other 25% originate somewhere between the lower end-plates of T12 and L2[8]. It is important also to consider these results in studying the variations and origin of renal vasculature while using non-invasive methods for renal artery anatomy and pathology such as reno vascular hypertension, as well as during surgeries related to renal arteries and kidneys.

The rate of variation of right and left renal arteries in this study was 29 (34.9%); 11(78.5%), 3(21.5%) of them have double and triple right renal respectively and 17(85%), 3(15%) of them have double and triple left renal artery respectively; 5(6%) of them have bilateral finding. In Harrison et al study 68% have single renal artery bilaterally, while 32% of their population exhibited anatomical variation of renal artery & in 5% of them the finding were bilateral. The main variation was double renal artery in around 90% of the abnormal rate, the remaining is triple renal artery(10%).[9]

In Satyapal et al study in South Africa; the incidence of double and triple renal arteries was 23.2% and 4.5%, and bilaterally was 10%. Additional arteries occurred more frequently on the left(32%) than on the right side (23%).[10] They also noted significant differences in the incidence of variations between sex (males> females) and race (African than others).

In Iran Fahimi found 18% of potential donors had renal artery variations, more in males population, 13% of them on the left side, 5% on the right and the majority of the right and left renal arteries originated at the first lumbar vertebral level.[11]

In Turkey, Ozkan and their colleagues noted that there was single renal artery feeding both kidneys in 76% of the population that was (202 person). More than one renal artery was found in 24%. More than one renal artery was observed on the right side in 16% and on the left side in 13% of population. In 5% there was

variation bilaterally.[2]

In Colombia, a study composed of 196 cases (85.4% were males, aged 33.8 years+_ 15.6), an additional renal artery found in 22.3% of population, two additional renal artery in 2.6%. The variation was more common on left side.[12]

In this study there were no errors in the prediction of arterial number when compared to their surgical findings during transplantation, and this indicated that the technique of angiography was correct in detecting the abnormalities of renal artery.

In conclusion the renal artery variation in our population is not uncommon. The rate nearly is close to the population of other areas. The influence of this variation should be taken in consideration during renal vascular surgeries in general and in renal transplantation specifically. Here it is worthy to recommend further studies to compare such results with more noninvasive test results such as MRA or MSCT angio of renal artery anatomy in order to use more noninvasive test for the purpose of investigating the anatomy and even pathology of renal vasculature.

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

Ameen M Mohammad (AMM), contributed the concept and design, data collection; interpretation with analysis and drafting with revision of the manuscript; Mohammed A Abdulrahman (MAA), contributed to the larger part of the angiographic work ; Shakir S Jabaly (SSJ), contributed to the larger part of the surgical and transplantation work. All authors approved the final submitted version of the manuscript.

REFERENCES

1. Campell MF. Anomalies of kidney. In: Campell MF, Harrison JS, editors. Urology. 3rd ed. Vol. 2. Philadelphia: W.B. Saunders; 1970. p. 1416-86.
2. Ozkan U, Oguzkurt L, Tercan F, Kizilikilic O, Koc Z, Koca N. Renal artery origins and variations: angiographic evaluation of 855 consecutive patients. Diagn Interv Radiol. 2006; 124: 183-6.
3. Ragiba Z, Can P, Ayla K. A retrospective study on multiple renal arteries in Turkish population. Anatomy. 2009;3:35-9.
4. Firat A, Akin O, Agildere AM, Aytekin C, Haberal M. Contrast-enhanced resonance angiography: evaluation of renal arteries in living transplant donors. Eur J Radiol. 2004;521: 84-93.
5. Fox M, Yalin R. Renal transplantation with multiple arteries. Br J Urol. 1979; 55:333-6
6. Benedetti E, Troppmann C, Gillingham K, Sutherland DE, Payne WD, Dunn DL, Matas AJ, Najarian JS, Grussner RW. Short and long term outcomes of kidney transplants with multiple renal arteries. Ann. Surg.1995;221(4):406-14.

7. Glass J. Kidney and ureter. In: Standring S, editor. Gray,s anatomy. 39th ed. Churchill Livingstone: 2005. p. 1274-6.
8. Kadir S. Kidneys. In: Kidar S, editor. Atlas of normal and variant angiographic anatomy. Philadelphia: W.B. Saunders Company;1991.p. 387-429.
9. Harrison Jr, Flye MW, Seigler HF. Incidence of anatomical variants in renal vasculature in the presence of normal renal function. Ann Surg. 1978;188(1):83-9
10. Satyapal KS, Haffejee AA, Singh B, Ramsaroop L, Robbs JV, Kalideen JM. Additional renal arteries: incidence and morphometry. Surg Radiol Anat. 2001. 23(1):33-8.
11. Fahimi F, Saba M. Evaluation of the renal arteries in kidney donors by conventional angiography. Journal of Qazvin University of Medical Sciences. 2003; 7(3):43-7
12. Saldarriaga B, Perez AF, Ballesteros LE. A direct anatomical study of additional renal arteries in a Colombian mestizo population. Folia Morphol (Warsz) 2008;67(2):129-34.

پوخته

جیاوازیا ئه نجیوکرافیا رەها خوینا کولجیسکی ل جه م خوبه خشیین دانا کولجیسکی ل بازیری دهوکی

پێشەکی و ئارمانج: ئه ف فه کولینه یا هاتیه ئه نجامدان ل نه خوشخانا ئازادی ل دهوکی ل سه نته ری ئه نجیوکرافیا دلی، هه ر ز ده ستبیکا 2010هه تا هه یفا حه فتا .2011ئه نجیوکرافی یا هاتیه ئه نجامدان ز بو 83خوبه خشیین کولجسیکی ئه فیین ساخله م ز هه می ئالیین نوزداری فه، وهاتنه ره وانه کرن ز لایی سه نته ری جاندنا کولجسکی فه ل نه خوشخانا ئازادی .هه می ئه و که سیین ئه جیوکرافی بو دهاته ئه نجامدان، مه هول ددا لایی راست ولایی جه ب یین کولجسکی ب ده ماریین وان یین خوینی بخووینین، وفوتوپین بیدفی بو وان ره هان د هاتنه وه رکرتن، وفوتویه کی زیده بو ره ها ئه ورته یی ل سه نته ری وی د هاته کرتن، دا هه می ئه نه تومی ب ئاشکرایی دیاربیت.

ریکێن فەکولینێ: ئه نجیوکرافی هاته ئه نجامدان بو 83که سان به ره ف بو خوبخشاندنا کولجسکی، 7ز وان ره که زی نیر بوو، و حه فت ز وان رهکه زی می بوو، زیی وان ز 18-47سالی بوو .هه می بشکنیین بیدفی بوو فان که سان هاتبوونه ئه نجامدان ل سه نته ری جاندنا کولجسکی ,و باش هاتبوونه ره وانه کرن بو سه نته ری دلی ز بو ئه نجامدانا کریارا ئه نجیو کرافیا ره ها خوینی یا کولجسکی .ل زورا ئه جیوکرافی ب ریبا ره ها خوینی یا بیی فوتوپین بیدفی بو هه ر دوو ئالیبا هاته ئه نجامدان.

ئەنجام: ز 83که سان، 69ز وان ره ها خوینا کولجسکا راستی و 63یا جه بی ز ئیك زیده ر د ده رکەتن 54 .ز وان ئیك ره ها خوینی ل کولجیسکا لایی راست وجه بی هه بوون,لی 29که سان ز ئیك رەهی بتر هه بوون .ل لایی راستی 10که سان دوو رهه هەبوون)و ز وانا 7ز ئیك زیدەر د هاتن,و 3ز دوو زیدەرا د هاتن(، و 3کەسان سی رەه هەبوون .ل لایی جەبی 17کەسان دوو رەه هەبوون و 2 کەسان سی رەه هەبوون .ئیك ل لایی راستی وئیك ل لایی جه بی رەها خوینی نه یا ساخلەم بوو.

دەرئەنجام: ز بەر هەبوونا جیاوازیین ئه نه تومی ل رەهین خوینیا کولجسکی بیدفیه بشکنیین بیدفی ب هینه ئه نجامدان ز بو زانینا وان جیاوازیین ز بە ر کار تیکرنا وان ل سەر ئه نجامین جاندنا کولجسکی.

الخلاصة

دراسة الاختلافات القسطارية للشريان الكلوي لدى المتبرعين بالكلية في مدينة دهوك

خلفية واهداف البحث: الاختلافات التشريحية للشريان الكلوي ليست قليلة ,ويمكن الكشف عن ذلك بواسطة العديد من الوسائل، وتصوير الأوعية عن طريق القسطرة يمكن الاعتماد عليها في الكشف عن الاختلافات التشريحية للشريان الكلوي .وينبغي اتخاذ كافة الخطوات من اجل زراعة ناجحة للكلية، ومن جانبنا، حاولنا دراسة انتشار الاختلافات التشريحية من الأوعية الدموية في الكلى عن طريق القسطرة للأشخاص المتبرعين بالكلية في مركز زراعة الكلية بمدينة دهوك.

طرق البحث: الدراسة شملت 83شخصا يفترض ان يكونوا من المتبرعين بالكلية، الذين خضعوا لتصوير الأوعية للشريان الكلوي في وحدة قسطرة القلب والأوعية الدموية في مركز آزادي للقلب، وذلك بالتعاون مع وحدة زراعة الكلى في مستشفى آزادي في دهوك .وتتراوح أعمارهم ما بين 47 – 18سنة (2.1− + 24)، و 76منهم من الذكور، ويفترض أن يكونوا اصحاء بعد اجراء الفحوصات اللازمة .ومن خلال طريقة شريان الفخذ تم الحصول على تصوير القسطاري للشريان الكلوي .وتاخذ الصورة لجهة اليمين واليسار للشريان الكلوي مع صورة واحدة للشريان الأبهر لكي لا تفوت أي اختلاف تشريحي للشريان الكلوي .وقد تم جمع البيانات من 1يناير 2010إلى 1يوليو 2011.

النتائج: 65.1) 54٪ (منهم لديهم شريان كلوي واحد طبيعي في الجهة اليمنى واليسرى للكلية، ولكن البقية (34% 29) لديهم اختلاف تشريحي للشريان الكلوي .الشريان الكلوي اليمين)} :مزدوج 12) 11 =٪(، 7منهم هم من أصل مستقل من الشريان الأورطي، 3أصل واحد(،)ثلاثي الفروع 3 =، اثنان منهم من أصل منفصلة، واحدة من أصل واحد(، .{الشريان الكلوي اليسار)} :مزدوج 20) 17 =٪(، و 10منهم هم من أصل مستقل، و 7من أصل واحد(،)ثلاثي الفروع 3 =، واحد من أصل مستقل، والثاني هو من أصل واحد.

الاستنتاجات: أن الاختلاف التشريحي للشريان الكلوي هو شائع، ومعرفة هذه الاختلافات التشريحية هي في نهاية المطاف ضرورية قبل عملية الزرع الكلوي، من اجل ان تكون عملية زراعة الكلية ناجحة اكثر وبمعدل اقل للمضاعفات الجراحية.

HEPATITIS B VACCINATION AMONG HEALTH CARE WORKERS IN ERBIL CITY, IRAQ

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ABSTRACT

Background and objectives In developing countries, 40-60% of Hepatitis B Virus infection in Health care workers was attributed to professional hazard. This study was carried out to calculate the vaccination rate among health care workers, and to assess the presence of association between vaccination rate and socio-demographic characteristics of health care workers.

Methods A cross-sectional study was conducted in Erbil City between September 1st, 2011 and March 1st, 2012 involving a convenient sample of health care workers from different departments in Erbil Teaching Hospital.

Results The sample included 300 health care workers (57% were males and 43% were females); their mean ± SD age was 30.43 ± 6.79 years (ranged from 20 to 55 years) with a male: female ratio of 1.33:1. Results revealed that 56.7% of participants have received vaccination and amongst this group 63.5% had completed their vaccination schedule of three doses and 36.5% were partially vaccinated. Vaccination uptake among males was significantly higher than females (64.3% vs. 46.5%) (P=0.002) and there was significant (P=0.001) association between type of employment and vaccination coverage which was highest among doctors.

Conclusions The vaccination rate was 56.7%, and the rate of vaccination was higher in males and doctors had the highest rate of vaccination. The highest vaccination coverage is in those who work in the emergency department followed by laboratory department than other work areas.

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Key words: Hepatitis B vaccine, rate, Erbil City

Among the blood borne pathogens, hepatitis B virus (HBV) has gained the status of global public health threat by being the 10th major deaths causing disease. HBV infects more than 2 billion peoples worldwide, of which over 350 million peoples are chronic carrier.[1] Hepatitis B virus is the leading issue of concern in society and medicine particularly in under-resourced health care system which lacks the safety measures necessary to avert the risks of infection.[2,3] Different wide hospital-based and population-based HBV surveys (individual researchers) estimated a prevalence rate of 2-7%. During the past two decades this risk has become even more significant as the prevalence of HBV has increased significantly[4], and risk of contracting hepatitis B by Health Care Workers (HCWs) is four fold higher as compared to general adult population. [1,5,6] Worldwide annual proportion of HCWs exposed to HBV infection were about 5.9%.

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In developing countries, 40-60% of HBV infection in HCWs was attributed to professional hazard while in developed countries the attributed fraction was less than 10% due to vaccination coverage.[1] The risk of HBV infection in an unvaccinated person from a single HBV infected needle stick injury ranges from 6-30%.[5]

Considering the importance of health care personnel and scarcity of significant report in HCWs from Erbil city, this study was designed to calculate the coverage rate of HBV vaccination in different occupational groups of HCWs, and to fine main barriers to vaccination. In addition to assessing its association with socio-demographic characteristics of participants.

METHODS

Population and data collection

A cross-sectional study was conducted in Erbil City between September 1st, 2011 and March 1st, 2012 involving a convenient sample of 300 HCWs from different departments in Erbil Teaching Hospital, Erbil city, Iraq. Verbal informed consent was obtained from all participants and they were assured that their participations were voluntary and their responses were anonymous and confidential. The official permission for carrying out this study was obtained from Erbil Teaching Hospital. Health care workers with more than 6 months of job experience and having frequent blood contacts were included in the study. Data collection was done via self administered questionnaire, including socio-demographic characteristics; age, sex, marital status, employment type, employment place, and vaccination coverage status. The questionnaire also contained questions related to reasons for non-vaccination. The vaccination status of participants categorized into incomplete vaccination (less than three doses) and complete vaccination (three doses). The usual schedule for adult is at 0,1, 6 months.

Data analysis

Data entry and analysis was done by using Statistical Package for Social Sciences (SPSS, version 18.0). P value $\leq$ 0.05 regarded as statistically significant. Statistical tests included Chi-square ($\chi 2$) test to compare between the proportions of different "characteristics" among those who received vaccination with the same proportions among those who did not.

RESULTS

The sample included 300 HCWs (57% were males and 43% were females); their mean ± SD age was 30.43 ± 6.79 years (ranged from 20 to 55 years) with a male: female ratio of 1.33:1. The mean ± SD ages of HCWs who received the vaccine was 30.86 ±6.74 while the mean of those who did not receive was 29.87 ±6.84 years. Table 1 shows that 56.7% of participants have received vaccination and vaccination rate among males was significantly higher than females (64.3% vs. 46.5%) (P=0.002). There was a significant (P=0.001) association between employment status where vaccination coverage was highest among doctors. Out of the 170 vaccinated participants, 63.5%

have received complete vaccination doses, 36.5% received incomplete vaccination doses. A statistically significant association between vaccination doses and employment type (P=0.041) was proved, (Table 2).

Table 1. HBV vaccination coverage by sample characteristics

Characteristics	HBV vaccine coverage		P-value
	Received No. (%)	Not received No. (%)	
Age group (year)			
< 26	50 (54.9)	41 (45.1)	0.596
26- 35	83 (55.3)	67 (44.7)	
36- 45	32 (65.3)	17 (34.7)	
46-55	5 (50.0)	5 (50.0)	
Sex			
Male	110 (64.3)	61 (35.7)	0.002
Female	60 (46.5)	69 (53.5)	
Marital status			
Single	75 (54.3)	63 (45.7)	0.454
Married	95 (58.6)	67 (41.4)	
Employment status			
Doctor	66 (68.8)	30 (31.2)	0.001
Nurse	69 (55.2)	56 (44.8)	
Pharmacist	6 (25.0)	18 (75.0)	
Technician	7 (35.0)	13 (65.0)	
Lab Worker	22 (62.9)	13 (37.1)	
Employment place			
Emergency	74 (57.4)	55 (42.6)	0.959
Ward	40 (56.3)	31 (43.7)	
Outpatient clinic	11 (57.9)	8 (42.1)	
ICU	16 (61.5)	10 (38.5)	
Lab.*	29 (52.7)	26 (47.3)	
Years of employment			
> one year	131 (59.5)	89 (40,5)	0.091
≤ one year	39 (48.8)	41 (51.2)	
Total	**170 (56.7)**	**130 (45.3)**	

*Lab worker and technicians

Table 2. HBV vaccination doses by employment status

Employment status	HBV vaccination doses		Total	P value
	Incomplete No. (%)	Complete No. (%)		
Doctor	28 (42.4)	38 (57.6)	66	0.041
Pharmacist	3 (50.0)	3 (50.0)	6	
Nurse	25 (36.2)	44 (63.8)	69	
Technician	4 (57.1)	3 (42.9)	7	
Lab worker	2 (9.1)	20 (90.9)	22	
Total	62 (36.5)	108 (63.5)	170	

Results revealed that 27.7% of the participants have no time to be vaccinated; 22.3% been not at risk and 13.4% thought that the vaccine is not available, (Table 3).

Table 3. Reasons of non vaccination

Reasons of non vaccination	No. (%)
Been not at risk	29 (22.3)
Don't believe in the efficacy of the vaccine	20 (15.3)
Forget to take	11 (8.40)
Don't have time	36 (27.7)
Been pregnant	5 (3.80)
Worried about side effects	11 (8.40)
Thought not available	18 (13.8)
Total	130

DISCUSSION

Iraq was a pioneer among Middle Eastern countries in introducing the hepatitis B vaccine. The importation of sufficient amounts of vaccines in the early 1980s allowed for the vaccination of high risk groups since 1986 and introduction of infant immunization for hepatitis B as a part of Expanded Program on Immunization (EPI) since 1992.[7,8] This study revealed that the overall HBV vaccination coverage among HCWs was 56.7%, which is more than that reported in previous study conducted in Erbil,[9] in which the vaccination coverage rate among such group was 18.2%. According to the report issued by Iraqi Health Authorities in 2006, 29.4% of HCWs in Iraq have received the full course of HBV vaccination.[8] The current study likely reflects the wide educational campaign for the prevention of parenterally transmitted viral infections addressed to HCWs in Iraq during the past years. A study conducted in Athens found nearly the same vaccination coverage rate (57.1%).[10] The universal coverage is not achieved despite the availability of vaccine since 1992.[8] Most of the western countries recommend the need for immunization against HBV in the start of career in healthcare setting[2] but no such policy is employed in Iraq, either in letter or in spirit. The coverage rate of HBV vaccination was significantly higher among males than females (P=0.02), this might be due to that females are more concerned about their health and side effects of the vaccine. It is a matter of fact that the risk factors against the vaccination coverage would vary among different occupations and among different regions of country.[2,11] Determining the reasons against the vaccination provides valuable information for identification and evaluation.[12] By eliminating these reasons and providing necessary facilities, 100% vaccination coverage is well within the interest of possibility.[13] Results might be able to shed light on major obstacles to vaccine coverage, including work pressure and negligence of the vaccine, and may act as a local data to develop important guidelines which, if properly implemented, will be able to control the spread of Hepatitis B infection in Erbil. This study is a non-probability approach that can not be used to infer from sample to general population under study. Further suitable studies such as sero-prevalence are recommended to know the actual protective level.

Despite the availability and accessibility of a cost effective Hepatitis B

vaccine since mid 80's, the vaccination coverage among health care workers is low (56.7%). The rate of vaccination was higher in males, doctors and those with more than one year of employment.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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REFERENCES

1. Singhal V, Bora D, Singh S. Hepatitis B in health care workers: Indian scenario. J Lab Physicians 2009; 1(2):41-8.
2. Hussain S, Patrick NA, Shams R. Hepatitis B and C prevalence and prevention awareness among health care workers in a tertiary care hospital. Int J Pathol 2010; 8(1):16-21
3. Qureshi H, Bile KM, Jooma R, Alam SE, Afridi HU. Prevalence of hepatitis B and C viral infections in Pakistan: Findings of a national survey appealing for effective prevention and control measures. East Mediterr Health J 2010; 16: S15-23.
4. Jahan S. Epidemiology of needle sticks injuries among health care workers in a secondary care hospital in Saudi Arabia. Ann Saudi Med 2005; 25 (3):233-8.
5. Sharma R, Rasania SK, Verma A, Singh S. Study of prevalence and response to needle stick injuries among health care workers in a tertiary care hospital in Delhi, India. Indian J Community Med 2010; 35(1):74-7.
6. Reis RK, Gir E, Canini SRMS. Accidents with biological material among undergraduate nursing students in a public Brazilian university. Braz J Infect Dis 2004; 8(1): 18-24.
7. Ali HY. Hepatitis B infection among Iraqi children: the impact of sanctions. East Mediterr Health J 2004; 10(1-2): 6-11.
8. Al-Mashhadani JI, Al-Hadithi TS, Al-Diwan J, Omer AR. Prevalence of hepatitis B serological markers in Baghdad, Iraq. J Arab Board Med Special 2008; 9(3):17-22.
9. Mansoor AY, Othman SM. Screening of hepatitis B surface antigen among certain risk groups and general population in Erbil governorate. Zanco J Med Sci 2006; 10(1&2): 48-51.
10. Rachiotis G, Goritsas C, Alikakou V, Ferti A, Roumeliotou A. Vaccination against hepatitis B virus in workers of a general hospital in Athens. Med Lav 2005; 96 (1): 80-6.
11. Ahmed H, Rauf MA, Farooqi JI, Khan N, Saad , Imtiaz, *et al*. Status and attitude towards hepatitis 'B' virus vaccination in staff of lady reading hospital Peshawar. JPMI 2009; 23(3):209-12.

