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College of Medicine

# Duhok Medical Journal

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# Duhok Med J

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# Duhok Med J

## CONTENTS

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# SERUM ZINC AS A RISK INDICATOR FOR ORAL HEALTH STATUS AMONG SECONDARY SCHOOL STUDENTS IN DUHOK KURDISTAN REGION , IRAQ

HALA ANDRUOS YOUSIF B.D.S*
ALI .H. AL-DOSKY BSC, MSC, PHD**
QAYSER SAHIB HABEEB M.B.CH, MSC, MD***

*Submitted 1 March 2015; accepted 30 June 2015*

## ABSTRACT

**Background and Objective:**
In recent years there has been growing interest in understanding the exact role played by trace elements in several diseases. Particular attention has been paid to elements with possible influence on oral health status like zinc. The wide inconsistencies about the subject and the paucity of local studies in this context mandated the conduct of this study. The objective was to investigate the relationship of serum zinc with oral health status.

**Materials and Methods:**
A cross sectional design enrolling eight secondary schools in Duhok city has been adopted from 15th April to 15th June 2013. The sample comprised 280 (188 males and 92 females) apparently healthy students aged 18-23yrs. The study made use of blood samples collected in a previous study of Dr. Ali Hussein Ahmad. The same samples were used to determine the level of serum zinc. A questionnaire was used to obtain information on age, gender, medical diseases and drug history. This was followed by clinical dental examination to assess two standard oral health indices, namely, Decayed, Missing, Filled Surfaces (DMFS) and gingival index (GI) for each student.

**Results:**
The mean serum zinc was (78.72 ± 13.54 µg/dl) the value was higher in males and the differences were statistically significant ( $p < 0.001$).The mean DMFS was higher in females than in males (12.08 ± 5.52 vs. 10.37 ± 5.84 respectively. P 0.02), while the mean GI was higher in males than in females (0.94 ± 0.77 vs. 0.49 ± 0.58 respectively. $p < 0.001$).
Serum zinc was negatively correlated with both DMFS and GI, the correlation was stronger with DMFS scores ($r = -0.9$) than with GI scores ($r = -0.6$).

**Conclusions:** Different levels of serum zinc relate variably to oral health status. Serum zinc relates mainly to DMFS scores through a negative correlation.

**Duhok Med J 2015; 9 (1): 1-10.**

**Keywords:** serum zinc, oral health, students, Duhok.

Trace elements play an important role in human teeth and health as well. They constitute a minute part of the living tissues and are important for the vital processes of life. Various diseases of `previously unknown etiology have been attributed to an imbalance of trace elements, both deficiency and excess have been associated with many diseases including dental caries.[1-3] Trace elements either directly or indirectly influence the susceptibility of the teeth to dental caries, investigations suggested that some trace elements are cariogenic[4], and some trace

* *Faculty of Medical Sciences School of Dentistry*
** *Department of Clinical Biochemistry School of Medicine*
*** *Department of Family Medicine School of Medicine*
*Correspondence to Qayser Sahib Habeebdr.qayser.habeeb@gmail.com*

elements are strongly cariostatic.[5] The relationship between trace elements and composition of saliva, dental decay and dental plaque and their interactions have been investigated for many years. The results are controversial.[6] Zinc is a very important factor for the function of many physiological and biochemical processes.[7-9] Zinc is widely used in dental products, it is incorporated into many fluoride toothpaste formulations, to reduce calculus, as an anti-bacterial agent and to reduce oral malodour.[10]

## METHODS

The study was conducted in Duhok city which lies in the far north–west of Iraq and forms the western city in Iraqi Kurdistan Region. A cross sectional study design was conducted on 280 secondary schools students (188 males and 92 females). The period of data collection extended from 15th April-15th June 2013. Enrolled subjects were apparently healthy students aged 18-23yrs of both gender. Exclusion Criteria included history of any systemic disease, current treatment, and the presence of fixed or removable orthodontic appliance in the mouth or other appliances. A study questionnaire was designed to obtain information on age, gender, medical diseases and drug history. The clinical dental examination took place during school hours in the classroom on comfortable chair, the intra oral examination was performed for all students to assess the main outcome measures, namely, (DMFS) and (GI).

Examiner reliability in calculating both DMFS and GI indices was assessed with a sample of fifteen subjects, the results showed no statistically significant difference neither for DMFS nor for GI. (p 0.75 and p 0.63 respectively). Table 1 and 2.

**Table 1. summary statistic assessing measurement reliability of DMFS values**

**Table1: Summary Statistics Assessing Measurement Reliability of DMFS Values**

| Examiner | No. | Mean DMFS | SD | P value* |
|---|---|---|---|---|
| Investigator | 15 | 20.3 | 11.2 | 0.75 |
| Specialist | 15 | 18.8 | 9.73 | |

* Based on paired t- test.

**Table 2. summary statistic assessing measurement reliability of GI values**

**Table 2: Summary Statistics Assessing Measurement Reliability of GI Values.**

| Examiner | No. | Mean GI | SD | P value* |
|---|---|---|---|---|
| Investigator | 15 | 0.37 | 0.46 | 0.63 |
| Specialist | 15 | 0.28 | 0.35 | |

* Based on paired t- test

Blood samples have been collected in a previous study, the same samples were used to determine the level of serum zinc. Laboratory analysis for zinc was done at the Department of Clinical Biochemistry, School of Medicine, University of Duhok.

Statistical analyses were performed using SPSS software. The results were then tabulated and statistical significance was inferred at $P \leq 0.05$.

## RESULTS

Those aged 18 years of study sample constituted the biggest proportion (51.43%). Students age ranged between 18 and 23 years with a mean of 19.16 ±1.49. Their serum zinc ranged from 50 to 113 µg/dL with a mean of 78.72 ±13.54. Table 3 and 4.

**Table 3. Study Sample by Age and Gender**

| Age (years) | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | No. | (%) | No. | (%) | No. | (%) |
| 18 | 102 | (36.43) | 42 | (15) | 144 | (51.43) |
| 19 | 29 | (10.36) | 8 | (2.85) | 37 | (13.21) |
| 20 | 39 | (13.93) | 13 | (4.65) | 52 | (18.58) |
| 21 | 7 | (2.5) | 10 | (3.57) | 17 | (6.07) |
| 22 | 9 | (3.22) | 7 | (2.5) | 16 | (5.72) |
| 23 | 2 | (0.71) | 12 | (4.28) | 14 | (4.99) |
| Total No. (%) | 188 | (67.15) | 92 | (32.85) | 280 | (100) |

**Table 4. Descriptive Measures of Serum Zinc**

| | Minimum | Maximum | Mean | Standard Deviation |
|---|---|---|---|---|
| Age | 18 | 23 | 19.16 | 1.49 |
| Serum Zinc µg/dL | 50 | 113 | 78.72 | 13.54 |

Overall, the mean serum zinc concentration coincided with the lower part of the normal range. Measurement of DMFS scores revealed higher mean values in females than in males (12.08 vs. 10.37 respectively. p = 0.02) . Table 5.

**Table 5. Study Sample by DMFS and Gender**

| DMFS | Total No (%) | Male | | Female | | *p. value* * |
|---|---|---|---|---|---|---|
| | | No. (%) | m (SD) | No. (%) | m (SD) | |
| 0 | 4 (1.4) | 4 (2.2) | 10.37 (5.84) | 0 (0.0) | 12.08 (5.52) | 0.02 |
| 1-5 | 48 (17.2) | 39 (20.7) | | 9 (9.8) | | |
| 6-10 | 98 (35) | 65 (34.5) | | 33 (35.9) | | |
| 11-15 | 75 (26.8) | 46 (24.5) | | 29 (31.5) | | |
| 16-20 | 34 (12.1) | 22 (11.7) | | 12 (13.0) | | |
| >20 | 21 (7.5) | 12 (6.4) | | 9 (9.8) | | |

* Based on Independent t test.

Measurement of Gingival Index scores revealed higher mean values in males than in females (0.94 vs. 0.49 respectively. $p < 0.001$) .Table 6.

**Table 6. Study Sample by Gingival Index and Gender**

| GI | Total No. (%) | Male | | Female | | *p. value* * |
|---|---|---|---|---|---|---|
| | | No. (%) | m (SD) | No. (%) | m (SD) | |
| Healthy ( 0 ) | 43 (15.4) | 28 (14.9) | | 15 (16.3) | | |
| Mild ( 0.1 - 1 ) | 161(57.5) | 107 (56.9) | | 54 (58.7) | | |
| Moderate ( 1.1 - 2 ) | 62 (22.1) | 42 (22.3) | 0.94 (0.77) | 20 (21.7) | 0.49 (0.58) | < 0.001 |
| Severe (2.1 - 3 ) | 14 (5) | 11 (5.9) | | 3 (3.3) | | |

* Based on Independent t test.

Prominent differences in serum level were documented between males and females. (81.16 µg/dL vs. 73.74 µg/dL respectively. $p < 0.001$) . Table7

**Table 7. Mean Serum Zinc by Gender**

| Level | Male | Female | Independent t test | *p. value* |
|---|---|---|---|---|
| | m (SD) | m (SD) | | |
| Serum Zinc µg/dL | 81.16 ( 13.94) | 73.74 ( 11.20) | 3.282 | < 0.001 |

In both males and females, DMFS score levels get worse as serum zinc decreases.( r - 0.938 ; $p < 0.001$). Table 8 and Figure 1.