12. Amini-Ranjbar S, Motlagh ME. Hepatitis B vaccination coverage among Iranian medical students and nursing staff. Am J Applied Sci 2008; 5(6):747-9.
13. Naz S, Ahmad M, Asghar H. Prevalence of hepatitis 'B' among hospital personnel in combined military hospital (CMH) Muzaffarabad. Int J Agri Biol 2002; 4(2):227-30.

پوختە

ماکوتەی ڤایرۆسی جگەر جۆری ب لە نێوان کارمەندانی تەندروستی لە شاری هەولێر–عیراق

پێشەکی و ئارمانج: لە وولاتە پێگەیشتووەکان 40 – 60 ٪ نەخۆشی هەوکردنی ڤایرۆسی جەرگ جۆری B لە کارمەندانی چاودێری تەندروستی دەگەڕێتەوە بۆ هۆکاری ترسناکی پیشەیی : ئەم توێژینەوەیە ئەنجام دراوە بۆ دیاری کردنی ڕێژەی کوتان لە نێوان ئەو کارمەندانەی کە لە بواری چاودێری تەندروستی کاردەکەن ، هەوەها بۆ هەلسەنگاندنی پەیوەندی نێوان ڕێژەی کوتان و تایبەتمەندیەکانی گشتی لە کارمەندانی بواری چاودێری تەندروستی.

ریکێن ڤەکولینێ: ئەم توێژینەوەیە ئەنجامدراوە لە ماوەی 1 – 9– 2011 تا 1– 5 – 2012 لە شاری هەولێر بە وەرگرتنی نموونە (سامپڵ) لە کارمەندانی بورای چاودرێری تەندروستی لە بەشە جیاوازەکان لە نەخۆشخانەی فێرکاریەکانی هەولێر.

ئەنجام: ئەم توێژینەوەیە (300) کارمەندی چاودێری تەندروستی دەگرێتە خۆی کە ڕێژەی نێر (57 ٪) وە ڕێژەی مێ (43 ٪) کە تەمەنیان لە (22–55 ساڵ) بوو. ئەنجامی ئەم توێژینەوەیە پیشانی دا کەوا تێکڕایی 56,7 ٪ لە بەشداربووان کوتراون وە لە نێوانیان دا 63,3 ٪ بەتەواوی کوتراون (3 جار) بەڵام 6,5 ٪ کەمتر لە 3 جار کوتراون . ڕێژەی کوتان لە نێوان نێرو مێ بم شێوەیە بوو 64,3 ٪ و 46 ٪ بەك لە دوای یەك . وەهەروەها پەیوەندیەکی بەهێز هەیە لە نێوان حۆری کارکردن لەگەڵ ڕێژەی کوتان کە زۆر بەرزبوو لە نێوان پزیشکان.

دەرئەنجام: ڕێژەی کوتان 56,7 ٪ بوو کە ڕێژەکە زۆربەرزبوو لە بەشداربووانی ڕەگەزی نێر وە هەروەها لە نێوان پزیشکان وە هەروەها دەرکەوت کە ڕێژەکە بەرزترە لە نێوان ئەو کەسانەی کەە کاردەکەن لەبەشی فریاکەوتن و تاقیگەکان وەك لەوانەی کە کاردەکەن لە شوینەکانی تری نەخۆشخانە.

الخلاصة

لقاح الكبد الفايروسي نمط ب بين الكوادر الصحية في مدينة اربيل، العراق

خلفية واهداف البحث: في البلدان النامية، 40–60٪ من حالات العدوى بفيروس التهاب الكبد B في العاملين في مجال الرعاية الصحية تعود لمخاطر مهنية .وقد أجريت هذه الدراسة لتحديد معدل التطعيم بين العاملين في مجال الرعاية الصحية، ودراسة العلاقة بين نسبة التطعيم والخصائص العامة من العاملين في مجال الرعاية الصحية.

طرق البحث: أجريت دراسة مقطعية في مدينة اربيل للفترة من 1 سبتمبر 2011 و 1 مارس 2012 على عينة مناسبة من العاملين في الرعاية الصحية من مختلف الأقسام في مستشفى أربيل التعليمي.

النتائج: شملت عينة 300 من العاملين في الرعاية الصحية وكانت نسبة الذكور (57٪) و الإناث (43٪). معدل العمرما بين 22 الى 55 سنة. و قدكشفت النتائج أن 56.7٪ من المشاركين تلقوا التطعيم وبين هذه المجموعة (63.5٪) قد أكملوا ثلاث جرعات و(36.5%) تم تطعيمهم جزئيا .نسبة التطعيم بين الذكور كانت معنوياً أعلى من الإناث (64.3٪) (46.5٪) على التوالي. وكان هناك علاقة معنوية بين نوع العمل والتطعيم الذي كان أعلى بين الأطباء.

الاستنتاجات: معدل التطعيم كان 56.7٪، و كان أعلى في جنس الذكور و كذلك الأطباء. و تبين أيضا ان نسبة التطعيم كان أعلى بين الذين يعملون في قسم الطوارئ تليها قسم المختبر من مجالات العمل الأخرى.

THE EPIDEMIOLOGICAL, CLINICAL AND LABORATORY CHARACTERISTICS OF TYPHOID FEVER OUTBREAK IN SULAIMANI GOVERNORATE DURING 2007-2008

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ABSTRACT

Background and objectives Sporadic cases of typhoid are frequently reported in Kurdistan Region, Iraq. The disease, however, has always got the potentiality to occur in epidemic. During years 2007-2008**,** an outbreak of Typhoid fever (T.F) had occurred in Sulaimani-Iraqi Kurdistan. The aim of the study is to describe the epidemiological, clinical and laboratory characteristics of that outbreak in Sulaimani during that period.

Methods Three hundred and five patients were enrolled in the study. All were admitted in the general teaching hospital of Sulaimani. Full history, clinical Examination, Hematological, biochemical, abdominal ultrasound and blood culture and sensitivity were carried out.

Results Of the 305 patients, 207 of them had positive blood culture; the other 98 patients had negative blood cultures. In blood culture positive group, 53.1% were females and 46.9% were males. Their age ranged between 12-57 years. Blood cultures were positive in 67.1%, 17.9%, 15% for *Salmonella typhi*, *S.paratyphi B* and *S.paratyphi A* respectively. All were sensitive to ceftriaxone and all were resistant to chloramphenicol.

Conclusions In this study we realized that T.F emerged as one of most common causes of febrile illnesses in Sulaimani during the years 2007-2008 due to an outbreak that affected the city specially the areas with poor sanitary conditions. The clinical, epidemiological & antibiotics resistant patterns were almost similar (with minor differences) to those reported internationally especially the developing countries.

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Key words: Enteric fever, Typhoid fever, Multidrug-resistant typhoid fever

The term *enteric fever* was proposed as an alternative designation to distinguish typhoid fever from typhus.[1] The introduction of chloramphenicol for the treatment of typhoid fever in 1948 transformed a severe, debilitating, and often fatal disease into a readily treatable condition. Typhoid fever (T.F) is endemic in many parts of the developing world and tends to occur in outbreaks and epidemic forms.[2] Risk factors include contaminated water or ice,[3] flooding. Food and drinks purchased from street vendors, raw fruits and vegetables grown in fields fertilized with sewage, lack of hand washing and toilet access,[4] ill household contacts[5] and evidence of prior *Helicobacter pylori* infection (an association probably related to chronically reduced gastric acidity), with recent use of antimicrobial drugs.[6] The development of severe disease (which occurs in ~10–15% of patients) depends on host factors (immunosuppressant, antacid therapy, previous exposure, and

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vaccination), strain virulence and inoculum, and choice of antibiotic therapy.[7] Bleeding is the most common complication, occurring in up to 10 percent of patients. It results from erosion of a necrotic Peyer's patch through the wall of an enteric vessel, may occur at the end of the 2nd week or during the 3rd week of the illness. In the majority of cases, the bleeding is slight and resolves without the need for blood transfusion, but in 2 percent of cases, bleeding is clinically significant and can be rapidly fatal if a large vessel is involved.[7,8] Intestinal (usually Ileal) perforation is the most serious complication, occurring in 1 to 3 percent of hospitalized patients. Perforation may be manifested by an acute abdomen or, more covertly, by simple worsening of abdominal pain, rising pulse, and falling blood pressure in an already sick patient.[7] This study was designed to describe the clinical, epidemiological, and laboratory characteristics of typhoid fever outbreak in Sulaimani during the years of 2007-2008.

METHODS

This study was conducted between Oct. -1st -2007 and June -30th -2008 in the General Teaching Hospital of Sulaimani. Three hundred and five patients were included in the study. Those who were referred from outside the Sulaimani city, has no municipality, were regarded to be from rural areas. All patients were admitted in the General teaching hospital of Sulaimani during an outbreak of T.F in Sulaimani City, in which all cases of fever were suspected to be typhoid until proving otherwise. The Inclusion criteria were any patient who had fever for at least for 3 days before presentation and had one or more symptoms, signs or investigation results that made typhoid fever more likely e.g. pattern of fever, splenomegaly, leucopenia, infection of other family members….etc. We exclude other causes of fever with similar presentation.

A special form was filled for each patient including demographic data like gender, age, and residence, duration of fever, symptoms, family history, and source of water supply, also thorough examination was performed. Abdominal ultrasonography, complete blood count, biochemical, and liver function test in addition to blood culture/ sensitivity were done. Patients with pancytopenia were underwent bone marrow examination, those with mealena or bleeding per rectum underwent colonoscopy and those with suspected perforated viscus surgical opinion were sought. For those with elevated liver transaminases, hepatic viral markers were sent. Widal test was not used for diagnosis because of its high false positive results. Positive blood cultures were subjected to antimicrobial susceptibility test using Kirby-Bauer method[9] using eight antimicrobial agents; 1- amoxicillin, 2- ampicillin, 3- chloramphenicol, 4- co-trimoxazole, 5- ceftriaxon, 6- cefotaxime, 7- ciprofloxacin and 8- gentamicin. The diameter of inhibition zone was considered to evaluate the susceptibility according to the National Committee for Clinical Laboratory Standards, Subcommittee on Antimicrobial Susceptibility Testing,

2011[10] which has been changed recently to CLSI) Laboratories for stereotyping, Sensitivity.).Through World Health Organization (WHO) we sent some of the samples from Sulaimani to Egypt (NAMRO) – Table-7.

Statistical analysis was performed using "Biostatistics Student Edition" App for Ipad by Stephen S. Ashley.[11]

RESULTS

Three hundred and five patients were enrolled in this study, 138 were male, and 167 were female. We divided the patients into 2 groups according to blood Culture results (positive or negative), there was no significant difference between males and females as shown in table 1.

Table 1. Gender distribution, Blood culture results of the Patients

Gender	Culture positive No. (%)	Culture negative No. (%)	Total No. (%)
Male	97 (46.9)	41(41.8)	138 (45.2)
Female	110 (53.1)	57(58.2)	167(54.8)
Total	207(67.9)	98 (32.1)	305 (100)

P= 0.49

The mean age was 21.7year, 23 year in culture positive and culture negative patients respectively.

The duration of fever at time of presentation in most of patients was 1-2 weeks; most of the positive cultures were isolated among patients presented in the first and second weeks of the illness as shown in table 2.

The Degree of temperature was comparable in both groups, with no significant difference. Majority of patients were from rural or sub rural area in both group as shown in table 3.

Table 2. Duration of fever at time of presentation

Duration of fever (weeks)	Culture positive No. (%)	Culture negative No. (%)	Total No. (%)
First	82 (39.6)	24 (24.5)	106 (35)
Second	88 (42.5)	50 (51)	138 (45)
Third	29 (14)	20 (20.4)	49 (16)
Fourth	8 (3.9)	4 (4.1)	12 (4)
Total	207	98	305 (100)

P= 0.0629

Table 3. Geographical distribution of the patients according to blood culture results

Address	Culture positive No. (%)	Culture negative No. (%)	Total No. (%)
Urban	30 (14.3)	11 (11.2)	41 (13.4)
Suburban	60 (29)	25 (26)	85 (27.9)
Rural area	117 (56.6)	62 (62.8)	179 (58.7)
Total	207	98	305 (100)

P = 0.883

In both group, only one third of the patients were sufficiently supplied with tap water, while the majority were depending on well water or both tap and well water at that time as shown in table 4.

The cultured bacteria were susceptible to Ceftriaxon, Cefotaxime, Ciprofloxacin and Gentamicin, while almost all were resistant to ampicillin, amoxicillin, chloramphenicol, and cotrimoxazole as shown in table 5.

Family members of the infected patients were more infected among culture positive patients than culture negative patients as shown in table 6.

About one third of the patients had anemia and leucopenia in both groups.

Figure 3 shows hematological findings in blood culture +ve patients. Figure 4 shows hematological findings in blood culture -ve patients.

Table 4. Source of water supply according to blood culture results

Water sources	Culture positive No. (%)	Culture negative No. (%)	Total No. (%)
Tap	68 (32.9)	31 (31.6)	99 (32.5)
Well	80 (38.6)	45 (45.5)	125 (41)
Mixed	59 (28.5)	22 (22.4)	81 (26.5)
Total	207	98	305 (100)

P = 0.639

Table 5. Source of water supply according to blood culture results

Antibiotics	Sensitive No. (%)	Resistant No. (%)
Ceftriaxon	207 (100)	0
Ciprofloxacin	205 (99.1)	2 (0.9)
Cefotaxime	199 (96.2)	8 (3.8)
Gentamicin	193 (93.3)	14 (6.7)
Co-trimoxazole	5 (2.4)	202 (97.6)
Amoxicillin	4 (1.9)	203 (98.1)
Ampicillin	1 (0.4)	206 (99.6)
Chloramphenicol	0	207 (100)

P= 0.0629

Table 6. Frequency of infection among family contacts according to blood culture results

Culture result	Infected family members No. (%)	P value No. (%)
Positive	38 (18.4)	0.32
Negative	14 (13.8)	0.55
Total	52 (17)	0.41

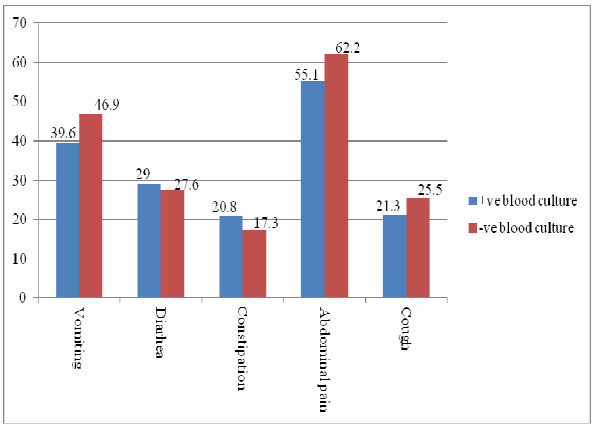

Figure 1. Symptoms at presentation in percentages

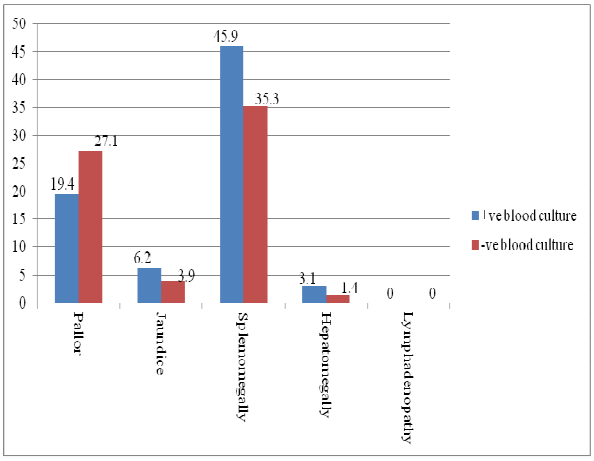

Figure 2. Signs at presentation in percentages

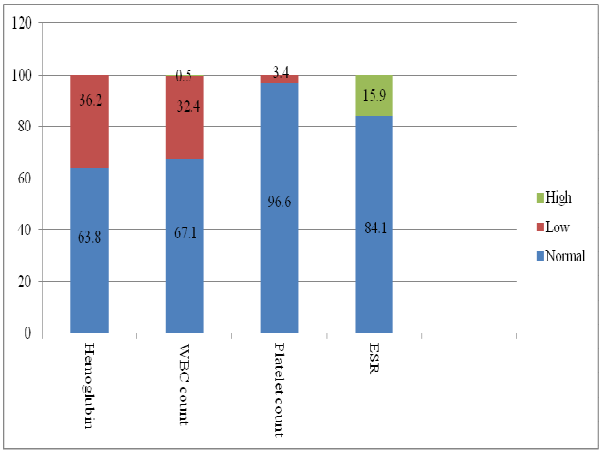

Figure 3. Hematological findings in blood culture +ve patients in percentages

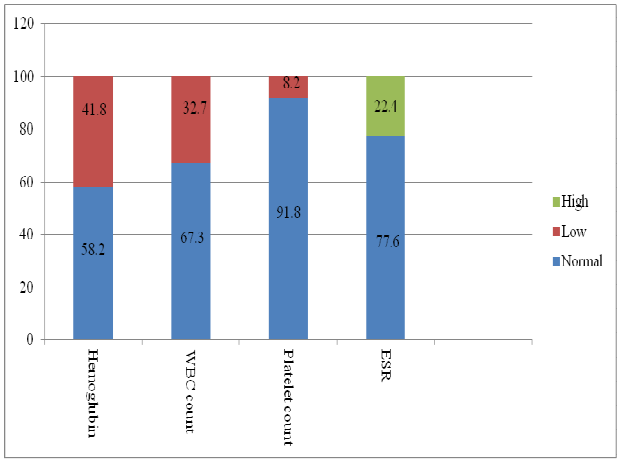

Figure 4. Hematological findings in blood culture -ve patients in percentages

Abdominal sonography reveals splenomegaly in 43%, 55% among culture positive and culture negative groups respectively.

Among culture positive patients, *S. typhi* was responsible for two third of the cases.

DISCUSSION

Typhoid fever is one of the most common infectious diseases in developing countries. Early and definitive diagnosis of the disease is not only important in relieving patients' suffering, but also critical in avoiding fatal complications.[1] This study was performed during a T.F outbreak from October 2007 to June 2008 in Sulaimani city, during which the outbreak was at its maximum peak. A study done by Kustner shows that the ''seasonal pattern'' of T.F in South Africa peaks in the months from January through March and through August to October, when these areas are usually at their driest,[12] but dryness may not limit the spread of T.F in urban areas. In many developing countries, during dry season, untreated waste water is used for irrigation in periurban vegetable farms which are often eaten raw without having been thoroughly washed (e.g. Salads); this has been linked with major outbreaks in urban areas.[12] In this study females were slightly more than males (53.1% V 46.9%). Other study was done by Kustner[13] showed that males and females are equally infected, though hospital-based physicians noted a slight female dominance as noted by Chalmer[14] and Gaffar,[15] This might be explained by difference in immunity (gastric acidity) or female admitted to hospital more than male or the sample was randomly collected. Mean age was 21.57 years, same were observed by many studies that the incidence in endemic areas is typically peaking in school-aged children and young adults, then falling in middle age, as shown in studies done in Santiago, Chile 1977–1981,[16] Vietnam 1995– 1996,[17] in Kalkaji and New Dehli,[18] Older adults are presumably relatively resistant due to frequent boosting of immunity.

In this study diarrhea was more common than constipation, this is in accordance with other studies done by HML, Yap and Rasaily.[19-21] but other studies show that in adult constipation is more common than diarrhea except in children and adult infected with HIV. [22] In current study dry cough was present among 21.3% of cases, in a study done by Hornick et al dry cough was in third of cases.[23] In this study spleen was enlarged in 43% of cases (by sonography), other study stated that spleen is palpable in 11-71%.[24] This is most probably due to

variability in the time of presentation. Hepatomegaly was present in 3.4% (by sonography); this was less than other study which showed hepatic enlargement in 14-65%.[25] Also this is most probably due to variability in the time of presentation. In this study we didn't find any patient with rose spots, this is in agreement with some other observers, who didn't see them at all, like Chalmers,[16] this might be explained by our darker skin color. The study found that 36.2% of patients were anemic, 32.4% were leucopenic and 3.4% were thrombocytopenic. These results were comparable to a study done by Yaramis et al in Turkey, where 38% of patients were anemic, 18% leucopenic, 10% were thrombocytopenic.[25] In another study done by Rasoolinejad in Iran, 72.9% were anemic, 11.2% leucopenic and 9.1% were thrombocytopenic.[26] Also 3% of the patients had pancytopenia that is most probably due to extensive hemophagocytosis known as infection-associated hemophagocytosis syndrome (IAHS). In this study 3.9% of patients had jaundice, 5.8% had elevated ALT / AST, which differs from the study done by Rasoolinejad in Iran, that showed 1.8% of cases had jaundice, 24.2% had elevated ALT / AST.[26] The reason behind this different may be due to racial differences Among the blood positive cultures 67.1% were positive for Salmonella typhi, 15% for Salmonella paratyphi A and 17.9% for Salmonella paratyphi B. This is also comparable with other study estimated that there is one case of paratyphoid fever for every four cases of typhoid fever, but the incidence of infection associated with S. Paratyphi A appears to be increasing, especially in India.[3] In our study all cases were resistant to chloramphenicol, most of them resistant to amoxicillin, ampicillin and co-trimoxazole, nearly the same results observed by Phuong et al. who reported that, 85% of isolates of S. typhi were resistant to chloramphenicol, ampicillin and trimethoprim-sulfamethoxazole.[27] World-wide spread of multi-drug resistant (MDR) strains of S.typhi poses a serious therapeutic challenge.[28,29] In our study all cultures were sensitive to ceftriaxon. There have been sporadic reports of high-level resistance to ceftriaxone (Minimal inhibitory concentration, 64 mg/liter) in S. enterica Serotype typhi and S. enterica serotype paratyphi although these strains are very rare.[30,31] We record 2 cases with ciprofloxacin resistant. In many area of the world S.typhi strains resistant to ciprofloxacin have already been reported.[29] One of the culture positive female who was in a visit to Sulaimani treated successfully ,after she returned to Germany got relapse and she had been fully investigated and found to have S.typhi strain that is resistant to ampicillin, ampicillin/sulbactam, piperacillin, cefotaxime, ceftazidime, cefepime, chloramphenicol, streptomycin, Trimethoprim /sulfamethoxazole , azithromycin, and nalidixic acid. A reduced susceptibility to ciprofloxacin was detected (MICCIP = 1µg/mL). The isolate was susceptible to Imipenem, meropenem, gentamicin, tobramycin, and amikacin.[32]

Also a study done by Mohammed OM et al in Sulaimani/Iraq (2009) showed high

resistant rate for chloramphenicol, Trimethoprim, amoxicillin& streptomycin but very low resistant rate to amikacin, azithromycin, ciprofloxacin &ceftriaxon.[33]

In current study 98 cases were blood cultures negative, Culture negative will not totally exclude typhoid fever, depending on type of media used, no of bacteria. In this study previous antibiotics were used in 96% of them who were treated with antibiotics before presentation, 75.5% of them presented after first week, these 2 factors may be the main reason behind the negativity of blood cultures, this is also observed in 2 studies done by Wain J. et al they showed that the sensitivity of blood culture is higher in the first week of the illness and is reduced by prior use of antibiotics.[34, 35] In the current study 53% of those with Splenomegaly presented in the 2nd week and 71.4% of complications had occurred in 3rd week of the disease of the disease, this is similar to observation of Stuart.[36]

In conclusion typhoid fever emerged as one of the most common causes of febrile illnesses in Sulaimani during the years 2007-2008. The clinical, epidemiological and antibiotics resistant patterns were mostly similar (with minor differences) to those reported internationally specially the developing countries. Infection in urban areas is not uncommon in relation to rural areas with more poor sanitation and low levels of education. Young adults were mostly affected. After fever, abdominal pain and vomiting were the main presenting features. Diarrhea was more common than constipation among those infected with typhoid fever. Ceftriaxon and ciprofloxacin were most sensitive antibiotics. Resistance developed to almost all previously sensitive antibiotics such as amoxicillin, ampicillin, chloramphenicol and others, and our results were approved by WHO laboratories (NAMRO) in Egypt. Negativity of blood cultures most probably related to delay in presentation and previous antibiotics use.