**Table 8. DMFS by Gender and Serum Zinc**

| DMFS | Total No (%) | Male | | Female | | *p. value* * |
|---|---|---|---|---|---|---|
| | | No. (%) | Serum zinc m (SD) | No. (%) | Serum zinc m (SD) | |
| 0 | 4 (1.4) | 4 (2.2) | 111.5 (1.29) | 0 (0.0) | NA | NA |
| 1—5 | 48 (17.2) | 39 (20.7) | 98.92 (4.25) | 9 (9.8) | 92.22 (1.48) | < 0`.001 |
| 6—10 | 98 (35) | 65 (34.5) | 84.94 (4.82) | 33 (35.9) | 82 (4.14) | 0.003 |
| 11—15 | 75 (26.8) | 46 (24.5) | 72.48 (3.08) | 29 (31.5) | 69.14 (2.83) | < 0.001 |
| 16—20 | 34 (12.1) | 22 (11.7) | 63.5 (2.24) | 12 (13.0) | 61.5 (1.93) | 0.013 |
| >20 | 21 (7.5) | 12 (6.4) | 58.58 (4.91) | 9 (9.8) | 56.11 (2.62) | 0.187 |

* Based on Independent t test.

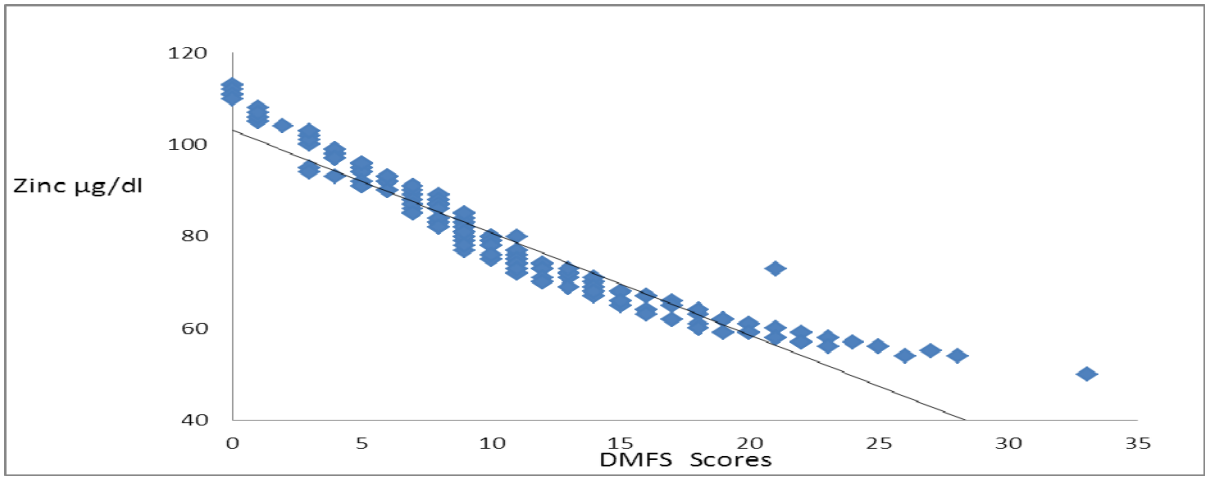


**Figure 1. Correlation between DMFS Scores and Serum Zinc Pearson Correlation Coefficient (r) = - 0.938 p < 0.001**

In both males and females, gingival index gets worse as serum zinc decreases.(r = - 0.635 p < 0.001). Table 9 and Figure 2

**Table 9. Gingival Index by Gender and Serum Zinc**

| GI | Total No. (%) | Male | | Female | | *p. value** |
|---|---|---|---|---|---|---|
| | | No. (%) | Serum zinc m (SD) | No. (%) | Serum zinc m (SD) | |
| Healthy (0) | 43 (15.4) | 28 (14.9) | 95.71 (11.46) | 15 (16.3) | 82.07 (9.38) | < 0.001 |
| Mild (0.1- 1) | 161 (57.5) | 107 (56.9) | 84.96 (9.87) | 54 (58.7) | 76.13 (9.64) | < 0.001 |
| Moderate (1.1- 2) | 62 (22.1) | 42 (22.3) | 66.1 (6.64) | 20 (21.7) | 63 (7.10) | 0.098 |
| Severe (2.1 – 3) | 14 (5) | 11 (5.9) | 64.73 (8.24) | 3 (3.3) | 60.67 (8.33) | 0.464 |

*Based on Independent t test.