REFERENCES

1. Levine MM. Typhoid fever. In: Evans AS, Brachman PS, (Eds). Bacterial Infections of Humans. Epidemiology and Control 3rd ed. New York, Plenum Medical BookCompany, 1998, p.839-58.
2. Woodward TE, Smadel JE, Ley HL. Preliminary report on the beneficial effect of Chloromycetin in the treatment of typhoid fever. Ann Intern Med. 1948;29:131-4.
3. Black RE, Cisneros L, Levine MM, , Banfi A, Lobos H, Rodriguez H. Case-control study to identify risk factors for pediatric endemic typhoid fever in Santiago, Chile. Bull World Health Organ. 1985; 63(5):899-904.
4. Luby SP, Faizan MK, Fisher-Hoch SP, Syed A, Mintz ED, Bhutta ZA. Risk factors for typhoid fever in an endemic setting, Karachi, Pakistan.Epidemiol Infect. 1998;120(2):129-38.
5. Luxemburger C, Chau MC, Mai NL, Wain J, Tran TH, Simpson JA. Risk factors for typhoid fever in the Mekong delta, southern Viet Nam: a case-control study.Trans R Soc Trop Med Hyg .2001; 95(1):19-23.

6. Gasem MH, Dolmans WM, Keuter MM,Djokomoeljanto RR.Poor food hygiene and housing as RFs for typhoid fever in Semarang, Indonesia. Trop Med Int Health. 2001; 6(6):484-90.
7. Van Basten JP, Stocken, brugger R. Typhoid perforation: a review of the literature since 1960. Trop Geogr Med .1994; 46(6):336-9.
8. Dockrell DH, Sundar S, Angus BJ. Infectious disease, In Davidson's Principles& Practice of Medicine,21st ed. Churchill Livingstone, 2011.p.334-5.
9. Bauer AW, Kirby WM, Sherris JC, Turck M. Antibiotic susceptibility testing by a standardized single disk method. Am J Clin Pathol. 1966;45(4):493-6.
10. CLSI. Performance Standards for Antimicrobial Susceptibility Testing; Twenty-First Informational Supplement. CLSI document M100-S21 Wayne, PA: Clinical and Laboratory Standards Institute;. 2011.
11. Ashley SS. Biostatistics Student Edition. Apple store; 2011 [cited 2012 10/4/2012]; Available from: http://itunes.apple.com/us/app/biostatistics-student-edition/id415378283?m.t
12. Hohmann EL, Oletta CA, Killeen KP, Miller SI.phoP/phoQ-deleted Salmonella typhi (Ty800) is a safe and immunogenic single-dose typhoid fever vaccine in volunteers. J Infect Dis.1996;173(6): 1408-14.
13. Kustner HGV. Trends in four major communicable diseases. S Afr Med J .1979; 55(12):460-73.
14. Chalmers IM. Typhoid fever in an endemic area: a 'great imitator'. S A fr Med J. 1971; 45(17): 470-2.
15. Abdool Gaffar MS, Seedat YK, Coovadia YM, Khan Q. The white cell counts in typhoid fever. Trop Geogr Med .1992; 44(1-2): 23-7.
16. Ferreccio C, Morris JG Jr, Valdivieso C, Prenzel I, Sotomayor V, Drusano GL. Efficacy of ciprofloxacin in the treatment of chronic typhoid carriers. J Infect Dis. 1988; 157(6):1235-9.
17. Lin FY, Ho VA, Khiem HB, Trach DD, Bay PV, Thanh TC. The efficacy of a Salmonella typhi Vi conjugate vaccine in two to five years old children. N Engl J M. 2001; 344(17): 1263-9.
18. Sinha A, Sazawal S, Kumar R, Sood S, Reddaiah VP, Singh B. Typhoid fever in children aged less than 5 years. Lancet. 1999; 354: 734-7.
19. Oh HML, Masayu Z, Chew SK. Typhoid fever in hospitalized children in Singapore. J Infect. 1997; 34(4):237-42.
20. Yap YF, Puthucheary SD. Typhoid fever in children—a retrospective study of 54 cases from Malaysia. Singapore Med J. 1998; 39(6):260-2.
21. Rasaily R, Dutta P, Saha MR, Mitra U, Lahiri M, Pal SC. Multi-drug resistant typhoid fever in hospitalized children.Clinical, bacteriological and epidemiological profiles.Eur J Epidemiol. 1994; 10(1):41-6.
22. Gotuzzo E, Frisancho O, Sanchez J, Liendo G, Carrillo C, Black RE. Association between the acquired immunodeficiency syndrome and

infection with Salmonella typhi or Salmonella paratyphi in an endemic typhoid area. Arch Intern Med. 1991; 151(1): 381-2.

23. Hornick RB. Typhoid fever. In: Hoeprich PD, Jordan MC, Ronald AR, (eds). Infectious Diseases.A Treatise of Infectious Processes.5th ed. Philadelphia, J B Lippincott Company, 1994: 747 –53.
24. Seebaran AR, Coovadia YM, Bhana RH, Rajput MC, Naidoo BT, Haffejee IE. Typhoid fever in the adult and pediatric Indian population of Durban. S Afr Med J .1990; 77(6):14-7.
25. Ahmet Y, Idris Y; Selahattin K. Clinical and laboratory presentation of typhoid fever. International Pediatrics.2001;16(4) : 227-30.
26. Rasoolinejad M, Esmailpoor N, Mogbel B. Salmonella Hepatitis (analysis of hepatic involvement in 107 patients with typhoid fever). Medical Journal of Islamic World Academy of Science. 2006;16(2): 93-4.
27. Cao XT, Kneen R, Nguyen TA, Truong DL, White NJ, Parry CM.A comparative study of ofloxacin and cefixime for treatment of Typhoid fever in children.The Dong Nai Pediatric Center Typhoid Study Group. Pediatric Infect Dis J. 1999; 18(3):245-8.
28. Bhutta ZA, Farooqui BJ, Sturm AW.Eradication of a multiple drug resistant Salmonella paratyphi A causing meningitis with ciprofloxacin. J Infect .1992; 25(2):215-9.
29. Pokharel BM, Koirala J, Dahal RK, Mishra SK, Khadga PK, Tuladhar NR.Multidrug-resistant and extended-spectrum β-lactamase (ESBL)–producing *Salmonella enterica* (serotypes Typhi and Paratyphi A) from blood isolates in Nepal: surveillance of resistance and a search for newer alternatives. Int J Infect Dis. 2006;10:434–8.
30. Saha SK, Talukder SY, Islam M, Saha S. A highly ceftriaxon-resistant Salmonella typhi in Bangladesh.Pediatr Infect Dis J .1999; 18(4):387.
31. Mandal BK. Salmonella typhi and other salmonellas. Gut .1994; 35(6):726-8.
32. Abrescia FF, Gobbi F, Angheben A, Gobbo M, Bisoffi Z, Falda A,et al. Salmonella enterica Serovar Typhi with CTX-M β-Lactamase,Germany. Emerging Infectious Diseases. 2009;15(9):1535.
33. Mohammed O, Srwa A, Ibrahim S. Bacteriological and Molecular Genetic Study of Salmonella typhi Isolated From Patients with Enteric Fever. Journal of Koya University. 2009;12: 57-76.
34. Wain J, Diep TS, Ho VA, Walsh AM, Nguyen TT, Parry CM, et al. Quantitation of bacteria in blood of typhoid fever patients and relationship between counts and clinical features, transmissibility, and antibiotic resistance. J Clin Microbiol .1998; 36(6):1683-7.
35. Wain J, Pham VB, Ha V, Nguyen NM, To SD, Walsh AL, et al. Quantization of bacteria in bone marrow from patients with typhoid fever:

relationship between counts and clinical features. J Clin Microbiol. 2001; 39(4):1571-6.

36. Hosoglu S, Aldemir M, Akalin S, Geyik MF, Tacyildiz IH, Loeb M. Risk Factors for Enteric Perforation in Patients with Typhoid Fever. Am J Epidemiol.2004; 160 (1): 46-50.

پوختە

سیما درمیی و کلینکی وتاقیگەییەکانی پەتای گرانەتا لە پارێزگای سلێمانی لە ساڵی 2007 –2008 ز

پێشەکی و ئارمانج: جار بە جار نەخۆشی گرانەتا ڕوو دەدات لە کوردستانی عیراقدا، بەڵام ئەگەری ڕوودانی نەخۆشییەکەبەشێوەی پەتا هەر هەیە . لە ساڵانی 2007 –2008 ز پەتایەکی گەورەی نەخۆشییەکە لە پارێزگای سلێمانی ڕوویدا . ئامانجی ئەم توێژینەوە دەرخستنی سیما درمیی وکلینکی و تاقیگەییەکانی ئەم پەتایە بوو.

ڕیکێن ڤەکولینێ: سێ سەدو پێنج نەخۆش لێکۆڵینەوەیان لە سەر کرابوون کە هەموویان لە نەخۆشخانەی فێرکاری هەناوی لە سلێمانی خەوێنرابوون ، هەموویان پرسیاری تەواویان لێ کرابوون و پشکنینی **کلینکی** وە هەموو پشکنینی تاقیگەیە پێویستەکانیان بۆ کرا .

ئەنجام: لە 305 نەخۆش ، 207 یان ئەنجامی چاندنی خوێن بۆ نەخۆشییەکە هۆکاری نەخۆشییەکەی دەرخستبوو وە ئەنجامی چاندنی خوێن لە 98 یان نەرێنی بوون . لە ئەوانەی کە چاندنی خوێن نەخۆشییەکەی دەرخستبوو ، 53.1٪ مێ بوون وە 46.9 یان نێر بوون . تەمەنی نەخۆشەکان لە 12– 57 ساڵ بوو . هەموو میکرۆبەکان گرانەتای بەرگربوون بۆ کلۆرامفینیکۆل وە بەرگرنەبوون بەرامبەر سیفتریاکسون . میکرۆبەکان بریتی بوون لە *S.typhi* ، *S.paratyphi B*، *S. paratyphi A* بە ڕێژەی 67.1٪ ، 17.9٪ و 15٪ یەک لەدوای یەک.

دەرئەنجام: لەم توێژینەوەیەدا دەرکەوت کە گرانەتا لەو ماوەیەدا هۆی سەرەکی تا بوو لەو پەتایەدا کە لە سلێمانی ڕوویدا لە 20007 –2008 ، بە تایبەت لەو شوێنانەی کە پاك و خاوێنیان تیا کەم بوو . سیما درمیی و کلینکی تاقیگەییەکانی ئەم درمە نزیك بوو لەو درمانەی کە لە وڵاتانی جیهانی سێ ڕوو ئەدات لە گەڵ چەند جیاوازیەکی کەمدا.

الخلاصة

الخصائص الوبائية و السريرية والمختبرية لوباء الحمى التيفوئيدية في محافظة السليمانية للفترة ما بين 2007 -2008 م

خلفية واهداف البحث: ان مرض التيفوئيد يحدث كثيرا" بين الحين والاخر فى كوردستان العراق ولكن امكانية حدوث المرض كوباء تضل قائمة . خلال سنة (2007 – 2008) م حدث وباء كبير لمرض التيفوئيد في محافظة السليمانية وكان من اهداف هذا البحث اظهار الخصائص السريرية والوبائية والمختبرية لهذا الوباء.

طرق البحث: ضمن دراسة 305 مريض خلال الوباء قد أُدخلوا مستشفى التعليمى الباطنى العام في السليمانية و جميعم سُألوا عن مرضهم و أجري لهم الفحص السريرى والفحوص المختبرية المطلوبة.

النتائج: ضمن 305 مريض ، كانت نتيجة زرع الدم لمكروب التيفوئيد موجب عند207 مقابل 98 مريض كانت نتيجة زرع الدم سالب . وضمن المجموعة الموجبة كانت 53.1% أنثى والبقية ذكر . كان اعمار المرضى بين 12–57 سنة . وكانت بكتريا التيفوئيد المزروعة عبارة عن نوع تايفى، باراتايفى B، باراتايفى A بنسب 67.1% ، 17.9 % ، 15% على التوالي.

الاستنتاجات: أظهرت الدراسة بأن حمى التيفوئيد كانت السبب الرئيسى للحمى فى تلك الفترة خاصة في المناطق قليلى النظافة . كانت خصائص الوباء قريبة مع بعض الأختلافات عن خصائص وباء التيفوئيد التى تحدث في مناطق العالم الثالث.

VITAMIN D STATUS IN PREGNANT AND NON-PREGNANT WOMEN IN A KURDISTAN REGION-NORTH IRAQ

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ABSTRACT

Background and objectives Maternal vitamin D deficiency is a common finding during pregnancy and is a widespread public health problem in many populations. The aim of the study was to determine the prevalence of vitamin D and the current vitamin D status among a sample selected from the healthy women in Kurdistan Region, Iraq.
Methods A cross-sectional study was made of 25-hydroxy vitamin D levels of 300 apparently healthy women (200 pregnant and 100 non-pregnant). They were selected from women attending the Antenatal care unit, Obstetrics and Gynecology Department , Azadi Teaching Hospital, Duhok, during the period from May 2012 to November 2012.
Results The study confirms that vitamin D status is low among pregnant and non- pregnant women in a Kurdistan Region population. It is thus indicates the need for screening serum vitamin D levels in healthy women, particularly during the course of pregnancy.
Conclusions The study confirms that vitamin D status is low among pregnant and non-pregnant women in a Kurdistan Region population. It is thus indicates the need for screening serum vitamin D levels in healthy women, particularly during the course of pregnancy.

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Key words: Vitamin D, Pregnancy, Healthy women

Vitamin D is an essential fat-soluble vitamin, which is required for the maintenance of good health. A high prevalence of vitamin D deficiency is now recognized in pregnant women[1] Vitamin D is important in pregnancy because it has implications for both maternal and child health. It has been reported that vitamin D deficiency during pregnancy is associated with multiple adverse health outcomes in mothers such as gestational diabetes,[1] pre-eclampsia, preterm birth and low birth weight.[2] Cesarean deliveries are four times more common among those displaying lower 25(OH) D levels.[3] Moreover, neonatal respiratory infections, and children low bone mineral density, type-1 diabetes, and eczema are more common in those with vitamin D deficiency.[4] In Iraq, reports on this issue are limited and the prevalence of vitamin D deficiency has not been established among Kurdish women . Hence the present study was conducted to determine the current vitamin D status in pregnant and non-pregnant women selected from a healthy population in Kurdistan Region, and to identify population group for whom vitamin D supplement may be a concern.

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METHODS

This study was conducted at the antenatal care unit of Azadi teaching hospital, Duhok city, Kurdistan Region, Iraq. Three hundred women were included in this study. Of these, 200 were pregnant women at different trimesters (50 in the first trimester, 50 in the second trimester and 100 in the third trimester). Classification of pregnant women in regard to weeks of gestation was based on the record of last menstrual period (LMP) and the results of ultrasound (U.S).Gestational age was determined by LMP and by the imaging technique of ultrasonography.[5] The remainders (100) were age matched apparently healthy non-pregnant women selected from the medical staff and relatives of women attending the same hospital.

The non-probability consecutive sampling technique was used. It was a cross -sectional study, in which a group of apparently healthy pregnant women was compared with a control group of healthy non-pregnant women to find out the status of serum vitamin D levels during pregnancy. Verbal consents were obtained from each woman after explaining the nature of the study. Ethical approval to carry out this study was given by the local ethics committee of Duhok Heath Directorate.

Pregnant women were fit with inclusion criteria: age 20-35 years, parity 1-4, no history of (DM, hypertension, renal disease, liver disease, thyroid and parathyroid disease or taking vitamin D or calcium supplementation).

A pre-tests questionnaire was used to obtain information from the participants about age, parity, past medical history, past obstetric history, and drug history.

Assessment of vitamin D status was done according to the following criteria (6). Vitamin D deficiency is defined as a < 10 ng/ml, Vitamin D insufficiency 10 – 29.9 ng/ml, sufficient 30 – 150 ng/ml and toxic levels ≥ 150 ng/ml.

Serum concentration of 25(OH) D was measured by ELISA technique (Accu-Bind ELISA micro wells). Statistical analysis was performed using SPSS software, vision 21.0. Independent t-test was used to assess differences in serum analyte among groups. The Chi-square test was used to compare the tallies or counts of categorical between two or more independent groups.

RESULTS

The mean (SD) values of serum 25(OH) D level of pregnant women was 27.0 (15.6) ng/ml and the non-pregnant women was 31.7(13.3) ng/ml, $p<0.01$. Of the three hundred studied women 9.7 %(n=29) were vitamin D deficiency. The prevalence of vitamin D deficiency among pregnant and non-pregnant women was 14% and 1%, respectively. The prevalence of vitamin D insufficiency was 43.3 %(n=130) in pregnant women and 17.7 %(n=52) in non-pregnant women (Table 1). Vitamin D deficiency was more prominent in women in the third trimester (8.5%) as compared to the first and second trimesters (2.5%, 3.0%) respectively (Table 2). Pregnant women with age ≥30 years had a

higher prevalence of vitamin D deficiency(18.6%) as compared to pregnant women with age <30years 11.5% (Table 3). The prevalence of vitamin D deficiency was found to be higher in multiparity (25.0%) as compared to Para one woman. 12.1 % (Table 4).

DISCUSSION

Maternal vitamin D deficiency is a widespread public health problem,[7] Adequate vitamin D concentrations during pregnancy are necessary to ensure appropriate maternal responses to the calcium demands of the fetus and neonatal handling of calcium.[8] This study revealed that the prevalence of low vitamin D status was more among pregnant women, although a high percentage of the non-pregnant women were with vitamin D insufficiency. It is therefore, such a high prevalence of vitamin D insufficiency in our population (61%) is especially noteworthy because several factors are known to impact negatively on vitamin D status. Of these, nutrition status and exposure to sun light are with the most marked negative effect on serum vitamin D concentration.[9] In addition an important

Table 1. Vitamin D levels of the studied population

	n	Mean (SD)	25 (OH) D levels (ng/ml)		
			<10 No. (%)	10-29.9 No. (%)	≥30 No. (%)
Pregnant	200	27.0 (15.6)	28 (14)*	102 (51)	70 (35)
Non-pregnant	100	31.7 (13.3)	1 (1)	51 (51)	48 (48)
Total	300	28.5 (14.8)	29 (9.7)	153 (51)	118 (39)

*Based on Pearson Chi-Square test, $p<0.01$.