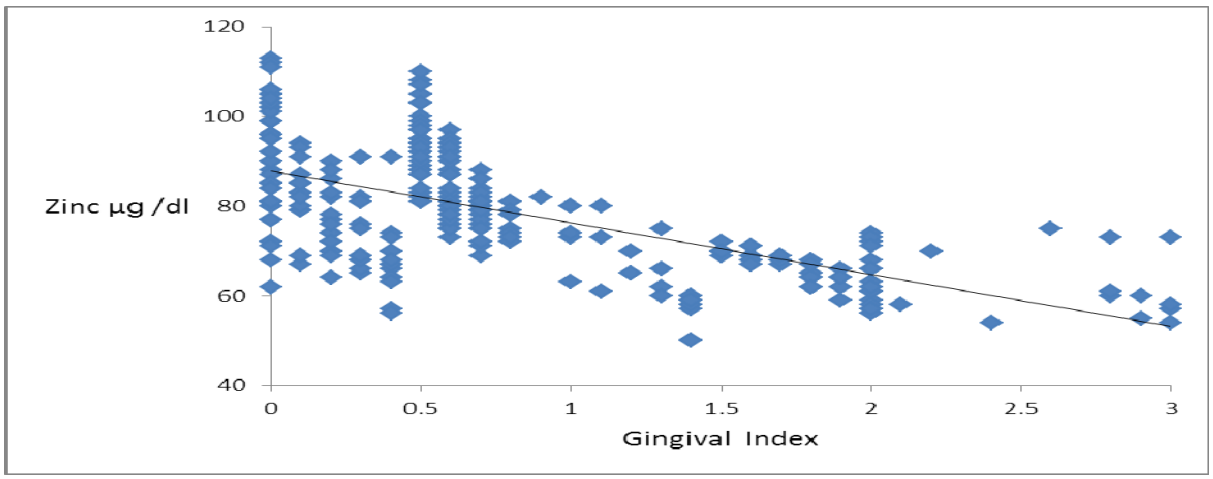


**Figure 2. Correlation between Gingival Index and Serum Zinc Pearson Correlation Coefficient (r - 0.635; p < 0.001)**

## DISCUSSION

Dental caries and periodontal diseases are one of the most global oral health problems and most prevalent disease.[11] There are many factors that can cause dental caries. Dietary factors are important for the oral cavity, the structure and integrity of the teeth, the pH and the composition of the plaque and saliva.[12] Zinc is an important trace element` and is found in tissues` throughout the body.[13] In the mouth, it is present naturally in plaque, saliva and enamel.[14] In the present study only 4 males of the study sample were free from dental caries. As to the gingival status, more than half of both males and females suffered "mild gingivitis" (56.9% vs. 58.7% respectively).

A prominent finding of the present study was the low normal serum level of zinc exhibited by the study participants which was more evident in females than in males (73.74 µg/dL vs.81.16 µg/dL respectively. $P < 0.001$ on indians in 2005 with amean serum zinc concentration of (106.6 ± 5.89 µg). Such levels are lower than serum zinc concentration of adults in study performed on Indians in 2005 with a mean serum zinc concentration of (106 ±5.89µg/dL).15A low normal serum zinc concentration in Iraq population was also observed in an earlier study where mean serum zinc concentration was (78 ±11.7 µg/dL).[16] The lower mean serum zinc concentration in females may be attributed to repeated blood loss during the menstrual cycle and previous pregnancy and lactation.

The present study showed a strong negative correlation between serum zinc concentration and DMFS score ($r – 0.938$, $p < 0.001$).This result was similar to that of an earlier study that showed that prevalence of dental caries was higher in zinc deficient children compared to the zinc sufficient group.[17] On the contrary ,another study showed that oral zinc supplement has no effect on oral health of children and proved no statistically significant difference in (DMFS) scores between zinc supplement group and placebo group.[18]

The mean DMFS score in females is (12.08±5.52) which is higher than that of males (10.37 ± 5.84), the difference proved statistically significant ( $p < 0.05$). This may be related to the lower zinc concentration in females than in males. The present study showed a moderate negative correlation between Gingival Index and serum Zinc concentration (r-0.635, $p < 0.001$). This finding agrees with the findings of Atasoy and Ulusoy (2012) who reported poor gingival health in zinc deficient children compared to the zinc sufficient group. Zinc deficiency could be one of the many factors which play a role in gingival health because zinc deficiency can increase the permeability of gum tissue, permitting antigens to gain entrance more easily into the gingival tissue.

In conclusion, our study has demonstrated that the mean serum zinc concentration showed low normal level that is more evident in females.

Serum zinc was negatively correlated with both DMFS and GI, the correlation being stronger with DMFS ( r - 0.9) than with GI ( r - 0.6).

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# پوختە

## توخمێ زنك وەك پێڤەرەكێ مەترسیدار لسەر ساخلەمیا دەڤ ودانا ل دەف قوتابییێن ناڤنجی لباژێرێ دهوكێ

**ئارمانج:** ل ڤان سالێن دوماهی پیتە هاتە دان بگەلەك توخمێن ورد و كارتێكرنا وان ل سەر گەلەك نەخوشیا و پیتەكێ تایبەت هاتە دان بو وان توخما ئەوێن كارتێكرنێ لسەر سەلامەتیا دەڤ و ددانا وەكی تـوخمێ زنك و ژبـەر گەلـەك خەبـەرێن بـێ ڤـاژ و بـەرفرەه و كێمیـا ڤەكولینا لسەر بابەتی ئەڤ ڤەكولینە هاتەكرن بو زانینا پەیوەندیا لنافبەرا توخمێ زنكی و سەلامەتیا دەڤ و ددانا.

**رێكێن ڤەكولینێ:**

ئەڤ ڤەكولینە لسەر بنیاتێ هەشت قوتابخانێن ناڤنجی وئامادەیی ل باژێرێ دهوكێ ل ناڤبەینا ١٥ نیسانێ هـەتا ١٥ تیرمـەهێ ٢٠١٣. ڤـێ ڤەكولینێ (٢٨٠) نموونە بخوڤە گرتینە ژ قوتابییێن ساخلەم وەكو دیار (١٨٨ نێر و ٩٢ مێ) ژیێ وان دناڤبەینا (١٨–٢٣) سـال. نمـوونێن خوینێ پێن هاتینە كوم كرن ژ ڤەكولینا پێشوەخت بو یا دكتور علی حسین احمد و هەمان نموونە هاتینـە بكارئینـان. بـو تـەخمین كرنـا ئاستێ توخمێ زنك دناڤ خوینێدا. بو ڤێ ڤەكولینێ فورمەك هاتی یە ئامادەكرن بو وەرگرتنا زانینا ئـەوێن پـەیوەنـدی پێڤـە هـەی وەكـی (ژی، رەگەز، نەخوشێن بەرێ ڤەكولینێ، دەرمانێن بكارئیناین) لبەر هندێ پشكنینا دەڤ و ددانـێن كـەتی و سـەرێن ددانـا (DMFS) و پیڤەرێ سەلامەتیێ یێ پدیێ (GI) بو هەر قوتابیەكی.

**ئەنجام:**

ئەنجامێن بدەستڤە هاتین كو رێژەیا ئاستێ توخمێ زنكی دناڤ خوینێدا (78.72 ± 13.54) Mg/dl و بهایێ بلنـدتر لـدەڤ قوتـابییێن نێـر برێـژەیا ئامـاری ($P < 0.001$) و تێكرایـی (DMFS) بلنـدتر بـو لـدەڤ قوتـابییێن مـێ (12.08 ± 5.52) Mg/dl بەرامبـەر (10.37 ± 5.84) Mg/dl و رێژەیا ئاماری ($P = 0.02$). بەڵێ نیشانكەرێ پدیێ (GI) بلندتر بو و رێژەیا ئامـاری ($P<0.001$) و رێژەیا ئاستێ توخمێ زنكی دنـاڤ خوینێدا پەیوەندیـەكا بـەروڤاژی دگـەل نیـشانكەرێ (DMFS, GI) و پەیوەندیـەكا بهێـز دگـەل نیشانكەری (DMFS) ($r = -0.9$) بەرامبەر نیشاكەرێ (GI) ($r = -0.6$)

**دەرئەنجام:**

ئاستێن جیاواز پێن زنكی دناڤ خوینێدا گرێدایە بشێوەكێ جیاواز دگەل بارێ تەندروستی یێ دەڤ و ددانا، توخمێ زنك تێتە گرێدان دگەل خوینێ بشێوەكێ بنیاتی دگەل نیشانكەرێ (DMFS) وەك دیار پەیوەندیەكا بەروڤاژیی یە.

## الخلاصة

### مستوى الخارصين في مصل الدم كعامل خطورة لصحة الفم لدى طلبة المدارس الثانوية في دهوك، اقليم كوردستان، العراق

**خلفية البحث:** ازداد في السنوات الاخيرة الاهتمام بفهم الدورالدقيق للعناصر النزرة في العديد من الأمراض وقد اولي اهتمام خاص بالعناصر التي يحتمل تاثيرها في صحة الفم والاسنان مثل الخارصين. وبسبب التناقضات الواسعة حول هذا الموضوع وندرة الدراسات المحلية في هذا السياق تم أجراء هذه الدراسة. تهدف الدراسة الى تحري علاقة الخارصين بصحة الفم والاسنان.