Table 2. Vitamin D levels by gestational age

	n	Mean (SD)	25 (OH) D levels (ng/ml)		
			<10 No. (%)	10-29.9 No. (%)	≥30 No. (%)
First	50	27.5(15.5)	5(2.5)	27 (13.5)	18 (9.0)
Second	50	26.8(15.2)	6(3.0)	32 (16.0)	12 (6.0)
Third	100	24.5(16.8)	17(8.5)	43 (21.5)	40 (20.0)
Total	200	27.0(15.6)	28(14)	102 (51)	70 (35)

Table 3. Vitamin D levels by women age

Group	n	Mean (SD)	25 (OH) D levels (ng/ml)		
			<10 No. (%)	10-29.9 No. (%)	≥30 No. (%)
Pregnant					
Age<30 (yrs.)	130	27.9 (16.3)	15 (11.5)	69 (53.1)	46 (35.4)
Age>30 (yrs.)	70	25.6 (14.3)	13 (18.6)	33 (47.1)	24 (34.3)
Non-pregnant					
Age<30(yrs.)	56	31.8 (14.3)	0 (0.0)	30 (53.6)	26 (46.4)
Age >30(yrs.)	44	31.3 (12.3)	1 (2.3)	21 (47.7)	22 (50.0)

Table 4. Vitamin D levels by parity

Group	Parity	n	Mean (SD)	25 (OH) D levels (ng/ml)		
				<10 No. (%)	10-29.9 No. (%)	≥30 No. (%)
Pregnant						
	Para 1	74	27.0 (16.8)	9 (12.1)	40 (54.1)	25 (33.8)
	Para 2	70	29.2 (15.0)	10 (14.3)	40 (57.1)	20 (28.6)
	Para 3	48	27.5 (14.4)	8 (16.6)	20 (41.7)	20 (41.7)
	Para 4	8	25.3 (13.7)	2 (25.0)	2 (25.0)	4 (50.0)
Non pregnant						
	Para 1	31	30.2 (12.0)	0 (0.0)	16 (51.6)	15 (48.4)
	Para 2	27	31.0 (14.4)	1 (3.7)	15 (55.5)	11 (40.7)
	Para 3	22	31.0 (13.3)	0 (0.0)	12 (54.5)	10 (45.5)
	Para 4	20	30.3 (13.0)	0 (0.0)	8 (40.0)	12 (60.0)

*Based on Pearson Chi-Square test, p>0.05

cause of vitamin D deficiency particularly during the course of pregnancy can be the age of mother, gestational age and parity.[10] However, the dietary intake of vitamin D was not determined, which is a limitation of this study. The prevalence of low vitamin D status was related to age in this study. The results of the present study showed a lower mean serum 25 (OH) D concentrations in pregnant women of age ≥ 30 years. Reduced vitamin D concentrations in serum of older age pregnant women may suggest decreased in the vitamin D store, and decreased synthesis of vitamin D in the skin with increasing age, resulting from reduced concentration of 7-dehydrocholeterol in the skin.[11] Other studies in a tropical country with abundant sunshine have shown similar findings,[12] 30% of the population in the eastern province of Saudi Arabia between the ages of 25-35 years and 55% of the population between the ages 36-50 years had serum 25(OH) D concentrations of ≤ 20 ng/ ml. Others[10] demonstrated that the peak prevalence of vitamin D deficiency was observed in pregnant women of age group 31-40 years. However, minimum vitamin D deficiency was observed in non-pregnant women of age ≥30 years. This finding may suggest other factors play a role rather than the effect of age.

The impact of gestational age as a factor for low vitamin D status in pregnant women was examined. Mean concentration of 25(OH) D of the pregnant women at first trimester was higher when compared with second and third trimesters, but the difference was non-significant. The concentration of 25-hydroxy vitamin D in serum seems to be dependent on the time of gestation, is reduced in later periods because of the current fetal growth and development Thus, it is important to highlight that the prevalence of vitamin D deficiency was significantly higher in the third trimester. Of all pregnant women,

65% were vitamin D insufficiency, 30% were in the third trimester Vs 16% in the first trimester. These data are consistent with finding reported by others. Reported data from Pakistan shows pregnant women whose clothes that partly or completely covered their body had serum 25(OH) D levels below 30ng/ml at delivery.[13] Vitamin D is also called the sunshine vitamin because the major source (80%) of vitamin D is Ultraviolet light. Kurdistan Region is rich in abundant sunshine throughout the year. However, the present study showed vitamin D deficiency is common in our locality, particularly in pregnant women at third trimester. This paradox may partly be explained by the prevalent social and cultural practice in Kurdistan that precludes adequate exposure of pregnant women to sunshine. Increasing urbanization is also one of the reasons that results in poor outdoor activity. Any reductions in sun exposure attributable to the limited mobility during later stages of pregnancy can cause also vitamin D deficiency.

To rule out the impact of parity on vitamin D status; It was found that the risk of severe vitamin D deficiency was significantly higher for pregnant women with multi parity than in women with one parity (25% Vs 12.1%), while the risk of vitamin D insufficiency was nearly similar for pregnant and non-pregnant women with multipara (50% and 40%) respectively. It appears that the present results are comparable with other studies done elsewhere reports[14] that having given birth two or more times, giving birth to more than one child at a time (e.g. twins), are significant risk factors for vitamin D deficiency during pregnancy. However, equal number of women from different age groups and parity was not included in study, which is another limitation of this study

The current study confirms that vitamin D status is low among pregnant and non- pregnant women. Although low vitamin D status may be caused by a number of factors, including insufficient synthesis in the skin and inadequate intake or absorption of vitamin D, age of the mother, gestational age and parity may impact negatively on vitamin D status. It is thus indicates the need for screening serum vitamin D levels in healthy women, particularly during the course of pregnancy .Vitamin D supplementation may be an effective public health intervention means to improve the vitamin D status of the population. A large scale study is recommended on vitamin D status and its relation with outcome of pregnancy in Kurdistan Region-Iraq population.

REFERENCES

1. Zhang C, Qiu C, Hu FB, David RM, van Dam RM, Bralley A et.al . Maternal plasma 25-hydroxyvitamin D concentrations and the risk for gestational diabetes mellitus. PloS one 2008; 3(11:e 3753.
2. Bodnar LM, Catov JM, Simhan HN, Holick MF, Powers RW, Roberts JM.. Maternal vitamin D deficiency increases the risk of preeclampsia.J Clin Endocrinol Metab 2007; 92(9):3517-22.

3. Merewood A, Mehta SD, Chen TC, Bauchner H, Holick MF. Association between vitamin D deficiency and primary cesarean section. J Clin Endocrinol Metab 2009;94(3):940-5..
4. Hensel KJ, Randis TM, Gelber SE, Ratner AJ. Pregnancy-specific association of vitamin D deficiency and bacterial vaginosis . Am J Obstet Gynecol 2011; 204(1): e41-49.
5. Hacker NF. Hacker and Moore's Essential of Obstetrics and Gynocology 2010. 5th ed:Linda Van Pelt.
6. Holick MF. Vitamin D staus: measurement, interpretation, and clinical application. Ann. Epidemiol 2009; 19(2): 73-8..
7. Holick MF, Chen TC. Vitamin D deficiency: a worldwide problem with health consequences. Am J Clin Nutr 2008; 87(4): 1080s-86s.
8. Holick MF. High prevalence of vitamin D inadequacy and implications for health. Mayo Clin Proc, 2006;81(3):353-73.
9. Aslam M, Masood Z, Sattar A, Qudsia M. Vitamin D deficiency; prevalence in pregnant women. Professional Med J Apr 2012;19(2):208-13.
10. Holick MF. Vitamin D deficiency. N Engl J Med 2007;357(3):266-281.
11. Holmes VA, Barnes MS, Alexander HD, McFaul P, Wallace JM. Vitamin D deficiency and insufficiency in pregnant women; a longitudinal study. Br J Nutr 2009;102(6):876-81.
12. Al Turki HA, Sadat Ali M, Elg AH, Al Mulhim FA, Al Ali AK. 25-Hydroxyvitamin D levels among healthy Saudi Arabian women. Saudi Med J 2008; 29(12): 1765-8.
13. Hossain N, Khanani R, Hussain-Kanani F, Shah T, Arif S Pal L. High prevalence of vitamin D deficiency in Pakistani mothers and thier newborns. Int J Gynecol Obstet 2011;112(3):229-33.
14. Andersen LB,Abrahamsen B, Dalgard C, Kyhl HB, Beck-Nielsen SS, Frost-Nielsen M, et al. Parity and tanned white skin as noval predictors of vitamin D status in early pregnancy: a population-based cohort study. Clin Endocrinol 2013; 79(3):333-341.

پوختە

ئاستێ ڤیتامین د لدەف ژنین دووگیان و بین نە دووگیان ل هەریما کوردستانێ – باکوڕ عیراقێ

پێشەکی و ئارمانج: کیمبونا ڤیتامین د لدەف دایکان دیاردەکا بەربەلاڤە ل دەمێ دووگیانیئدا ودهیتە هژمارتن ئیک ژئاریشین ساخلەمیا گشتی بین گەلەك بەربەلاڤ . ئەڤ ڤەکولینە هاتە کرن ژبو سنورکرنا ئاستێ ڤیتامین د ددەمێ نوکەدا لدەف کومەکا سنوردار ژژنین دووگیان وبین نە دووگیان بین ساخلەم ل هەریما کوردستانێ – عیراق.

ریکێن ڤەکولینێ: لماوێ دناڤ بەرا أیارا 2012 و تشرینا دووێ یا 2012 ڤەکولینەکا(cross section) هاتەکرن و 300 ژن بخوڤە گرتن, ژوانا 200 ژن دووگیان وساخلەم بوون و 100 نەدووگیان بەلێ هەر ساخلەم بوون. هاتبونە هەلبژارتن لبەشێ ئافرەتان و زاروکبونێ لنەخوشخانا ئازادی یا گشتی ل دهوکێ.

ئەنجام: تئکرایێ ئاستێ ڤیتامین د دناف خوینئدا لدەف ژنین دووگیان ﴿27.0 (15.6) ng/ml﴾ و ژنین نە دووگیان ﴿ 31.7 (13.3) ng/ml﴾, P<0.01. بەربەلاڤبونا کیمبونا ڤیتامین د یا دژوار لدەف ژنین دووگیان(14.0%) و ژنین نە دووگیان (1.0%). کیمبونا ڤیتامین د (<30 ng/ml) هەبوو ﴿130(43.3%)﴾ لدەف ژنین دووگیان و ﴿52 (17.7%)﴾ لدەف ژنین نەدووگیان. بلندترین بەربەلاڤبون بو کیمبونا ڤیتامین د یا دژوار (8.5٪) هاتە تئبینیکرن لدەف وان ژنین ل سێ هەیڤین دوماهیێ بین دووگیانیێ و لدەف وان ژنین گەلەك زاروك پەیدابوین (25٪).

دەرئەنجام: کیمبونا ڤیتامین د دهیتە هژمارتن ئیک ژئاریشین ساخلەمیێ بین بەربەلاڤ دناف ژنین دووگیان وبین نە دووگیان بین ساخلەم ل هەریما کوردستانێ, ئەفجا باشترە لئنیرین بو ڤیتامین د دناف خوینیدا بهیتە کرن دماوێ دووگیانیئدا.

الخلاصة

حالة الفيتامين د لدى النساء الحوامل وغير الحوامل في إقليم كردستان، شمال العراق

خلفية واهداف البحث: نقص فيتامين د عند الأمهات ظاهرة شائعة خلال الحمل وتعد من مشاكل الصحة العامة الواسعة الانتشار. أجريت الدراسة لتحديد حالة فيتامين د الحالية لدى مجموعة محددة من النساء الحوامل وغير الحوامل الأصحاء في إقليم كردستان، عراق .

طرق البحث: خلال الفترة ما بين أيار 2012 وحتى تشرين الثاني 2012, تم إجراء دراسة مقطعية شملت 300 امرأة, 200 منهن نساء حوامل أصحاء و 100 نساء غير حوامل أصحاء. تم اختيارهن من قسم النسائية والتوليد, مستشفى أزادي التعليمي العام في دهوك.

النتائج: معدل مستوى فيتامين د في مصل الدم عند النساء الحوامل [ng/ml (15.6) 27.0] وغير الحوامل [31.7 ng/ml (13.3)], P<0.01. انتشار نقص فيتامين د الشديد عند النساء الحوامل (14.0%) وغير الحوامل (1.0%). نقص مستوى فيتامين د (<30 ng/ml) كان موجود في [(43.3%)130] من النساء الحوامل وفي [(17.7%) 52] من النساء الغير الحوامل. أعلى انتشار لنقص فيتامين د الشديد (8.5%) لوحظ في مجموعة الثلث الثالث من الحمل وعند النساء اللاتي لديهن ولادات كثيرة (25%).

الاستنتاجات: أن نقص فيتامين د يشكل مشكلة صحية شائعة بين النساء الحوامل وغير الحوامل الأصحاء في, إقليم كردستان, لذا يفضل فحص مستوى فيتامين د في مصل الدم خلال فترة الحمل.

HYPERURICEMIA AMONG PATIENTS WITH METABOLIC SYNDROME ATTENDING DUHOK DIABETES CENTER

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ABSTRACT

Background and objectives Hyperuricemia is known to be associated with type2 Diabetes Mellitus (type 2 DM) and metabolic syndrome. However, this association still needs to be delineated in our population .The aims of this study were to evaluate the prevalence of hyperuricemia in Kurdish type 2 DM population and to explore the metabolic factors clustering with hyperuricemia for patients with metabolic syndrome.

Methods Across-sectional study was conducted on 400 patients with metabolic syndrome .They were selected from patients diagnosed as type 2 DM or being treated with antidiabetic drugs who visited Duhok Diabetes Center during the period of the study(n=3678).The patients were divided into quartile according to their uric acid levels, lowest(first) quartile to the highest(fourth) quartile. The metabolic syndrome was defined according to the ATP-111 criteria; we exclude patients treated for hyperuricemia.

Results The prevalence of hyperuricemia was 8.0% .The age prevalence of hyperuricemia was 5.8% in the patients aged 40-60 years and 2.2% in those aged more than 60 years .The mean serum uric acid was 4.98 mg/dl(95%Cl 4.79-5.15) for males and 4.18 mg/dl (95%Cl 4.01-4.35) for females. In ANOVA analysis, patients with first quartile (uric acid< 4.0 mg/dl) were associated with lower mean values of waist circumference, blood pressure, triglycerides, blood glucose, insulin and HOMA-IR; but higher values of HDL-cholesterol than those with this comorbidity. A significant correlation between serum uric acid and insulin resistance was observed($r=0.344$, $p=0.01$), and a less significant value with waist circumference($r=0.125$, $p<0.05$) and triglycerides ($r=0.206$, $p<0.05$).

Conclusions In patients with metabolic syndrome, about half have uric acid levels (>4.0 to ≤7.0 mg/dl) and one out of 10 has hyperuricemia. The most determinant of hyperuricemia is waist circumference and insulin resistance.

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Key words: Hyperuricemia, Metabolic syndrome, Diabetes mellitus

Hyperuricemia is an increasingly common medical problem not only in the developed countries but also in the developing countries.[1] It has been described that hyperuricemia is associated with features of the metabolic syndrome (MS) such as obesity, dyslipidemia, hyperglycemia and hypertension.[2,3] This association, however, still needs to be delineated in our population. Hence, the present study was conducted to determine the prevalence of hyperuricemia and the metabolic factors clustering with hyperuricemia among randomly selected patients with metabolic syndrome of Duhok city population.

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METHODS

Collection of data was carried out during the period from May 2011 to October 2011 at the Duhok Diabetes Center, Duhok, Kurdistan Region, and Iraq. A cross-sectional study design was conducted on 400 patients with MS (161 males and 239 females). The protocol was designed that all patients with MS visited the center were selected randomly (every third patient). Patients interviewed and informed about the nature of the study and instructed to report in fasting state. At the beginning a total of 481 patients were enrolled in the study. Then 81 Patients with acute infection, pregnancy, chronic liver disease, renal disease, and with hypouricemia treatment were excluded from the study. The protocol was approved by the ethical committee of the General Directorate of Health in Duhok Governorate. A verbal consent of all the participants was obtained at the start of the study. The diagnosis of metabolic syndrome was based on the criteria by NCEP-ATPIII.[4] The participants were classified as having metabolic syndrome if they had at least 3 components of an NCEP-ATPIII definition of metabolic syndrome(1) fasting plasma glucose level of 110 mg/dl or greater,(2) a fasting triglycerides level of 150 mg/dl or greater, (3) an HDL-Cholesterol level<40 mg/dl for men and <50mg/dl for women, (4) a blood pressure of 130/85 mmHg or greater or on pharmacological treatment for hypertension, and(5) waist circumference>102 cm for men and >88cm for women. A pre-tested questionnaire designed to obtain information on gender, birth date; waist circumference measured for each subject using tape measure, and blood pressure using mercuric sphygmomanometer and the use of medication was recorded. Fasting blood specimens were collected for measurement of serum uric acid, glucose, triglycerides and HDL-Cholesterol by Clinical Chemistry Analyzer, Lisa Xs(open, automated, discreet, random access).Serum Insulin level was measured using ELISA technique(Accu-Bind ELISA microwells), monobind Inc. lake forest, CA92630, UASA. Insulin resistance was calculated using homeostasis model assessment of insulin resistance (HOMA-IR) by the equation:

HOMA-IR= [(FBS mg/dl) * 0.05* insulin level uIU / ml] / 22.5. All data were analyzed using the Statistical Package for Social Science SPSS version 18.0. One way ANOVA test was used to obtain different serum uric acid quartile among diabetic patients.

RESULTS

The prevalence of hyperuricemia (men>7.0 mg/dl, women >6.0 mg/dl) in patients with MS was 8.0%, (in those aged 40-60 years 5.8% verses 2.2% aged >60 years). The general characteristics of the study patients are described in Table 1. The mean serum uric acid was 4.98 mg/dl (95%Cl 4.79-5.15) for men and 4.18 mg/dl (95%Cl 4.01-4.35) for women (p <0.05).Uricemia (≥4.0 to <7.0mg/dl), 54.5

%.(in men 70.2% verses 49.8% in women (p<0.05). In ANOVA analysis, patients with first quartile (uric acid< 4.0 mg/dl) were associated with lower mean values of waist circumference, , blood glucose, insulin , HOMA-IR and triglycerides; but higher values of HDL-cholesterol than those with the highest (uric acid ≥7.0 mg/dl) quartiles(Table 2). The association of each components of the metabolic syndrome with hyperuricemia is demonstrated in Table 3. Patients with waist circumference (men>102cmm, women >88 cm) had a higher incidence of hyperuricemia as compared to the other components. A significant correlation between serum uric acid and insulin resistance was observed(r=0.344, p<0.01).Less significant values with waist circumference, triglycerides and HDL-cholesterol were observed (r=0.125 and 0.206 and -0.164) respectively (p<0.05) for all parameters (Table 3).

Table 1. Patient characteristics

Characteristics	Mean+SD
Age (years)	50.2±8.1
Waist circumference (cm)	
Male	106.9±6.4
Female	106.7±9.7
Systolic BP (mmHg)	135.0±20.6
Diastolic BP (mmHg)	84.6±10.3
Fasting blood glucose (mg/dl)	197.2±78.2
Insulin (uIU/ml)	8.8 ±2.3
HOMA-IR	3.8 ±1.9
Triglycerides (mg/dl)	221.3±143.3
HDL-Cholesterol(mg/dl)	
Male	36.6±8.2
Female	40.4±9.4
Uric Acid (mg/dl)*	
Male	4.98±1.18
Female	4.18±1.31

*95% Cl for serum uric of males (4.79-5.15) and of females (4.01-4.35), uricemia (>4.0 to <7.0), 54.5%.

Table 2. Mean +SD of metabolic factors according to uric acid quartiles-ANOVA analysis

Metabolic factor	Quartiles of serum uric acid (mg/dl)			p-value
	<4.0 (n=162)	≥4.0 to <7.0 (n=218)	≥7.0 (n=20)	
Waist circumference (cm)	105.6±9.5	107.7±7.8	108.5±6.9	0.04
Systolic BP (mmHg)	135.1±21.3	134.4±20.4	140.2 ±15.8	0.08
Diastolic BP (mmHg)	84.7 ±11.2	84.4±9.8	84.5± 8.0	0.1
Glucose (mg/dl)	167.9±72.1	166.5±75.6	181.8±85.2	0.01
Insulin (uIU/ml)	6.1±2.0	8.3±1.6	11.2 ±7.2	0.015
HOMA-IR	2.3±1.9	3.1±1.8	5.1±2.2	
Triglycerides (mg/dl)	184.6±90.4	245.9±162.3	249.4±204.3	0.01
HDL-Cholesterol	40.4±10.2	38.0±8.2	35.5±6.5	0.01

NS: not significant (p>0.05).

Table 3. Distribution of components of metabolic syndrome in patients with hyperuricemia (n=32)

Component	Percentage (%)
Waist circumference (male>102 cm, female>88 cm)	93.7
Blood pressure>135/85(mmHg)	50.0
Fasting blood glucose>110 mg/dl	84.3
Triglycerides >150 mg/dl	78.1
HDL-Cholesterol (men< 40 mg/dl, women<50mg/dl)	84.2

Table 4. Correlation analysis of serum uric with metabolic factors

Metabolic factor	r	P value
Waist circumference (cm)	0.125	0.03
Blood pressure (mm Hg)	0.030	0.410
Fasting blood glucose (mg/dl)	0.029	0.390
Insulin(uIU/ml)	0.064	0.500
HOMA-IR	0.344	0.012
Triglycerides(mg/dl)	0.206	0.04
Hdl-Cholesterol(mg/dl)	- 0.164	0.05

DISCUSSION

The present study is the first cross-sectional study of estimating uric acid levels among patients with MS in Duhok city population. The results of this study (8.0%) were lower than in other ethnic groups.[5,6] It has been reported that the prevalence of hyperuricemia among patients with MS around 18% in males and 17% in females. Such a difference is especially noteworthy because several factors are known to impact on the levels of uric acid and the prevalence of hyperuricemia. Of these, dietary factors as well as the age of the population and the cutoff points used to define hyperuricemia. Age and hyperuricemia are independent risk factors of metabolic disease and the coexistence of the two will substantially increases metabolic syndrome risk.[7] In this study, age appears to be related to hyperuricemia, a group of patients whose age between 40-60 years had a higher incidence of hyperuricemia as compared to those in other age group. Several studies have proved the association between waist circumference, dyslipidemia, high blood pressure, diabetes mellitus and uric acid levels,[8,9]but the association between insulin resistance and hyper- uricemia remains unclear. It is known that obesity leads to an increase in plasma uric acid levels. The complex interplay between obesity and insulin resistance has been implicated in metabolic syndrome.[10] The association between waist circumference and hyperuricemia is well established. Over 90%of metabolic syndrome patients with hyperuricemia have central obesity. The uric acid is known to play a role in the pathophysiology of insulin resistance and cellular disturbances in glucose and lipid metabolism.[11,12] In patients with metabolic syndrome, there is an increase in serum uric acid, glucose, triglycerides and insulin levels. These findings represent an important extension of previous finding that patients with diabetes or insulin resistance are markedly hyperuricemia.[13] In our study, among the components of metabolic syndrome, HOMA-IR values are significantly associated with uric acid levels. Previous studies have revealed that insulin increases serum uric acid through the hexose monophosphate shunt connecting with uric acid production.[14] Thus, the high insulin levels can lead to hyperuricemia. In the present study, the high fasting insulin levels may explain the

high levels of uric acid in patients with metabolic syndrome.

It can be concluded that patients with metabolic syndrome have a prevalence of hyperuricemia of about (8%), and about half of them have uric acid between(>4.0 - <7.0 mg/dl).The measured uric acid status is associated with metabolic syndrome components. The most determinant of hyperuricemia is waist circumference and insulin résistance. Thus screening of hyperuricemia in metabolic syndrome patients is recommended and the treatment of associated problems such as hypertension, dyslipidemia, diabetes mellitus and obesity is mandatory.

REFERENCES

1. Alberti KG, Zimmet P, Shaw J.Metabolic syndrome--a new world-wide definition. A Consensus Statement from the International Diabetes Federation. Diabet Med 2006; 23:469-80.
2. Conen D, Wietlisbach V, Bovet P, Shamlaye C, Riesen W, Paccaud F, Burnier M.'Prevalence of hyperuricemia and relation of serum uric acid with cardiovascular risk factors in a developing country'. BMC Public Health 2004; 4:9.
3. Schachter M. Uric Acid and Hypertension'.Curr Pharm Des. 2005;11:4139-43.
4. Grund SM, Brewer Jr HB,Cleeman JI, Smith SC Jr, Lenfant C .'Definition of metabolic syndrome; report of the National Heart, Lung and blood Institute/ American Heart Association conference on scientific issues related to definition'. Circulation 2004;109:433-8.
5. Ishizaka N, Ishizaka Y, Toda E, Nagai R, Yamakado M.'Association between serum uric acid, metabolic syndrome, and carotid atherosclerosis in Japanese individuals'. Arterioscler Thromb Vasc Biol 2005; 25:1038-44.
6. Nakanishi N, Okamoto M, Yoshida H, Matsuo Y, Suzuki K, Tatara K . 'Serum uric acid and risk for development of hypertension and impaired fasting glucose or Type II diabetes in Japanese male office workers'. Eur J Epidemiol 2003;18:523-30.
7. Li Y, Stamler J, Xiao Z, Folsom A, Tao S, Zhang H.'Serum uric acid and its correlate in Chinese adult population, urban and rural, of Beijing. The PRC-USA Collaborative Study in Cardiovascular and Cardiopulmonary Epidemiology'. Int J Epidemiol 1997; 26:288-96.
8. Krishnan E, Kwoh CK, Schumacher HR, Kuller L.'Hyperuricemia and incidence of hypertension among men without metabolic syndrome'. Hypertension 2008; 49:298-303.
9. Coutinho TA, Turner ST, Peyser PA, Bielak LF, Sheedy PF, 2nd, Kullo IJ.'Associations of serum uric Acid with markers of inflammation, metabolic syndrome, and subclinical coronary atherosclerosis'. Am J Hypertens 2007; 20:83-9.
10. Matsuura F, Yamashita S, Nakamura T, Nishida M, Nozaki S, Funahashi T, Matsuzawa Y.'Effect of visceral fat accumulation on uric acid metabolism

in male obese subjects: visceral fat obesity is linked more closely to overproduction of uric acid than subcutaneous fat obesity'. Metabolism 1998; 47:929-33.

11. Muscelli E, Natali A, Bianchi S, Bigazzi R, Quinones Galvan A, Sironi AM, Frascerra S, Ciociaro D, Ferrannini E.'Effect of insulin on renal sodium and uric acid handling in essential hypertension'. Am J Hypertens 1996; 9:746-52.
12. Quinones Galvan A, Natali A, Baldi S, Frascerra S, Sanna G, Ciociaro D, Ferrannini E.'Effect of insulin on uric acid excretion in humans'. Am J Physiol 1995; 268:E1-5.
13. GrundySM.'Hypertriglyceridemia, insulin resistance, and the metabolic syndrome'. Am J Cardiol 1999; 83:25F-9F.
14. Modan M, Halkin H, Karasik A, Lusky A.'Elevated serum uric acid--a facet of hyperinsulinaemia'. Diabetologia 1987; 30:713-8.

پوختە

یوریك أسید دناف خوینا نە خوشین میتابولیزمی ئە وین سە رە دانا سە نتە ری نە خوشیا شە کری دکە ن ل دهوکی

پێشەکی و ئارمانج: یا دیارە کوب بلندبونا ریزا یوریك أسید یا کریدایە ب جوری 2 زنە خوشیا شە کری و نە خوشیا میتابولزمی. دکە ل ڤی جە ندی یا فە رە کو ئە ف کریدانە زیدە تر بهیتە دیارکرن دنا جفاکی مە دا. ئارمانجا ڤی فە کولینی دیارکرنا ریزا یوریك أسید د نە خوشین جوری 2 یین شە کری ودیارکرنا فاکتە رین دی یین کریدای بلند بونا یوریك أسید دنە خوشین شە کریدا.

ریکێن فەکولینێ: ئە ف فە کولینە هاتە ئە نجام دان لسە ر 400 نە خوشین میتابولیزمی کو ئە وی هاتینە دە ست نیشانکرن وە ك جوی 2 نە خوشیا شە کری ز کوزمی 3678 نە خوشان ئە وین سە رە دانا سە نتە ری نە خوشیین شە کری دای ل بار یزکە ها دهوکی. نە خوش هاتن هدا بە ش کرن بو جار جاریکا ل دیف بلندیا یریك أسید و ئە و نە خوشین دە رمانین شە کری و ە ردکرن هاتنە لادان.

ئەنجام: دڤ فە کولینی دا ریزا بلند بونا یریك أسید 8٪ بو. ریزا بلند بونا یریك أسید د تە مە نی 40–60 سالی دا 5,8٪ بو و 2,2٪ دنە خوشین زیی وان زیدە ی 60 سال . ریزا یوریك أسید دسیرە می دا 4,98 ملغم/دل بو (95٪ CI 4,79 – 5,15) یین نیر و 4,18 ملغم/د ل یین می (95٪ CI 4,01 – 4,35). شلوفە کرنا أنوفا بو نە خوشین جاریکا ئیکی (یوریك أسید کیمتر ز 4 ملغم/د ل) دیار بو کوکیمترین ریزا ناف تە نکی و فشارا خوینی و رینی سیا نی و ریزا شە کری و أنسولینی و HOMAIR هە بو وریزا بلند ز رینی تیر هە بو . بە یە ندی دیار بو دناف بە را یوریك أسید و بە ر هنکاریا أنسولینی (r = 0.344، p = <0,01) وریزا کیمتر دنا ف تە نکیدا (r = 0.125 p = <0.01) ورینی سیانی (r = 0.206 p = <0.05).

دەرئەنجام: دیار بو دڤ فە کولین یدا کو نیفا نە خوشین متابولیزمی ریزا یوریك أسیدی دناف خوینیدا (<4,0 تا < 7,0 ملغم/د ل) وئیك ز هە ر دە ها ز نە خوشا بلند بونا یوریك أسید دناف خینیدا هە بو. فاکتە ری سە رە کی یی دە ست نیشانکرنا بلند بونا یوریك اسیدی دناف خوینیدا جیوی ناف تە نکی یە و بە رکریا أنسولینی.

الخلاصة

حامض البوليك الدموي لدى مرضى المتلازمه الأيضيه الوافدين الى مركز علاج السكري في دهوك

خلفية واهداف البحث: من المعروف بأن أرتفاع نسبة حامض البوليك يكون مصاحبا ل النوع 2 من مرض السكري و المتلازمه الأيضية. مع ذلك فأن هذا الأرتباط يحتاج ألى مزيد من التحديد في مجتمعنا. ألهدف من هذه الدراسه هو لتقييم نسبة أرتفاع حامض البوليك لدى مرضى النوع 2 مرض السكري لمجتمع كردستان و لكشف العوامل الأيضيه المصاحبه لأرتفاع حامض البوليك لمرضى السكري.

طرق البحث: أجريت هذه الدراسه المقطعيه على 400 مريض من مرضى المتلازمه الأيضيه. تم أختيار العينه الذين تم تشخيصهم على أنهم مرضى من النوع 2 من مرض السكري أو من الذين يتم معالجتهم بالأدويه المضاده لمرض السكري والذين يترددون على مركز علاج أمرض السكري في محافظة دهوك (العدد 3678). تم تقسيم المرضى حسب نسبة حامض البوليك من الربع الأول (أدنى نسبة حامض البوليك) الى الربع الرابع (أعلى نسبة حامض البوليك). تم تعريف المتلازمة الأيضيه حسب معيار ATP-111 وقد تم أستثناء المرضى الذين يعالجون بأدوية أرتفاع نسبة حامض البوليك.

النتائج: كانت نسبة أنتشار أرتفاع حامض البوليك 8%. نسبة أرتفاع حامض البوليك لدى المرضى ذوو معدل العمر 40-60 سنة كانت 5.8% وكانت 2,2% لدى المرضى الذين كانت أعمارهم أكثر من 60 سنة. كان معدل حامض البوليك في المصل 4.98 ملغم/دل (95% CI 4.79 – 5.15) للذكور و 4.18 ملغم/د ل للأناث (95% CI 4.01 – 4.35). عند أجراء تحيلي الأنوفا المرضى من ضمن الربع الأول (حامض البوليك أقل من 4 ملغم/د ل) كانت لديه أقل نسة من محيط الخصر وضغط الدم والدهون الثلاثيه ونسبة السكر في الدم والأنسولين و HOMAIR ومستوى أعلى من الكوليستيرول ذو التركيز العالي . تم ملاحضة علاقه معنوية بين مستوى حامض البوليك ومقاومة الأنسولين (r = 0.344 p <0.01) ونسبة أقل من قيمة محيط الخصر (r = 0.125 p <0.01) ودهون ثلاثيه (r = 0.206 p <0.05).

الاستنتاجات: تبين من الدراسه بأن حوالي نصف المرضى ذوو المتلازمه الأيضيه كانت لديهم حامض البوليك الدموي (> 4,0 الى < 7,0 ملغم/د ل) وأن واحدا من عشرة كانت لديهم أرتفاع في حامض البوليك الدموي. العامل المحدد الأساسي لأرتفاع حامض البوليك الدموي هو محيط الخصر و المقاومه للأنسولين.

PHYTOSTEROLS AND PHYTOSTANOLS IN PALM OILS

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ABSTRACT

Background and objectives Phytosterols (plant sterols) are triterpenes that are important structural components of plant membranes. They serve to stabilize phospholipid bilayers in plant cell membranes just as cholesterol does in animal cell membranes. Phytostanols occur in trace levels in many plant species and they occur in high levels in tissues of only in a few cereal species. In this study the search was mainly for sitostanol which reduces cholesterol absorption in the bowel. In addition to other unidentified plant sterols in the crude palm oil (CPO), crude palm kernel oil (CPKO) and crude palm fiber oil (CPFO) extracts.

Methods The unsaponifiable sterols extracts from CPO, CPKO and CPFO were isolated by preparative thin layer chromatography. The isolated sterols were analysed as free and trimethylsilylated (TMS) derivatives by GC correlations and GC-MS mass spectral data in comparison with their standard sterols.

Results Qualitative and quantitative separations of the sterols are illustrated. Tables are presented showing the sterols composition determined in the oils. There were no major differences between the above three oils with respect to their main sterols composition, but the total amount of the sterols in CPFO were much higher than CPKO and CPO respectively. In addition to the well identified sterols in the palm oils (i.e cholesterol, campesterol, stigmasterol and β-sitosterol). Additional sterols were isolated and identified in CPO: stellasterol and cycloartenol. CPKO: fucosterol, 5α-4,4-dimethylcholest-8,24-dien-3β-ol and cycloartenol, CPFO: brassicasterol, sitostanol and 4,4-dimethylcholest-5-en-3β-ol.

Conclusions Sitostanol was only found in CPFO (16 ppm) but was not found in CPO or CPKO.

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Key words: Palm oils, Phytosterols, Sitostanol

Phytosterols and phytostanols are from plants origin, with the highest concentrations occurring in vegetable oils. Chemically, these sterols have the same basic structure as cholesterol but differences arise from the side chain which is modified by the addition of one or two supernumerary carbon atoms at C-24 with either α or β chirality. The 24-alkyl group is characteristic of all phytosterols and is preserved during subsequent steroid metabolism in both fungi and plants to give hormones that regulate growth and reproduction in a manner similar to animals.

Most phytosterols are compounds having 28 to 30 carbon atoms and one or two or three carbon-carbon double bonds, typically one or two in the sterol nucleus and sometimes a second in the alkyl side chain. All phytosterols were shown to derive in plants from cycloartenol and in fungi (including yeasts), as in vertebrates, from lanosterol, both direct products of the cyclisation of squalene.[1]

More than 250 different types of

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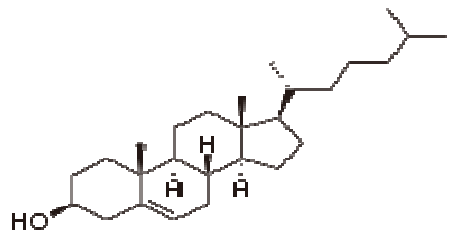
phytosterols have been reported in plant species[1]. Representatives of these sterols are campesterol, β-sitosterol and stigmasterol (in soybean oil). β-Sitosterol is present in all plant lipids and is used for steroid synthesis. Stigmasterol, which is used for the synthesis of progesterone and vitamin D3, is known as"Wulzen factor", a potential anti-inflammatory compound. Its action is mediated by the inhibition of several pro-inflammatory and matrix degradation mediators involved in osteoarthritis-induced cartilage degradation.[2]

The non-glyceride components content varies from oil to oil. It may range between 2-8% in some oils, but the constitution in most oils is 1% or below.[3] Plant sterols in vegetables, fruits and vegetable oils were extensively studied.[4-9]

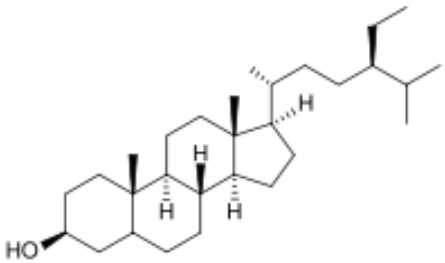
Considerable variability in the concentration of free sterols was observed among different oils. Concentrations between 200 and 400 mg/100 g are found in oils from sesame, canola, rapeseed, corn, and evening primrose.[10] Phytosterols produce a wide spectrum of biological activities in animals and humans. They are considered efficient cholesterol-lowering agents.[11,12] The lowering of serum cholesterol by plant sterols is believed to be the result of an inhibition of cholesterol absorption in the small bowel.[13,14] Plasma total and LDL-cholesterol concentrations, were significantly reduced by taking spreads enriched with plant sterols.[15] Also it has been found that plants sterols intake was associated with the protection of colon carcinogenesis and with a reduction in the risk of lung cancer and preventing coronary heart disease.[16,17] The focus of research has shifted from plant sterols to plant stanols because of their greater ability to reduce intestinal cholesterol absorption and virtually unabsorbed; thus, plant stanol ester foods are clinically proven, highly effective new dietary tools for managing blood cholesterol levels.[18] In addition, they produce a wide spectrum of therapeutic effects including anti-tumor properties. Further data on their metabolism and potential therapeutic action can be found in a review article.[19] A review of physiologic and metabolic aspects related to these cholesterol-lowering properties may be consulted.[20] The interest of adding sterols and stanols to human food to improve health has been discussed.[21] Clinical experiments have shown that only high amounts of stanols (about 9 g/day) can decrease serum α-carotene concentrations, without altering those of vitamins A, D and E.[22] As cholesterol, phytosterols may undergo oxidative processes. These oxyphytosterols have been shown to have beneficial biological properties which deserve further investigation.[23]

Phytostanols are plant sterols, referred to as stanols. They are fully-saturated subgroup of phytosterols, have no double bond in the ring B structure[8]. They are in general produced by hydrogenation of phytosterols. Sitostanol and campestanol exist in quantifiable amounts in cereals, fruits and vegetables, but generally of less concentration than the unsaturated plant sterols.[24] To improve their solubility, plant stanols are often combined with a fatty acid ester to produce plant stanol esters.

The most generally found stanol is sitostanol. Esterification of phytosterols with long-chain fatty acids increases fat solubility by 10-fold and allows delivery of several grams daily in fatty foods such as margarine. A dose of 2g/day as the ester reduces low density lipoprotein cholesterol by 10%, and little difference is observed between Δ^5-sterols and 5α-reduced sterols (stanols). Phytosterols can also be dispersed in water after emulsification with lecithin and reduce cholesterol absorption when added to nonfat foods.[25]



Cholesterol



Sitostanol

Sterols are often isolated in the unsaponifiable fraction of any lipid extract and determined by various chromatographic procedures (HPLC or GLC). An extensive review on the diversity, analysis, and health-promoting uses of phytosterols and phytostanols could be consulted.[26]

In plants, several sterol esters can be found in cell membranes and seed oils, such as ergosteryl, stigmasteryl and β-sitosteryl esters. In bryophytes (Hepaticae), cycloartenol and stigmasterol esters have been isolated.[27] The relative importance of esterified sterols depends on the vegetal oil, 50-70% being found in oils from evening primrose, avocado, rapeseed, canola, corn, peanut, and sunflower, 30-50% in oils from borage, olive, sesame, coconut, and cottonseed, and less than 30% in oils from safflower, palm, and soybean. Thus, a large variation in the content and distribution of the sterol fractions between different vegetal oils can be observed.[28] Variability reflects also differences in processing of oils and in growing season of the plant source.[29]

The content and composition of sterols in crude palm oil and palm kernel oil have been reported.[30-33] But in many of these papers only the dominant sterols have been studied, and phytostanols were not reported in oil extracted from palm fiber oil. It is aimed to search for sitostanol in the palm oil, as well as to investigate the possibility of the existence of other related sterols, which have not been detected in palm oils of this study.

METHODS

Sources of samples:

Samples of the crude palm oil used for this project were supplied by Malaysia Palm Oil Board (MPOB). Fiber oil used in this study was obtained by Soxhlet extraction of the palm fiber with 95% ethanol. Four replicates from each oil (crude palm oil,

crude palm kernel oil, crude palm fiber oil), totally 12 samples, were analyzed in this study (Table1).

Chemicals and reagents:

Solvents – Ethanol 95%, Fluka HPLC grade; n-hexane and ethyl acetate, Fisher Scientific; Phenolpthalein 1% (w/v) in ethanol 95%; Aqueous potassium hydroxide solution; Analar Sodium sulphate anhydrous; Mallinckrodt; N,O-Bis(trimethylsily)trifluroacetamide (BSTFA), PLERCE; Vanillin solution (1 g vanillin in 100 ml of concentrated H_2SO_4); silica gel 60 GF*254* (for thin layer chromatography), Merck.

Reference sterol standards:

Cholestanol and cholesterol, Fluka 97% (GC); Brassicaterol, MATREYA, INC; Ergosterol, SIGMA approx 90%; Campesterol, SIGMA approx 65%; Stigmasterol, β-sitosterol, SIGMA 98.3% purity (GC); Sitostanol, SIGMA 96.7% purity (GC).Other reference sterols were obtained from Professor C.J.W. Brooks, Department of Chemistry, University of Glasgow. The extraction and isolation of sterols from palm oil was done by using saponification method followed by preparative thin layer chromatography. GC-FID and GC-MS were used along with the reference sterols for subsequent analysis and identification.

Saponification and extraction:

The solidified oil samples were melted at 40^0C and shaken until the oil became homogeneous liquid. From each of these oils, 5 g was weighed accurately and dissolved in 30 ml of 95% ethanol (v/v), 55 ml of 50% KOH solution (w/w)[34] and the internal standard cholestanol (1.3 mg) was added (for the quantitative recovery calculations), then the solution refluxed for 1h. The unsaponifiable matter was extracted with hexane (4x50 ml) and dried over anhydrous Na_2SO_4, filtered and solvent evaporation under vacuum and the residue stored in the freezer.

Isolation of sterol fraction by preparative Thin Layer Chromatography (TLC)*:*

The recovered unsaponifiable matter was dissolved in hexane and applied on a preparative chromatoplate (20 cm x 20 cm) and developed with hexane: ethyl acetate (4:1, v/v)34. To indicate the sterols band, cholesterol was applied on another plate and developed in parallel. The sterol band was scraped off and extracted with hexane: ethyl acetate (1:1,v/v), filtered and dried with nitrogen.

Derivatisation*:*

Each of the standard and the samples (50-100 µg) was dissolved in dry pyridine (10 µl) and BSTFA (2 µl) was added and mixed thoroughly. The samples were heated at 60-80^0C for 1 hour. The reaction mixture was dried with nitrogen and re-dissolved in ethyl acetate. The reaction mixture was then analyzed immediately.

Analysis of sterol fraction by GC*:*

A Shimadzu GC-17A gas chromatography equipped with flame ionization detector, together with a HP-5MS column (cross linked 5% pheny1 methy1 siloxane), 30 m x 0.25 mm i.d. x 0.25 µm film thickness,

was used for these analyses. The GC conditions: Carrier gas: Nitrogen, injection port: 280^{0}C, Detector: 285^{0}C, oven: 280^{0}C, Auxiliary: 280^{0}C; Column pressure: 19 psi; Total flow (0.88 ml/min): Linear velocity (29.83 cm/s) and Control mode: Split less.