**المواد والطرق:** اعتمدت الدراسة التصميم المقطعي بضم ثمانية مدارس ثانوية في مدينة دهوك بالفترة من ١٥ نيسان الى ١٥ حزيران ٢٠١٣ وقد شملت عينة البحث (٢٨٠) من الطلبة الاصحاء ظاهرياً (١٨٨ ذكور، ٩٢ أناث) وبأعمارتراوحت بين (١٨–٢٣) عاماً. تم استخدام عينات دم كانت قد جمعت من خلال دراسة سابقة للدكتورعلي حسين احمد وقد أستخدمت نفس عينات الدم لتحديد مستوى الخارصين في مصل الدم لاغراض هذه الدراسة. تم تنظيم أستمارة أستبيان للحصول على المعلومات المتعلقة بالعمر، الجنس، الأمراض السابقة والادوية المستخدمة تلا ذلك فحص للفم والاسنان لتحديد مؤشر تسوس وقلع وحشوة الاسطح للأسنان الدائمية (DMFS) ومؤشر صحة اللثة (GI) لكل طالب.

**النتائج:** اظهرت الدراسة ان مستوى الخارصين في مصل الدم كان (٧٨.٧٢ ± 13.54 g/dlμ) القيمة كانت أعلى لدى الذكور وكان التباين بمستوى احصائي معنوي ($p < 0.001$). كان معدل مؤشر (DMFS) أعلى لدى الاناث منه في الذكور (5.52 ± 12.08 مقابل 5.84 ± 10.37) وبمستوى احصائي معنوي ($p = 0.02$) بينما كان مؤشر دالة صحة اللثة (GI) أعلى لدى الذكور منه في الاناث (0.77 ± 0.94 مقابل 0.5 ± 0.49) وبمستوى احصائي عالي المعنوية ($p <0.001$). ان نسبة الخارصين في مصل الدم كانت تتوافق سلباً مع مؤشري (DMFS, GI) وكانت العلاقة اقوى مع مؤشر DMFS ($r = -0.9$) منها مع مؤشر GI ($r = -0.6$)

**الاستنتاجات:** إن المستويات المختلفة للخارصين في مصل الدم تترابط بشكل متغاير مع الحالة الصحية للفم. يرتبط الخارصين في مصل الدم بشكل أساسي مع مؤشر (DMFS) من خلال علاقة عكسية.

# THE HR2 HAPLOTYPE IN PATIENTS WITH DEEP VENOUS THROMBOSIS IN DUHOK

**FARIDA F. NERWEYI, BSc, MSc, PhD***
**NAJAT TM AL-MZERY, BSc, MSc,***
**NASIR AL-ALLAWI, MBChB, MSc, PhD****

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## ABSTRACT

**Background:** Venous thrombosis is a multifactorial disorder, with a multitude of acquired and inherited risk factors implicated. Among the less investigated controversial inherited risk factors is the HR2 haplotype.

**Materials and Methods:** A total of 70 patients attending the Azadi Teaching Hospital in Duhok with Color Doppler confirmed deep venous thrombosis and seventy age and sex matched healthy controls were recruited. DNA was extracted by phenol-chloroform based method then the HR2 haplotype was screened for using a Restriction fragment Length Polymorphism-Polymerase chain reaction method.

**Results:** The patients had ages ranging from 12-81 (Median 45 years), with a Male: female ratio of 1.33:1. The controls on the other hand had ages ranging from 14-78 years (Median 43 years), and a Male: Female ratio of 1.12:1. A total of 4 patient (5.7%) and 4 controls (5.7%) were identified as carriers of the HR2 haplotype, Three of the patients and four of the controls were heterozygous for the mutation, while the remaining one patient was homozygous for it. There was no significant difference in the frequency of the HR2 haplotype between patients and controls (p=1.0). Furthermore, no significant association was found within the patients' group between the HR2 haplotype and age (p=0.147), though slightly significantly higher number of females were HR2 carriers (p=0.03).

**Conclusion:** The current study has documented that among the patients with venous thrombosis in Duhok, the HR2 haplotype does not appear to carry a significant thrombotic risk on its own, further larger studies including concomitant screening for other thrombophilic mutations may determine whether this mutation may increase the risk associated with these factors.