Identification and Confirmation by Using GC-MS:

A Shimadzu GCMS QP5050A series gas chromatograph coupled with a quadrupole mass spectrometer was used and the Column: SGE, *forte* BPX5-5% Phenyl Polycarborane-siloxane (cross linked 5% pheny1 methy1 siloxane), 30 m x 0.25 mm i.d. x 0.25 µm film thickness. The GC-MS conditions: Carrier gas: Helium; injection port: 280^{0}C; isothermal: oven: 280^{0}C; interface temp.: 280^{0}C, column inlet pressure: 98.6 kPa, column flow: 0.7 ml/min, linear velocity :32.8 cm/sec, control mode: splitless, split Ratio :18, total flow :14.3 ml/min. Temprature program: injection port: 280.00 °C, oven :280.00 °C (5min.), 5 °C/min to 280 °C (40min.), Interface Temp.: 280.00 °C, control mode :splitless, column inlet pressure: 98.6 kPa, column flow :0.9 mL/min, linear velocity :36.5 cm/sec, split ratio :14, total flow :14.3 mL/min . Qualitative data were acquired in the Electron Impact mode (70 ev) and scanning from 50 to 550 a.m.u. at 1.53 sec/scan. The isolated sterols were identified by GC-MS as free and their TMS derivatives by GC correlations and GC-MS mass spectral data in comparison with the standard sterols.

Selected Ion Monitoring (SIM):

Mass-spectrometric sensitivity and selectivity are greatly aided by a data system capable of monitoring selected ions from the mass spectra, i.e. selected ion monitoring (SIM). From the mass spectra of sitostanol, 3 characteristic ions (m/z: 215, 398 and 488) were chosen for monitoring. To determine the existence of sitostanol in the oil samples under SIM mode, the oil samples spiked with a small amount of sitostanol were injected into the GC-MS.

RESULTS

The recovered phytosterols in CPO, CPKO and CPFO and their percentage in unsaponifiable matter are shown in (Table 1). It has been found, that the amount of the total phytosterols in CPFO (6942 mg/kg) to be higher than, the palm oils: CPKO (1483 mg/kg) and CPO (1122 mg/kg), respectively. The internal standard cholestanol was added to these three oils (Table 1) before the saponification, 62% recoveries of the total sterols were calculated and this has been taken in to account. The phytosterols composition (ppm) in these three oils and their retention times are detailed in (Table 2).

The identification of all the isolated sterols were made by GC and GC-MS. These analysis data and in comparison with their corresponding standard sterols as free and TMS-ethers, led to the confirmation of the isolated sterols structures (Table 3, 4, and 5).

Table 1. Unsaponifiable Matter and Sterols Composition in Palm Oil, Palm Kernel Oil and Palm Fiber Oil

Crude Palm Samples	Oil sample, g	Unsaponifiable matter, g	Sterols fraction (TLC), g	Unsaponifiable matter in oil, mg/kg	Total sterols in oil, mg/kg	Unsap matter Oil's weight, %	Sterols Oil's weight, %	Sterols Unsap matter, %
CPO sample no. 2	5.1568	0.0321	0.0068	6225	1319	0.62	0.13	21.18
CPO sample no. 6	5.3645	0.0285	0.0054	5313	1007	0.53	0.10	18.95
CPO sample no. 11	3.8896	0.0199	0.0043	5116	1106	0.51	0.11	21.61
CPO sample no. 20	5.0238	0.0582	0.0053	11585	1055	1.16	0.11	9.11
Range (n = 4)	-	-	-	5116 – 11585	1055 – 1319	0.51 – 1.16	0.10 – 0.13	9.11 – 21.61
Mean (n = 4)	-	-	-	7060	1122	0.71	0.11	17.71
CPKO sample no. 3	5.0810	0.0118	0.0070	2322	1378	0.23	0.14	59.32
CPKO sample no. 4	5.7342	0.0167	0.0094	2912	1639	0.29	0.16	56.29
CPKO sample no. 10	5.2751	0.0179	0.0078	3393	1479	0.34	0.15	43.58
CPKO sample no.	5.0178	0.0082	0.0072	1634	1435	0.16	0.14	87.80
Range (n = 4)	-	-	-	1634 – 3393	1378 – 1639	0.16 – 0.34	0.14 – 0.16	43.58 – 87.80
Mean (n = 4)	-	-	-	2565	1483	0.26	0.15	61.75
CPFO sample no. 7	2.0494	0.0611	0.0118	29814	5758	2.98	0.58	19.31
CPFO sample no. 9	1.4905	0.0326	0.0116	21872	7783	2.19	0.78	35.58
CPFO sample no. 12	1.0262	0.0150	0.0058	14617	5652	1.46	0.57	38.67
CPFO sample no. 17	1.0380	0.0520	0.0089	50096	8574	5.01	0.86	17.12
Range (n = 4)	-	-	-	14617 – 50096	5652 – 8574	1.46 – 5.01	0.57 – 0.86	17.12 – 38.67
Mean (n = 4)	-	-	-	29100	6942	2.91	0.70	27.67

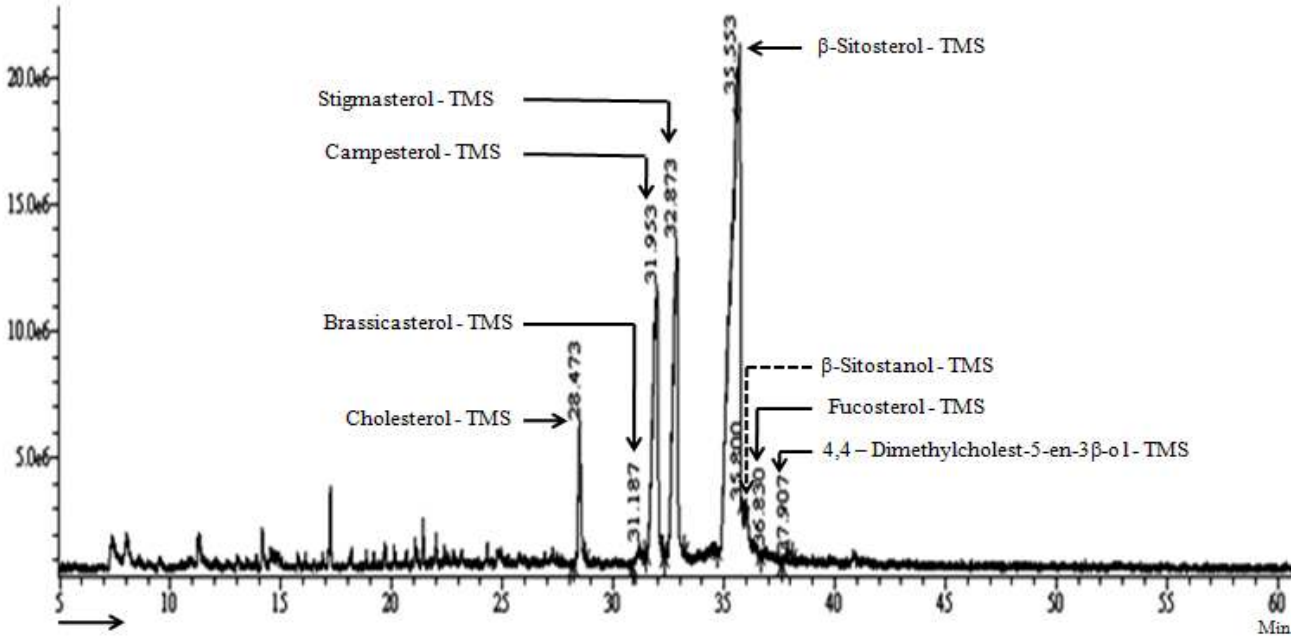


Figure 1. TIC Chromatogram of the Trimethylsilylated (TMS) - isolated Sterols from Crude Palm Fiber Oil (CPFO)

Table 2. The GC Retention Times and Compositions (ppm) of the Sterols in Crude Palm, Crude Kernel and Crude Palm Fiber Oil

Sterol	Retention time, tr (min.)	Corrected concentration (ppm)		
		CPO	CPKO	CPFO
Cholesterol	28.47	15	16	184
Brassicasterol	31.19	-	-	29
Campesterol	31.95	153	119	1161
Stellasterol	32.37	5	-	-
Stegmasterol	32.87	99	207	1129
β-Sitosterol	35.55	444	876	4082
β-Stanol	35.85	-	-	16
Fucosterol	36.83	-	3	-
4,4-Dimethyl-cholest-5-en-3β-ol	37.91	-	-	12
5α-4,4-Dimethyl-cholesta-8,24 dien-3β-ol	39.95	-	3	-
Cycloartenol	41.05	5	1	-

Table 3. Gas Chromatographic - Mass Spectrometric data for the Trimetylilated – isolated Sterols from Crude Palm Oil (CPO)#

Steroid	tr (min.)	Steroid - TMS m.w.	$M^{+\cdot}$	m/z of the other principle ions above 200 (%)	Base peak (100%)
Cholesterol (m.w. 386)	28.47	458	458 (40)	443 (13), 368 (83), 353 (43), 255 (23), 247 (23), 213 (15)	329
Campesterol (m.w. 400)	31.95	472	472 (47)	457 (13), 400*(0.6), 367 (38), 343 (97), 255 (29), 229 (6), 213 (18), 201 (12)	382
[Stellasterol] Ergost-7-en-3β-ol (m.w. 400)	32.37	472	472 (49)	459 (16), 443 (0.7), 431 (0.4), 395 (3), 367 (40), 343 (94), 315 (7), 296 (2), 289 (4), 255 (33)	382
Stigmasterol (m.w. 412)	32.87	484	484 (87)	394 (87), 379 (33), 372 (15), 355 (40), 351 (33), 330 (4), 309 (7), 271 (16), 213 (33)	255
β -Sitosterol (m.w. 414)	35.55	486	486 (46)	469 (9), 458 (1), 445 (0.5), 414* (0.9), 396 (94), 381 (39), 329 (7), 303 (6), 275 (22), 255 (40), 213 (33)	357
[Cycloartenol] 9-19-Cyclo-9β-lanost-24-en-3β-ol (m.w. 426)	41.05	498	498 (8)	483 (16), 471 (7), 443 (1.2), 426* (1.4), 408 (39), 393 (28), 357 (11), 339 (1.3), 325 (6), 300 (2), 281 (56), 267 (9), 257 (39), 241 (10), 217 (11)	386

In addition to the temperature programming these samples were also run isothermal at 280.00 °C.
* Molecular weight (m.w.)of the free sterols.

Table 4. Gas Chromatographic - Mass Spectrometric data for the Trimetylilated - isolated Sterols from Crude Palm Kernel Oil (CPKO)#

Steroid	tr (min.)	Steroid - TMS m.w.	$M^{+\cdot}$	m/z of the other principle ions above 200 (%)	Base peak (100%)
Cholesterol (m.w. 386)	28.47	458	458 (38)	443 (10), 429 (0.5), 416 (0.5), 401 (1), 386* (1), 368 (81), 353 (42), 340 (3), 301 (8), 275 (12), 257 (1), 247 (26), 233 (11), 215 (12), 203 (16)	320
Campesterol (m.w. 400)	31.95	472	472 (45)	457 (44), 443 (15), 430 (1), 415 (1), 400* (1), 367 (37), 354 (5), 343 (98), 327 (2), 301 (1), 289 (9), 273 (8), 262 (5), 255 (33), 247 (8), 233 (7), 215 (7), 213 (24), 203 (16)	382
Stigmasterol (m.w. 412)	32.87	484	484 (100)	469 (28), 443 (4), 426 (4), 410 (5), 395 (37), 386 (42), 371 (17), 355 (68), 343 (63), 327 (6), 310 (13), 296 (17), 282 (31), 273 (34), 253 (68), 241 (2), 228 (22), 217 (44), 201 (22)	484
β -Sitosterol (m.w. 414)	35.55	486	486 (46)	471 (14), 458 (1), 443 (0.5), 414* (0.8), 396 (99), 381 (45), 368 (4), 341 (2), 329 (8), 315 (1), 287 (5), 273 (7)	357
Fucosterol (m.w. 412)	36.83	484	484 (71)	469 (17), 458 (8), 445 (22), 430 (3), 412* (1), 379 (16), 369 (8), 349 (8), 330 (1), 311 (5), 285 (9), 269 (18), 253 (30), 243 (12), 227 (17), 211 (30)	394
α-4,4-Dimethyl- cholesta-8,24–dien - 3β-ol (m.w. 412)	39.95	484	484 (82)	469 (27), 458 (6), 445 (4), 412* (2), 395 (15), 381 (29), 367 (5), 349 (32), 327 (4), 313 (4), 295 (7), 281 (28), 271 (11), 243 (11), 227 (17), 211 (21)	281
[Cycloartenol] 9-19-Cyclo-9β-lanost-24-en-3β-ol (m.w. 426)	41.05	498	498 (50)	485 (16), 471 (15), 443 (10), 426* (10), 405(11), 386 (95), 374 (29), 359 (65), 347 (49), 329 (26), 317 (18), 296 (17), 264 (19), 241(31), 225 (31), 213 (28), 209 (80)	281

In addition to the temperature programming these samples were also run isothermal at 280.00 °C.
* Molecular weight (m.w.)of the free sterols.

Table 5. Gas Chromatographic - Mass Spectrometric data for the Trimetylilated - isolated Sterols from Crude Palm Fiber Oil (CPFO)#

Steroid	tr (min.)	Steroid - TMS m.w.	$M^{+\cdot}$	m/z of the other principle ions above 200 (%)	Base peak (100%)
Cholesterol (m.w. 386)	28.47	458	458 (12)	430 (15), 404 (1), 368 (67), 353 (82), 301 (89), 273 (9), 247 (17), 231 (57), 213 (54)	386*
Brassicasterol (m.w. 398)	31.19	470	470 (5)	461 (3), 443 (6), 428 (5), 415 (7), 398* (10), 396 (11), 381 (7), 369 (36), 363 (12), 338 (6), 327 (6), 295 (44), 331 (1), 273 (8), 253 (9), 207 (48)	221
Campesterol (m.w. 400) .	31.95	472	472 (0.6)	382 (60), 367 (15), 315 (83), 289 (70), 273 (77), 255 (69), 231 (67), 213 (37)	382
Stigmasterol (m.w. 412)	32.87	484	484 (1)	351 (44), 300 (64), 271 (83), 255 (94), 229 (25), 213 (56)	412*
β -Sitosterol (m.w. 414)	35.55	486	486 (0.3)	396 (58), 381 (47), 329 (78), 303 (53), 273 (50), 255 (47), 231 (42), 213 (67)	414*
Stanol (m.w. 416) .	35.86	488	488 (4)	473 (11), 446 (5), 431 (6), 396 (81), 383 (31), 364 (7), 339 (14), 329 (42), 317 (13), 302 (31), 283 (26), 271 (51), 255 (73), 247 (32), 232 (42), 215 (57)	416*
4,4-Dimethyl-cholesta-5-en-3β-ol (m.w. 414)	37.91	486	486 (2)	478 (10), 465 (19), 452 (31), 431 (17), 414* (63), 396 (89), 369 (42), 355 (40), 343 (33), 327 (64), 303 (48), 276 (36), 256 (44), 229 (53), 209 (45)	381

In addition to the temperature programming these samples were also run isothermal at 280.00 °C.
* Molecular weight (m.w.) of the free sterols.

DISCUSSION

The results indicates that the proportion of the major sterols in the CPO and CPKO (i.e. campesterol, stigmasterol, β-sitosterol and cholesterol) are in agreement with the earlier investigators.[6,7,8] In addition, other sterols were isolated and found in: CPO (stellasterol and cycloartenol), CPKO (fucosterol, 5α-4,4-dimethylcholest-8,24-dien-3β-ol and cycloartenol) and CPFO (brassicasterol, sitostanol and 4,4-dimethylcholest-5-en-3β-ol). Sitostanol was only found in CPFO (16 ppm) but was not found in CPO. This presents in total, 7 additional sterols have been identified in

these three oils. But brassicasterol was only found in CPFO, although it has been reported in CPO in trace amounts.[8, 31] The several common points of EI–MS fragmentation can be used to predict fragments in phytosterols with the structures of their corresponding standards. The mass spectra of the common phytosterols in the isolated three oils which were each analyzed by GC–MS as the free form (M+) or as TMS ethers (M^++72). These were corresponded to campesterol (*m/z* 400 and 472), stigmasterol (*m/z* 412 and 484*)*) and sitosterol (*m/z* 414 and 486). Their common fragment ions (*m/z*) were: 255m 273, 329 and 343.[35] The identified sterols as TMS-ethers from the three oils were all presented their EI-MS molecular ions which it corresponds to their molecular weight. These also contains fragment ions (*m/z*) which corresponds to the molecular weights of these free sterols. The focosterol was distinguished from its epimer Δ5-avenasterol by its abundant EI mass spectra base peak, *m/z* 394. While the *m/z* 296 is much more abundant in Δ5-avenasterol.[36] Sterols extracted from the oils of CPO, CPKO and CPFO were separated by the GC-capillary column and identified, GC-MS-TIC. Their retention time correlation and compositions. Sitostanol (as TMS) was separated from β-sitosterol (Figure 1) with EI-MS molecular ion (*m/z* 488) which it corresponds to its molecular weight. Also it contains a base peak fragment ion (*m/z* 416, 100%) as its free stanol. For further confirmation, sitostanol in CPFO was detected as the trimethylsilyl derivative by using the GC-MS single ion monitoring (SIM) mode at characteristic ions (m/z 215, 396, 488) and this was confirmed by spiking with the standard sitostanol-TMS. The retention times of the free sterols and their TMS derivatives on the GC column showed approximately to be the same, but the derivatised sterols had less adsorption on the column and more symmetrical peaks. The GC and GC-MS results of the isolated sterols from CPO and CPKO were in the agreement with the published data.[6,37,38]

There were no major differences between the three palm oils extracts, with respect to their main sterols composition, but the total amount of the sterols in CPFO were much higher than CPKO and CPO respectively. In addition to the well identified sterols in the palm oils (i.e cholesterol, campesterol, stigmasterol and β-sitosterol). Additional sterols were isolated and identified in CPO: stellasterol and cycloartenol, CPKO: fucosterol, 5α-4,4-dimethylcholest-8,24-dien-3β-ol and cycloartenol, CPFO: brassicasterol, sitostanol and 4,4-dimethylcholest-5-en-3β-ol. Sitostanol was only found in CPFO (16 ppm) but was not found in CPO or CPKO.

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REFERENCES

1- Moreau RA, Whitker BD, Hicks KB. Phytosterols, Phytostanols, and their conjugates in foods. Prog. Lip. Res. 2002; 41: 457-500.

2- Gabay O, Sanchez C, Salvat C, Chevy F, Breton M, Nourissat G, Wolf C, Jacques C, et al. Stigmasterol: A phytosterol with potential anti-osteoarthritic properties. Osteoathr Cartil. 2010; 18(1): 106-116.

3- Rao Narasinga BS. Non-Glyderide Components of Oil and Fats and Their Nutritional and Health Significance. Malaysian Oil Sci. Technol. 1998; **7(1)**: 21-28.

4- Normen L, Johnsson M, Andersson H, Van Gameren Y, Dutta P. Phytosterol glycosides reduce cholesterol absorption in humans. Eur. J. Nutr. 1999; 38:84-89.

5- Jeong TM, Itoh T, Tamura T, Analysis of Sterol Fractions from Twenty Vegetable Oils. Lipids**.** 1974; 9 (11): 912-927.

6- Itoh T, Tamura T, Matsumoto T. Sterol Composition of 19 Vegetable Oils. J. Am. Oil Chem. Soc. 1973; 50: 122-125.

7- Itoh T, Tamura T, Matsumoto T. Methylsterol Compositions of 19 Vegetable Oils. , J. Am. Oil Chem., Soc. 1973; 50: 300-303.

8- Itoh T, Tamura T, Matsumoto T. Sterols and Methylsterols in some Tropical and subtropical Vegetable oils. Oleagineux. 1974; 29 (5): 253-256.

9- Weihrauch JL, Gardner JM. Sterol Content of Foods of Plant Origin. J. America. Dietic Assoc. 1978; 73: 39-46.

10- Phillips KM, Ruggio DM, Toivo JI, Swank MA, Simpkins AH. Free and esterified sterol composition of edible oils and fats. J Food. Comp Anal. 2002; 15: 123–142.

11- Trautwein EA, Duchateau GSMJE, Lin Y, Mel'nikov SM, Molhuizen HOF, Ntanios FY. Proposed mechanisms of Cholesterol-lowering action of Plant Sterols. Eur J Lipid Sci Technol. 2003; 105: 171-185.

12- Ostlund RE. Phytosterols, cholesterol absorption and healthy diets. Lipids. 2007; 42(1): 41-45.

13- Normen L, Dutta P, Lia A, Andersson H. Soy strerol esters and betasitostanol esters as inhibitors of

cholesterol. Am. J. Clin. Nutr. 2000; 71(4): 908-913.

14- Zhao J, Gershkovich P, Wasan KM. Evaluation of the effect of plant sterols on the intestinal processing of cholesterol. Int. J. Pharm. 2012; 436(1-2): 707-710.

15- Sierksma A, Weststrate JA, Meiher GW. Spreads enriched with plant sterols Brit. J. Nutr. 1999; 82 (4): 273-282.

16- Mendilaharsu M, De Stefani E, Deneo- pellegrini H, Carzoglio J, Ronco A. Phytosterols and the risk of lung cancer. Lung Cancer. 1998, 21(1): 37-45.

17- Genser B, Silbernagel G, De Backer G, Bruckert E, Carmena R, Chapman M.J, et al. Plant sterols and cardiovascular disease.. Eur Heart J. 2012; 33(4): 444–451.

18- Cater NB. Historical and scientific basis for the development of plant stanol ester foods as cholesterol-lowering agents. Eur Heart J. 1999;1(suppl):S36-S44.

19- Ling WH, Jones PJ. Dietary phytosterols: a review of metabolism. Life Sci 1995; 57(3): 195-206.

20- Brufau G, Canelab MA, Rafecas M. Phytosterols: physiologic and metabolic aspects. Nutr. Res. 2008; 28: 217-225.

21- Caswell H, Denny A & Lunn J. Plant sterol and stanol esters. Nutr. Bull 2008; 33: 368–373.

22- Gylling H, Hallikainen M, Nissinen MJ, Miettinen TA. The effect of a very high daily plant stanol ester intake. Clin. Nutr. 2010; 29(1): 112–118.

23- Hovenkamp E, Demonty I, Plat J, Lütjohann D, Mensink RP, Trautwein EA. Biological effects of oxidized phytosterols. Prog. Lip. Res. 2008; 47(1): 37-49.

24- Dutta PC, Applelqvist L-A. Saturated Sterols (Stanols) in Unhydrogenated and Hydrogenate. J. Sci. Food and Agric. 1996; 71(3): 383-391.

25- Ostlund, RE Jr. Phytosteros in human nutrition. Ann. Rev. Nutr. 2002; 22: 533-549.

26- Moreau RA, Whitaker BD, Hicks, KB. Phytosterols, phytostanols, and their conjugates in foods. Prog. Lip. Res. 2002; 41(6): 457-500.

27- Toyota M, Omatsu I, Braggins J, Asakawa Y. Lipid constituents of the New Zealand Liverwort Plagiochila circinalis. J. Oleo Sci. 2006; 55: 579-582.

28- Verleyen T, Forcadesa M, Verhea R, Dewettinckb K, Huyghebaertb A and De Greyt W. Analysis of free and esterified sterols in vegetable oils. J. Am. Oil Chem. Soc. 2002; 79(2) 117-122.

29- Phillips KM, Ruggio DM and Khorassani MS. Analysis of steryl glucosides in food. J. Food Comp. Anal. 2002; 15: 123-140.

30- Downes MJ. Determination of sterol composition of crude vegetable oils. *Part* II. Palm Oil and Palm oil Fractions. Leatherhead Fd. R. A. Tech. Circ, 1982; No. 781.

31- Downes MJ. Determination of sterol

32- composition of crude vegetable oils. Part IX. Palm Kernel Oil. Leatherhead Fd. R. A. Research Reports. 1985; No. 519.

33- Choo, Yuen-May; Yap, Soon-Chee; Ooi, Cheng-Keat; Ma, Ah-Ngan; Goh, Swee-Hock; Ong, Augustine Soon-Hock. Recovered oil from palm-pressed fiber. J. Am. Oil Chem. Soc. 1996; 73(5): 599-602.

34- Lau Harrison LN, Puah CW, Choo YM, Ma Ah Ngan, Chuah CH. Simultaneous quantification of free fatty acids, free sterols. Lipids;. 2005; 40(5): 523-528.

35- Del Riao JC and Ana Gutiea R. Chemical composition of Abaca**.** J. Agric. Food Chem. 2006; 54(13): 4600-4610.

36- Rahier A, Benveniste P. In: Nes WD, Parish EJ. Analysis of sterols and other biologically significant steroids. San Diego: Academic Press; 1989; 223–250.

37- Knights BA, Brooks CJW. Isomers of 24-ethylidenecholesterol: GC-MS characterization. Phytochemistry 1969; 8:463–467.

38- Knights BA. Gas~chromatographic analysis of plant sterols. J. Gas Chromatogr. 1967; 273-282.

39- Slover HT, Thompson RH Jr. and Merola GV. Determination of tocopherols and sterols by capillary gas chromatography J. Am. Oil Chem. Soc. 1983; 60(8): 1524-1528.

پوختە

فایتوستیرولس دناڤ رووین بێن خورمێدا فایتوستانولس

پێشەکی و ئارمانج: فایتوستیرول (ستیرولێ رووهکی) ژ ترایترپێبس , ئێکهژ پێکهاتن گـرنگ دناڤ خانێن رووهکیدا. ئەڤ پێکهاتەکاردکەن بـۆ جێگـیرکرنا چینا دووانی یا فوسفولیپێدس دناڤ دیوارێن خانا رووهکی هەروەسا کا چاوان کولیسترول کاردکەت دناڤ چینێن دیوارێن خانا رووهکی.فایتوستیرول دیاردبیت ب رێژێن کێم د زوربەی جورێن رووهکاندا و بەلێ دیار دبیت ب رێژێن زۆر ب تنێ ل شانێن هندەك جورێن توڤاندا.ل ڤێ لێکولینێ , لێگـەریان یا سەرەکی بـۆ ل سەر ستانولسی ئەوا کو مرۆیانا کولیسترولی کێم دکەت ل ریخولان, و پێکهاتن ستیرولسی ێێن دی ئەڤـین نەنیاس , ئەوێن کو هاتین دەرئینان ژ رووهکێ رووینێ خورما خام CPO) و رووینێ گـیزا خورمێ (CPKO) و رووینێ ژ ریشالێن رووینێ خورمێ (CPFO).

ریکێن ئەکولینێ: پێکهاتین ستیرولسی ئەوێن کو هاتین دەرئینان ژ ڤـان رووینان ژ پێکهاتێن دی هاتین جوداکرن برێکا رێژەیی – کروماتوگـرافی و پێکهاتین هاتین جوداکرن ب هاریکایا GC & GC-MS) وهك پێکهاتین بتێ وهك دەرهاتی ژ (TMS).

ئەنجام: جوداکرنا جوری و یا رێژەیی بو ڤـان پێکهاتێن ستیرولی ئەوێن کو هاتین دانان ل خشتین بەرنیاس و تێدا دیردکەت پێکهاتێن ئەوێن کو هاتین هەژمارکرن ل ڤـان رووینانداٍ. چ جوداهیێن مەزن نەبوون ژ لایەنێ پێکهاتێن ستیرولسێ گـشتی ل هەر سێ جورێن رووینن ل سەری مەئاماژەپێکری. بەلێ رێژا گـشتی ی هاتی دەرئینان ژ ستیرولسێ (CPFO) یاپـتر بەرنیاسە ل رووینین خورمێ , وهك : کولیسترولٌ ,کامپـیستیرولٌ , سێگـما ستیرولٌ و بیتا–سایتوستیرولٌ, ستیرولسێ زێدەهاتی یەلادان و هاتی یەدیارکرن دناڤ (CPO) :ستیلاستیرولٌ , و سایکلاوئارتینولٌ , (CPKO) :فوکوستیرولٌ , 5 ئەلفا –4,4– دایمیسایلٌکولست –24,8–دایین , 3–بیتا– ئول CPFO) : براسیکاستیرولٌ , سایتوستانولٌ و 4, 4 – دایمیسایلٌکولست–5– ین–3بیتا– ئولٌ .

دەرئەنجام: ستانولٌ بتێ هاتەدیتن ل (16 ppm) بتێ برێژ (CPKO) و ((CPFO) ب بەلێ نەهات دیتن ل (CPO).

الخلاصة

فايتوستيرولس وفايتوستانولس في زيوت النخيل

خلفية واهداف البحث: فايتوستيرول (السترولس النباتي) من الترايتربيينس، هو من المركبات المهمة في خلايا النباتات، تعمل هذه المركبات على استقرار الطبقة المزدوجة من الفوسفوليبدس في جدار خلية النبات كما تعمل الكوليسترول في اغشية الخلية الحيوانية. وتوجد هذه المركبات بكميات ضئيلة في معظم أنواع النباتات، لكن وجودها يكون بكميات عالية في أنسجة بعض أنواع الحبوب. في هذه الدراسة، سلط البحث الضوء على مواد الستانولس التي تقلل من امتصاص الكوليسترول في الأمعاء، ومركبات الستيرولس الأخرى غير المُعروفة والمستخلصة من نبات زيت النخيل الخام (CPO)، وزيت جوز النخيل (CPKO) والزيت المستخلص من ألياف زيت النخيل (CPFO).

طرق البحث: فصلت مستخلصات الستيرولات الغير قايلة للتصوبن من (CPFO) و (CPKO) و(CPO) بطريقة الكروماتوكرافي التحضيري. كذلك فصلت مركبات الستيرولس المستخلصة من هذه الزيوت عن المركبات الأخرى بطريقة الكمي–كروماتوكرافي بواسطة (GC & GC–MS) بوصفها مركبات منفصلة، وبوصفها مشتقات (TMS) كذلك بواسطة GC و GC–MS وكتلة البيانات الطيفية؛ إذ تمت مقارنة هذه البيانات مع ما يطابقها من الستيرولس القياسي.

النتائج: تم توضيح وشرح الفصل النوعي والكمي لمركبات الستيرولس في الجداول المعروضة وتبين من خلالها مكونات الستيرولس المقاسة في هذه الزيوت، ومن الجداول تبن عدم وجود فروقات كبيرة من ناحية مكونات الستيرولس الرئيسة في الزيوت الثلاثة أعلاه. فضلا عما توصل اليه البحث من كون الكمية الكلية المستخلصة من الستيرولس في (CPFO) أكثر من كل من (CPKO) و (CPO) على التوالي. بالإضافة الى الستيرولس المعروفة في زيوت النخيل، مثل: الكوليستيرول، والكامبيستيرول، والستيكما ستيرول، والبيتا – سايتوستيرول. عُزلت مركبات ستيرولس إضافية وشخصت في (CPO)وهذه المركبات: الستيلاستيرول والسايكلاوأرتينول، (CPKO): فوكوستيرول، و5 ألفا–4.4–دايمثايل كولست–24،8–دايين–3–بيتا–أول و(CPFO): البراسيكاستيرول ، و السايتوستانول و 4.4– دايميثايل كولست – 5– ين–3 بيتا – أول.

الاستنتاجات: توصل البحث إلى وجود مركب الستانول في (CPFO) فقط وبكمية (16 ppm) و لم يوجد في كل من (CPO) و(CPKO).

CARDIAC ANGIOSARCOMA WITH HAEMOPERICARDIUM

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SUMMARY

Cardiac angiosarcoma is a rare condition. However, it remains the most common malignant tumor of the heart. The right atrium is the most common primary site and the pericardium is the second common site. In adults, about 25% of primary tumors of the heart are malignant; angiosarcoma accounts for 35% to 40% of them with male preponderance, as reported from autopsy series. The diagnosis of cardiac angiosarcoma may be easily missed because of its non-specific presentation. In this report, we have presented a young gentleman who presented with significnat haemopericardium and who was diagnosed to have angiosarcoma of the pericardium.

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Key words: Shortness of breath, Haemopericardium, Cardiac angiosarcoma

Angiosarcoma is a tumor of mesenchymal origin; however, the etiology of these tumors remains largely unclear.[1] Cardiac angiosarcomas occur most commonly in the right atrium, in contrast to benign tumors of heart, which primarily occur in the left atrium. The incidence of cardiac angiosarcoma has been reported to be around 35% to 40% of primary malignant tumors of the heart with more occurrence in males as revealed from autopsy data.[2] Cardiac angiosarcoma develops primarily in the third to fifth decade of life and it is more common in men than in women. The clinical diagnosis is often difficult and may be missed because of the nonspecific presentation. Symptoms can be either cardiac or systemic. Metastases occur in approximately 66–89% of cases at the time of diagnosis and are mostly found in the lungs, liver, bone, lymph nodes, and central nervous system. As cardiac angiosarcoma is rarely reported, we are presenting this case which was admitted at Sultan Qaboos University Hospital, Oman.

CASE PRESENTATION

A 28-year-old Omani gentleman was presented with worsening shortness of breath, and productive cough with whitish sputum for more than three months. Initially his symptoms were mostly related to exertion that increased before his admission. He denied any chest pain, constitutional symptoms, fever or wheeze. He has never smoked and there is no family history of asthma or any chest diseases.

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Clinical examination revealed a good built gentleman who was haemodynamically stable with a regular pulse rate of 105 beat/min, BP 100/65 mmHg, oxygen saturation 95% in room air and he was afebrile. His chest examination showed reduced chest expansion in the left side with stony dullness in the infra-scapular region downwards, reduced breath sounds and decreased vocal fremitus in keeping with pleural effusion. The cardiovascular system examination showed no significant finding apart from muffled heart sounds. The rest of physical examination was unremarkable.

The initial laboratory investigations that included complete blood count, renal function, serum electrolytes, coagulation profile, c-reactive protein and ESR were within the reference ranges. His ECG showed sinus tachycardia and chest x-ray showed significant left-sided pleural effusion.

Echocardiography showed dilated left atrium with good systolic function but significant amount of pericardial effusion especially behind the right ventricle with significant compression on the right side of the heart (Figure 1). Subsequently, the patient had high resolution CT scan which showed a large infiltrating pericardial tumor with pulmonary metastases and few enlarged lymph nodes.

The patient underwent pericardiocentesis and approximately one litre of haemorrhagic fluid was drained. Thereafter, the patient underwent pericardiectomy and biopsy. Histopathological report of the biopsy was consistent with the diagnosis of pericardial angiosarcoma.

Treatment options were explained to the patient but he was keen to seek second opinion abroad. Unfortunately, no further follow up are available for this patient.

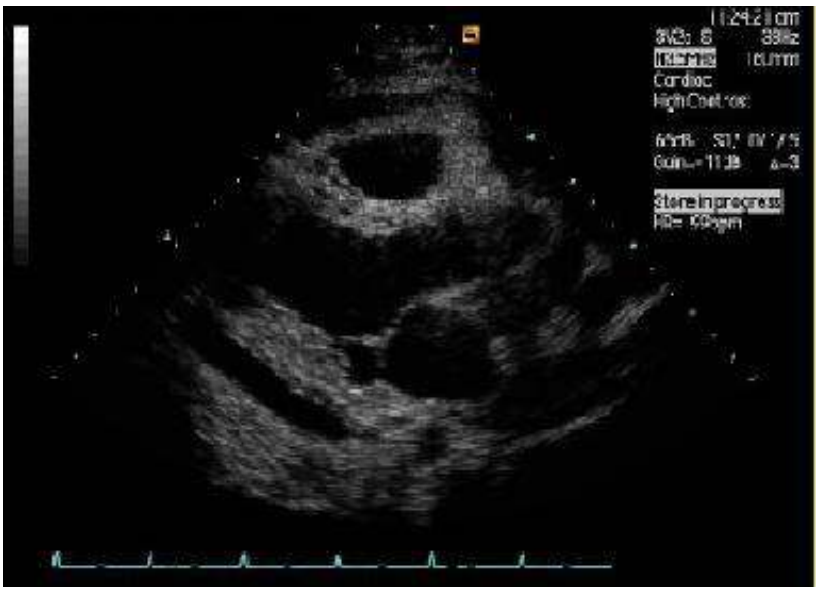

Figure 1. 2-D Trans-thoracic echocardiography showing dilated left atrium with significant amount of pericardial effusion surrounding the heart

DISCUSSION

The diagnosis of cardiac angiosarcoma may be easily missed because of its non-specific presentation. Typically the patients are presented with dyspnea, low grade fever, signs of caval obstruction, pericardial pain and cough,[1] The dyspnea is thought to be due to obstruction of the caval veins, right ventricle inflow or due to pericardial tamponade.[2,3] Investigations of this disease might also be not specific. The ECG may show non specific changes with low QRS voltage. Chest x-ray usually shows globular hear or massive cardiomegaly.[1] Echocardiography and especially, transesophageal echocardiography, can precisely locate the tumor, define its extent, and may accurately predict tumor type. Most cases are found to have haemopericordium and in two different necropsy review of patients with angiosarcoma, the pericardium was obliterated by the tumor.[3] MRI currently appears to be the imaging modality of choice in the assessment of a patient with known cardiac mass.[4]

The main treatment strategy in cardiac angiosarcoma is surgical resection with or without chemotherapy and radiation. However, regardless of treatment, the prognosis is very poor with a mean survival of several months after the initial presentation.[2] This is thought to be due to the locally invasive nature of the leision. In addition, surgical removal is limited by the amount of cardiac tissue that can be resected. The high rate of haematogenous spread with the poor response to both chemotherapy and radiotherapy, also contribute to the poor prognosis of this condition.[5] Novel approaches, such as the use of interleukin-2, have been reported to be effective. In a case of cardiac angiosarcoma treated with a combination of chemotherapy and immunotherapy, survival of 30 months after surgery has been reported.[6] Cardiac transplant has been performed in some cases with early diagnosis and incomplete resection of the tumor with worsened results because the immunosuppressive therapy can increase the risk of progression of cancer disease.[7]

In conclusion, Cardiac angiosarcoma is a rare condition and its diagnosis is usually difficult to make because of the nonspecific presentation. Initial diagnosis is usually suggested at echocardiography, but identification of mediastinal invasion and extracardiac metastases is best detected with CT and MR imaging. The overall prognosis remains short despite the advances in novel approaches. There is, however, an encouraging trend toward more accurate and earlier diagnosis, in large part because of improved imaging techniques.

REFERENCES

1. Lin TK, Stech JM, Eckert WG, Lin JJ, Farha SJ, Hagan CT. Pericardial angiosarcoma simulating pericardial effusion by echocardiography. Chest. 1978; 73(6): 881-3.
2. Brandt RR, Arnold R, Bohle RM, Dill T, Hamm CW. Cardiac angiosarcoma: case report and review of the literature. Z Kardiol. 2005; 94(12): 824-8.

3. Cheesman MG, Webester J, Rowlands D. Pericardial obliteration by angiosarcoma. Br Heart J. 1988; 60(3): 262-3.
4. Mader MT, Poulton TB, White RD. Malignant tumors of the heart and great vessels: MR imaging appearance. Radiographics. 1997; 17(1): 145-53.
5. Yao H, Miyamoto T, Mukai S, Yamamura M, Nakagawa T, Ryomoto M. Angiosarcoma of the pericardium. Review of 9 reports from Japan. Japanese J Thorac Cardiovas Surg. 2003; 51(2): 65-7.
6. Kakizaki S, Tagari H, Hosaka Y. Cardiac angiosarcoma responding to multidisciplinary treatment. Int J Cardiol. 1997; 62(3): 273-5.
7. Überfuhr P, Meiser B, Fuchs A, Schulze C, Rechenspurner H, Falk M, et al. Heart transplantation: an approach to treating primary cardiac sarcoma. J Heart Lung Transplant. 2002; 21(10): 1135-9.

پوختە

گرێکا دەمارا یا دلی دگەل ئاڤەخوین د پەردا دلی دا – راپورتکرنا حالەتەکێ

هەرچەندە کو گرێکا دەمارا یا دلی ژ حالەتێن گەلەك کێمە بەلێ دمینیت مشەترین جورێ گرێکێن پەنجەشێرێ یێن دلی. ژورا دلی یا راستێ لسەری مشەترین جهە بو قێ پەنجەشێرێ و پەردا دلی لرێزا دووێ دهێت. دناڤ هەمی گرێکێن دلی دا جورێ پەنجەشێری برێژا 25٪ دهێت و ژوان 35 – 40٪ ژ جورێ گرێکا دەمارایە و پتر لدەف رەگەزێ نێرە وەکی دیار د راپورتێن شروڤەکرنا تەخا دا لدەمێ مرنێ. گەلەك جاران ئەڤ جورە گرێکە ناهێتە دەستنیشانکرن ژبەر نیشانێن وێ یێن بەرزە. دڤێ راپورتێ دا مە حالەتێ زەلامەکی پێشکێشکرییە کو ئاڤەخوینەکا بەرچاڤ هەبوو لسەر پەردا دلی وهاتە دەستنیشانکرن کو گرێکا دەمارا یا بەنجەشێری لپەردا دلی هەبوو.

الخلاصة

الورم الوعائي القلبي مع نضوح دموي في شغاف القلب – قـرير حالــة

على الرغم من كون الورم الوعائي القلبي من الحالات النادرة، لكنه يبقى الأكثر شيوعاً من بين أورام القلب السرطانية. يعتبر الاذين الأيمن المنطقة الأكثر شيوعاً للورم الأولي و يليه شغاف القلب. تشكل الأورام السرطانية نسبة 25% من مجمل أورام القلب الأولية لدى البالغين ومنها 35- 40% هي من نوع الورم الوعائي السرطاني وبأكثرية لدى الذكور كما بينته تقارير التحليل النسيجي للجثث. كثيراً ما يصعب تشخيص هذا الورم وذلك لأعراضه الغير محددة. في هذا التقرير قمنا بعرض حالة شخص بالغ لديه نضوح دموي واضح في شغاف القلب و تم تشخيصه كحالة ورم وعائي للشغاف.

PARAGANGLIOMA OF THE MIDDLE EAR. A CASE REPORT IN DUHOK - IRAQ

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SUMMARY

Paragangliomas are rare tumors of the paraganglia. Here, we report the clinical, histopathological and immunohistochemical findings of a rare case of paragnglioma in a 20 year old lady who presented as an external ear polyp extending from the middle ear. Histopathological features raised the diagnosis of paraganglioma, and immunohistochemical stains confirmed the diagnosis.