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**Keywords:** HR2, Factor V A4070, Thrombosis, Kurds

Venous thrombosis is an important cause of morbidity and mortality worldwide with a reported rate of 1 in 1000 in western countries.[1] It is a multifactorial disorder due to a combination of a variety of acquired risk factors like immobility, pregnancy, post-delivery, contraceptive pills, hormonal replacement therapy, post-operative, old age, and malignancy.[2] A number of inherited risk factor have also been implicated and include among others: Protein C, Protein S and Antithrombin inherited deficiencies as well as Factor V Leiden and Prothrombin mutations.[3] One of the less focused upon polymorphisms is a missense mutation in exon 13 of factor V gene, that leads to replacement of Histidine with Arginine at position 1299 (Hist1299Arg).[4] The new mutation was

* *Scientific research center, Faculty of Science, University of Duhok.*
** *Scientific research center, Faculty of Medical Science, University of Duhok.*
*Corresponding author Prof. Nasir Al-Allawi, Medical Science, email: nallawi@yahoo.com*

first assigned the name R2 polymorphism because of the use of the restriction enzyme Rsa I to identify it. Later on this polymorphism was found to be tightly linked to at least 12 polymorphisms in the factor V gene and thus were collectively labeled as HR2 (Haplotype R2).[5,6] Subsequent studies investigated the HR2 haplotype with diverse results, with some studies showing association with reduced factor V levels and APC resistance and increased risk of thrombosis, others failing to show such an association.[5,7] Several different studies throughout the world gave variable prevalence rates of the haplotype in healthy populations and in venous thrombosis patients with rates of 5.8%-10.4% and 9.5-15.2% respectively.[8-10] However, limited number of studies on this mutation from Eastern Mediterranean region including Kurdistan exist.

## MATERIALS AND METHODS:

A total of seventy patients referred to the department of hematology at Azadi teaching hospital with a diagnosis of venous thrombosis were enrolled. The diagnosis of venous thrombosis was based on the results of color Doppler performed in the same hospital. In addition to the patients' a control group consisting of seventy healthy individuals were also recruited concomitantly.

A venous blood sample was obtained from each patient and control, and kept frozen at -20C until the time of DNA extraction. Extraction was performed by a phenol-chloroform based method. The Extracted DNA was thereafter amplified using specific primers to amplify a segment of DNA including the HR2 A4070G nucleotide.[10] The primers used were Forward primer: 5'CAAGTCCTTCCCCACAGATATA-3' and the reverse primer: 5'GGTTACTTCAAGGACAAAATACCT GTAAAGCT-3'. For each DNA sample, 25 µL of PCR mixture was prepared to contain 100 ng of the DNA sample, 1.0 U Taq DNA polymerase, 75 mM Tris-HCl (pH 8.8/25 °C), 20 mM (NH4)2SO4, 2.5 mM MgCl2, 0.01% (v/v) Tween 20, 0.2 mM each of dATP, dCTP, dGTP, and dTTP, and 20 pmol of each of the primers. The reaction mixture was amplified using an AB-2720 thermocycler (Applied Biosystem – USA), using the program: Pre-PCR 94° C 10 min, 35 cycles of 94° C 60 sec, 57° C 60 sec, 72° C 60 sec, followed by final extension at 72° C for 5 min. The resultant 703 bp amplicons were then digested overnight at 37° C using the restriction enzyme Rsa I as recommended by the manufacturer (Promega, USA). The digested products were then run on 2% agarose gel and the results were documented by photography.

The study was approved by the appropriate ethical committee at the Faculty of Science –University of Duhok. Statistical analysis utilized Chi Square, Fishers exact and Mann Whitney U tests where appropriate. $P<0.05$ was considered significant.

## RESULTS:

The mean age of the seventy enrolled patients with venous thrombosis was 47 (SD 16.9) years and they included 40 males and 30 females (M:F ratio of 1.33:1). The control group on the other hand, had mean age of 43.5 years (SD

14.7). The male to female ratio was 1.12:1. There were no significant differences between age and sex of the patients and control groups (p=0.65 and p=0.83 respectively).

Genomic DNAs for all enrolled patients were subjected to PCR-RFLP assay. A 703bp fragment encompassing nucleotide at position A4070G of HR2 gene was amplified with specific primers as depicted in figure (1). The amplicons were then subjected to digestion with the restriction endonuclease Rsa I, which revealed that three (4.3%) of the patients had 703, 492 & 211bp bands indicating that they are heterozygous for mutant allele (GA), while one patient (1.4%) had 492 and 211 bands only indicating that he is homozygous for this mutation (GG). All the remaining patients had a preservation of their 703 bp amplicons, so they were homozygous for the wild allele (AA) [figure 2], thus the overall carrier rates for A4070G in the patients' group was 5.7%. The corresponding Rsa I digestion results in the control group revealed that 4 controls (5.7%) were heterozygous for the mutant allele (GA), while the rest were homozygous for the wild allele.

When the patients' group was assessed regarding the association of HR2 haplotype with age group, no significant correlation was detected (p=0.147), while a significant higher females were found among HR2 carriers (p=0.03). When the control group was considered for age or sex associations with HR2 carrier state, none were significant (p=0.652 and 0.616 respectively). Furthermore, no significant differences in the frequencies of HR2 carrier state between the patients and the control groups were noted, since actually they were both 5.7% (p=1.0; OR: 1.0).