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Key words: Paraganglioma, Ear polyp

Paraganglioma is the generic term applied to tumors of paraganglia regardless of location. The only exception, largely on the basis of tradition, is the paraganglioma of the adrenal medulla, which is rarely designated as such but universally known as pheochromocytoma. By extension, paragangliomas located outside the adrenal gland that are obviously chromaffin and associated with clinical evidence of norepinephrine and/or epinephrine secretion also have been designated as extra-adrenal pheochromocytomas. Most of these arise from orthosympathetic-related paraganglia, whereas most of the nonchromaffin, nonfunctioning paragangliomas originate from parasympathetic-related organs. It is not possible on morphologic grounds to distinguish between these two types or to predict whether a tumor is functioning at the clinical level or not.[1]

Extra-adrenal paragangliomas are very uncommon tumors arising from neuroectodermal-derived paraganglion tissue. These tumors are usually located along the vascular tree, especially near the carotid body, the jugulotympanic body, or the mediastinal vessels.[2]

Jugulotympanic paragangliomas (JTP) tumors have a predilection for women. They arise from microscopic collections of paraganglia, which were described by Guild in a study involving serial sectioning of temporal bones; the first case of a patient with JTP was reported by Rosenwasser in 1945. These paraganglia (average of two to three in each temporal bone) may be found along the course of the Jacobsen nerve (tympanic branch of the 9th cranial nerve), the nerve of Arnold (auricular branch of the 10th cranial nerve), the adventitia of the jugular bulb, the osseous canal connecting the jugular fossa to the middle ear cavity, or within

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the middle ear (usually over the cochlear promontory). The varied locations of these paraganglia and the complex anatomy of this area form the basis for the different clinical presentations of patients with JTP. Small tumors arising over the cochlear promontory (tympanic paraganglioma) may arise as an aural polyp, with filling of the middle ear cavity or extension into the external ear canal. JTP can involve the temporal bone, with intracranial extension, or appear as a mass at the base of the skull, with erosion of the jugular foramen. Rarely, these tumors display clinical evidence of malignancy, primarily metastatic disease. The most common sites of metastasis include lymph nodes, skeleton, lungs, and liver. The histologic appearance of these tumors is usually not predictive of biologic behavior.[3]

CASE PRESENTATION

A 20 year old lady presented to the ENT clinic at Azady Teaching Hospital, Duhok City suffering from severe reduction in hearing in the left ear and intermittent bleeding. On examination, the surgeon noted a mass extending from the middle ear, damaging the tympanic membrane and extending as a polyp into the external ear. There was a complete conductive hearing loss in that ear. CT scan examination confirmed that the mass was originated from the middle ear and eroding the mastoid bone. Surgical excision was done and the specimen was sent for histopathology. Grossly, the lesion appeared as an ovoid vascular polyp-like lesion measuring 8x5x4 mm. Microscopically, the lesion was well-defined sub-epithelial, formed of nests of bland looking polygonal cells with finely granular cytoplasm. The nests were surrounded by spindle cells. The intervening stroma was well vascularized (Figure 1and 2). The diagnosis of paragnaglioma was aroused but serominous adenoma and adenocarcinoma couldn't be excluded. Immunohistochemically, using the automated Ventana immunotechnique, the tumor nests cells were strongly positive for chromogranin (Figure 3), CD56 (Figure 4) and NSE while the surrounding spindle (sustentacular) cells stained positive for S-100 protein (Figure 5 and 6).

DISCUSSION

Paragangliomas are rare neuroendocrine tumors derived from the extra-adrenal paraganglia. Head and neck paraganglia are associated with the parasympathetic nervous system, the largest being the carotid body, with others found at the vagus nerve, the jugular bulb, the tympanic branch of the ascending pharyngeal artery, the larynx, and other sites.[4] These tumors are more common in female.[5] The common presenting symptoms are usually pulsating tinnitus and conductive hearing loss, although large tumors may erode the tympanic membrane and appear as a bleeding aural polyp,[6] as did our patient. Most reported cases behaved in a benign way, however, very rare occasions of malignant behavior had beed reported.[4]

Although rare, paraganglioma in the head and neck region should be put in the differential diagnosis for any tumor when the anatomical location of the tumor allows this possibility. In addition, it should be also considered when there is nesting of the tumor cells, especially when the nests are surrounded by spindle cells and when the stroma is highly vascularized. Of course, nowadays, immunohistochemistry is of great help in solving the conflicts in diagnosis.

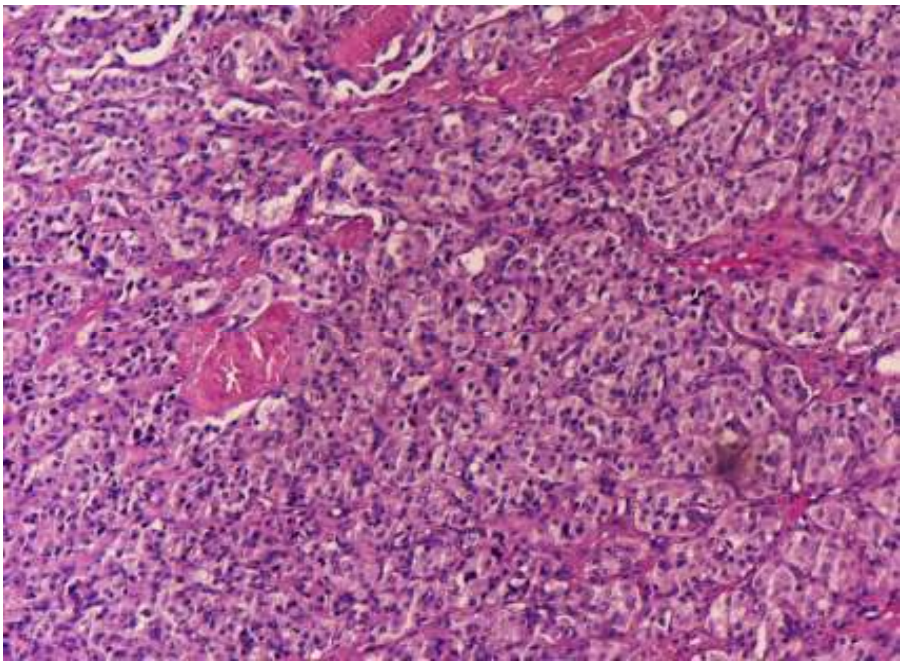

Figure 1. Nests of cells with a highly vascular stroma (H&E: × 100).

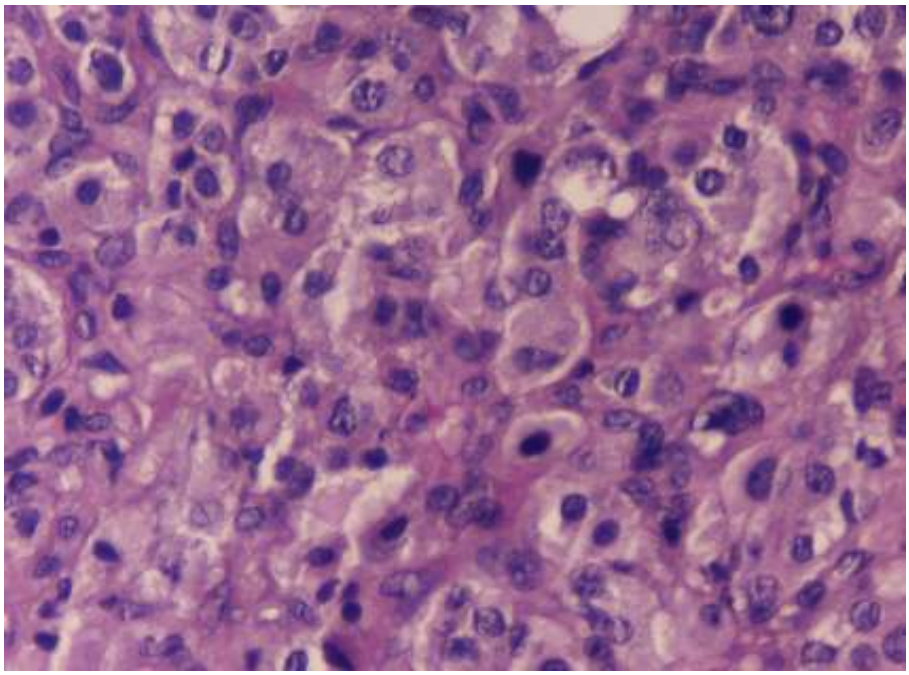

Figure 2. Polygonal cells with finely granular amphophilic cytoplasm (H&E: × 400)

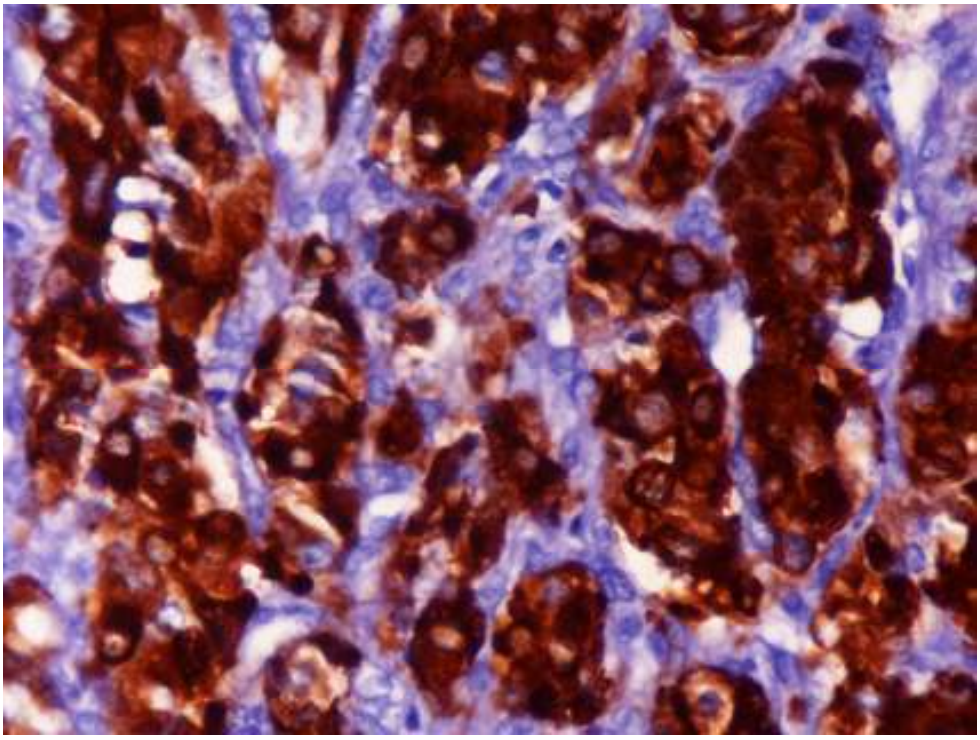

Figure 3. A strong immunohistochemical expression of tumor cells for chromogranin stain (×400)

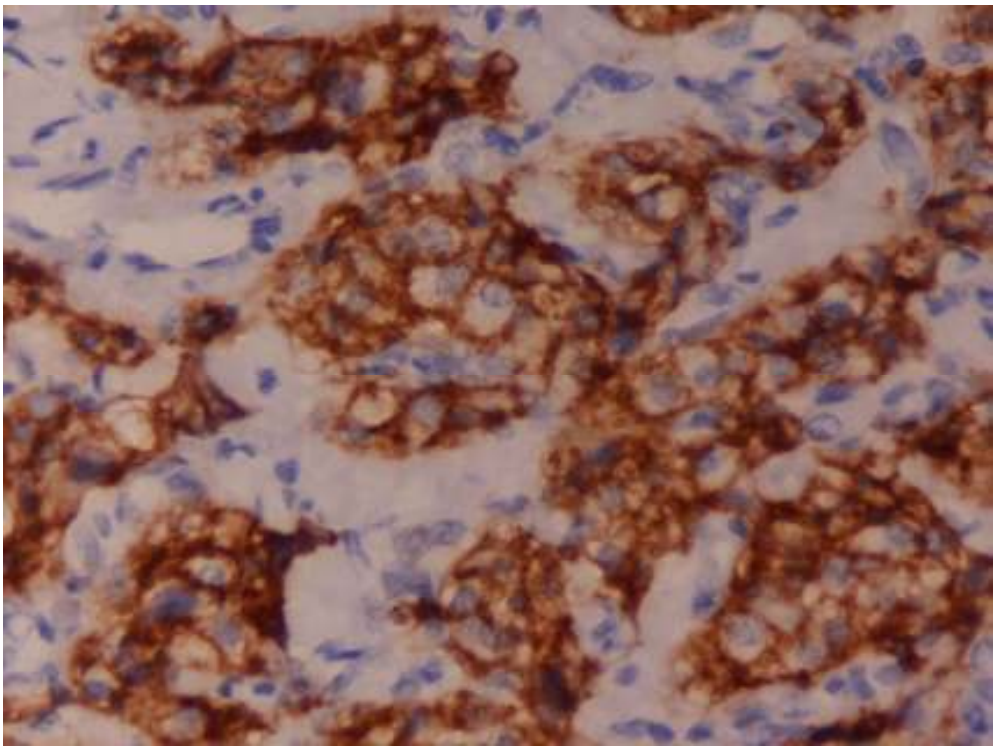

Figure 4. Positive immunohistochemical staining of tumor cells for CD 56 (× 400)

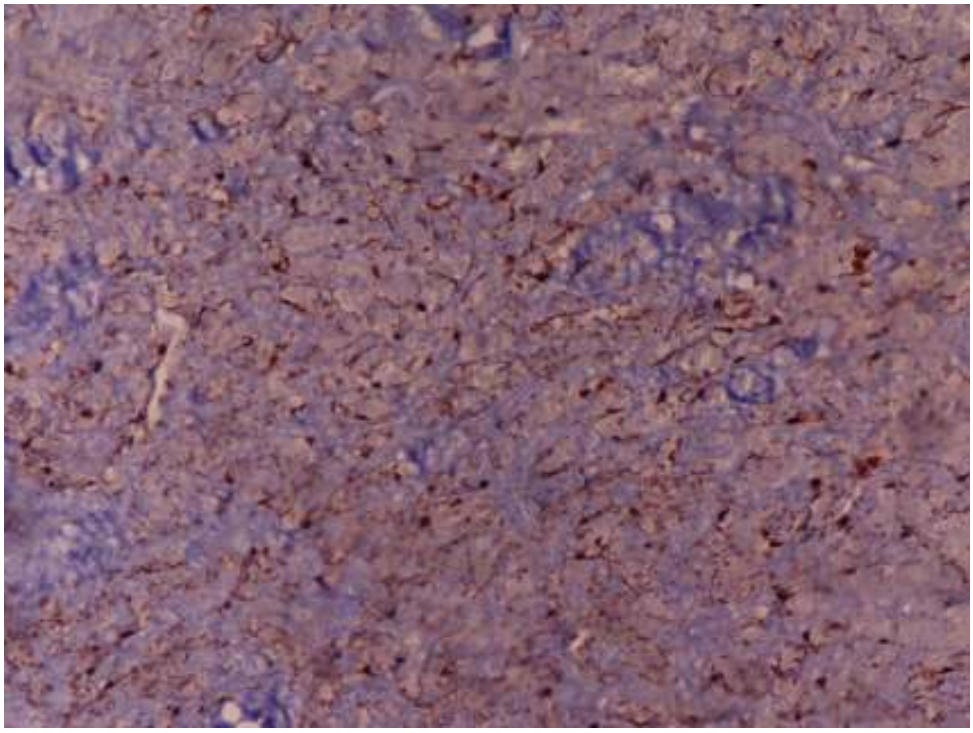

Figure 5. Sustanticular cells stained by S-100 protein immunostain (× 100)

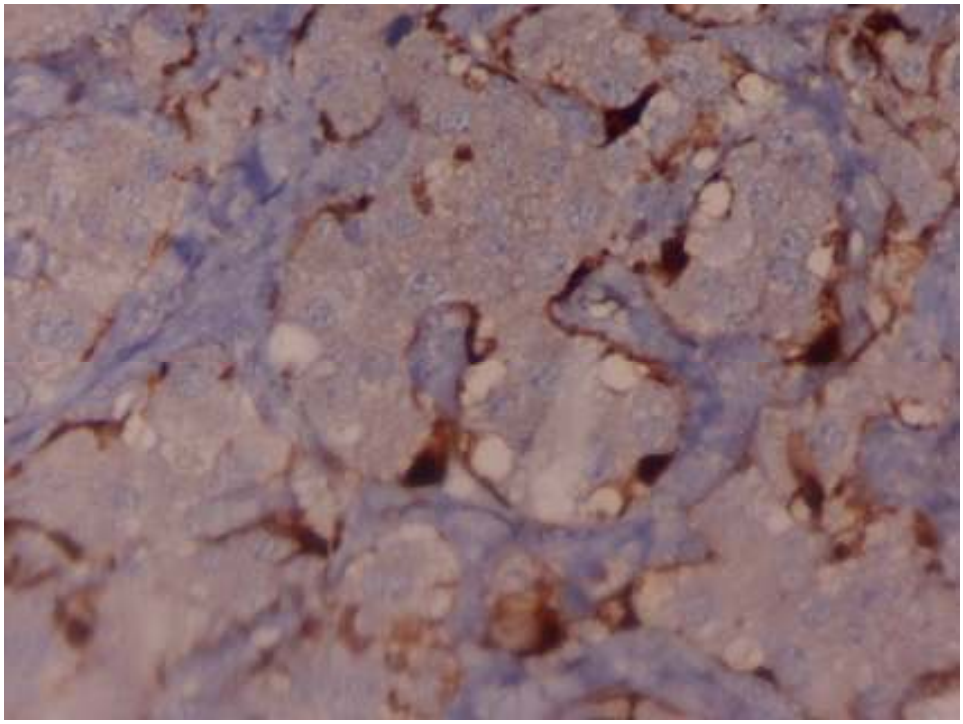

Figure 6. High power view of S-100 protein immunostain of the sustanticular cells (× 400)

REFERENCES

1. Rosai J. Rosai and Ackerman's surgical pathology. 9th ed. Vol 1. Edinburgh: Mosby, 2004.
2. da Silvaa RA, Grossa JF, Haddada FJ, Cíntia AB, and Younesa RN. Primary pulmonary paraganglioma: case report and literature review. Clinics. 2006;61(1):83-6.
3. Mills SE. Sternberg's diagnostic surgical pathology. 5th ed. Lippincott Williams & Wilkins, 2010.
4. Nedev PI. Paraganglioma of the middle ear – case report. Trakia Journal of Sciences 2008; 6(2): 36-39.
5. Kuczkowski J, Przewoźny T, Biernat W, Dubaniewicz-Wybieralska M. Nonchromaffin paragangliomas (chemodectoma) of the middle ear in the material of the ENT Department Medical University of Gdańsk. Otolaryngol Pol. 2011; 65(1):40-6.
6. Neto M, Isabela M. de Vuono, Souza LR, Testa JR, Pizarro GU, Barros F. Tympanic Paragangliomas: case reports. Rev Bras Otorrinolaringol. 2005; 71(1): 97-100.

پوختە

پارگانگیوما ل گوهێ ناڤەراست – راپورتکرنا حالەتەکێ

پاراگەنگلیوما وەرەمەکە کیم جاران روی ددەت دناف پاراگەنگلیادا, مە خانمەکا 20 سالان دیت لباژیری دهوکی کو ئەڤ وەرەمە یا هەی لسەر شیوەی زیادەکا گوشتی کو ژگوهی وی دەرکەفتبو, و ئەم شیاین پشت راست بین ژجوری وی ب پشکنینا شانەییا نەخوشی و پشکنینا بەرگەگریا شانەییا کیمیاوی.

الخلاصة

تقــرير حالــة– اورام الباراكانكليومـــا فـــي الاذن الوســـطى

اورام الباراكانكليوما هي من الاورام النادره التي تصيب الانسجه المجاوره للعقد العصبيه و هنا نوثق الحاله السريريه و نتائج الفحص النسيجي و الفحص المناعي النسيجي الكيميائي لحاله نادره من هذه الاورام لدى سيده في العشرين من عمرها و التي ظهرت على شكل زائده لحميه في الاذن الخارجيه ممتده من الاذن الوسطى
الصفات النسيجيه للورم اثارت الريبه في تشخيص الباراكانكليوما و لكن الصبغات المناعيه النسيجيه الكيميائيه اثبتت التشخيص بصوره قطعيه.

ERRATUM

Duhok Med J 2013;7(1): 93-94.

Article: A CYTOPATHOLOGICAL STUDY OF THE EFFECT OF SMOKING ON THE ORAL EPITHELIAL CELLS IN RELATION TO ORAL HEALTH STATUS BY THE MICRONUCLEUS ASSAY
Authors: SAEED H. SAEED, WASEN H. YOUNIS
Journal: Duhok Med J 2012;6 Suppl 3:170-177.

In this article, we regret to inform the authors and our readers that there was a printing error in page 172. The following correction is to be made:
Substitute page 172 (table 1 through 4) with the corrected version (table 1 though 6) presented in the back of this erratum page.

Table1.Micronuclei expression in the study sample.

Groups	The stain	Pap stain	Giemsa stain	The total of the micronuclei
Non-smokers		52	7	59
Light smokers		74	18	92
Heavy smokers		380	122	502

Table 2. The mean and the ±SD of the micronuclei expression in Pap stain.

sites	Palate			Gingiva			Buccal mucosa			Floor of mouth		
Groups	No.	mean	±SD	NO.	mean	±SD	No.	mean	±SD	No.	mean	±SD
Non-smokers	7	0.28	1.00	7	0.28	0	9	0.36	0	25	1.16	0.37
Light smokers	11	0.44	1.00	9	0.36	0	18	0.76	0.23	25	1.44	0.50
Heavy smokers	25	2.67	2.76	24	3.16	1.62	24	2.65	1.20	25	6.76	2.42

Table 3. The mean and the ±SD of the micronuclei expression in Giemsa stain.

Sites	Palate			Gingiva			Buccal mucosa			Floor of mouth		
Groups	No.	mean	±SD	No.	mean	±SD	No.	mean	±SD	No.	mean	±SD
Non-smokers	1	0.04	_	0	0	_	0	0	_	6	0.24	0
Light smokers	0	0	_	2	0.08	0	1	0.04	_	14	0.65	0
Heavy smokers	14	0.64	0.36	17	1	0.62	22	1.12	0.42	25	2.16	0.17

Table 4. The statistical difference of the micronuclei expression according to the oral sites. Note P>0.005is highly significant, NS means non- significant.

Stain	Pap stain			Giemsa stain		
sites	F-test	df	P-value	F-test	df	P-value
palate	15.98	2	0.0005	0.14	1	0.71 NS
Gingiva	15.30	2	0.0005	1.08	1	0.31 NS
Buccal mucosa	22.25	2	0.0005	0.26	1	0.61 NS
Floor of mouth	119.41	2	0.0005	18.08	2	0.0005

Table 5. The multiple linear regression of the micronuclei expression in the non-smokers' group.

Factors	Beta	t-test	P-value
Pl. I.	0.08	0.35	0.73
Gi. I.	-0.39	-1.57	0.15
Cal. I.	0.72	3.35	0.007
Amalgam	-0.04	-2.14	0.83
Composite	0.21	0.92	0.37

Table 6. The multiple linear regression of the micronuclei expression in the smokers' group.

Factors	Beta	t-test	P-value
Pl. I.	0.12	0.50	0.62
Gi. I.	0.11	0.50	0.62
Cal. I.	0.15	0.71	0.49
Amalgam	0.73	3.43	0.006
Composite	0.14	0.58	0.57