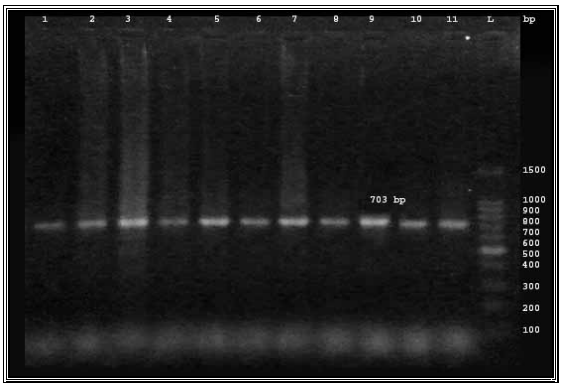


**Figure 1. PCR amplification leading to 703 bp amplicon.**

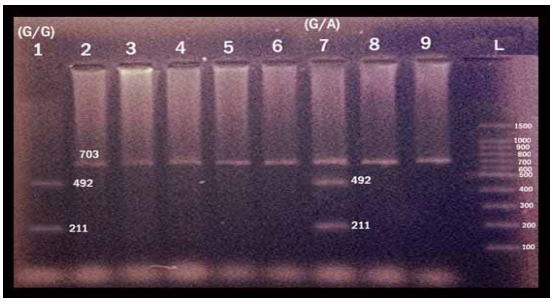


**Figure 2. Agarose Gel electrophoresis (2%) of amplicons after digestion with RsaI enzyme lane 1 shows disappearance of the 703 band and appearance of 492 and 211 bands (indicating that patient is homozygous for the mutant allele (GG), while lane7 shows 703, 492 & 211 band indicating heterozygous for mutant allele (GA). In lanes 2-6 and 8-9, the 703 bp amplicon remained intact indicating AA wild alleles.**

## DISCUSSION:

Since its first description in 1996, several studies have addressed the frequency of the HR2 haplotype in various populations.[4] The frequency was found to vary in different studies relevant to their respective ethnic backgrounds. The earlier studies from Europe revealed frequencies of 6.2-11.4% in healthy individuals,[9,11-13] while studies from the USA revealed rates varying from 11.9% in Caucasians to 5.6% among African Americans.[14] Studies on

Indians, Somalis and Australians revealed rates of 10%, 8% and 6.2 % respectively.[5,8] Notably an extremely high frequency of up to 50% was reported among Indian tribes from Costa Rica.[15] Studies from the Middle East, on the other hand, were rather scarce and reported rates of 7% in Kuwait, 8.5% in Saudi Arabia, 10.4% from Lebanon and 8.5% from Turkey.[10,16-18] While Zammiti and coworkers (2006) found a frequency of 5.5% among their 203 healthy Tunisian individuals screened.[19] The rate of 5.7% as reported in the current study from Iraq appears to be lower than most studies quoted above, and may relate to the impact of this mutation, if any, on venous thrombosis risk.

The frequency of the Factor V HR2 haplotype in patients with venous thrombosis from Duhok as documented in the current study is only 5.7%, which is less than figures reported from Europe ranging from 7.8% in Germany to 18.5% in France,[7,13] and figures of 8.6-9.1% reported from the United States.[14,20] Studies from the Middle East, on the hand, reported figures of 10.1-16.5% in Kuwait, Lebanon and Turkey,[10,18,21] again more than double those reported in the current study. The latter may be linked to a lower background frequency of this mutation in our population. Despite the evidence presented for increased APC resistance and possibly thrombotic tendency associated with HR2 haplotype by several studies,[5,7,11] the current study did not show any significant association of this haplotype with venous thrombosis (OR=1.0). However, the latter observation is not unique and is shared by several previous studies. In their meta-analysis of published studies (from Europe and North America) on risk of venous thromboembolism associated with the HR2 haplotype, Castaman and coworkers (2003) identified eight studies, including a total of 2,696 cases and 7,710 controls.[22] These studies showed a mean of 12.5% among VTE patients, compared to a mean of 11.5% among controls. The analysis revealed that while some studies demonstrated a significant effect of the HR2 haplotyping in increasing the risk of thrombosis,[7,9] others revealed a protective role.[13,14] However overall, the risk was of no significance, when the data were taken together.[22] Data from some of the Middle Eastern countries revealed and in contrast to our findings and those of the latter meta-analysis a highly significant association with VTE was reported from Kuwait, and from Lebanon.[10,21] The latter workers even recommended that screening for the HR2 haplotype should be done in patients with normal factor V Leiden results. The latter conclusion is in contrast to several earlier studies suggesting that while HR2 on its own may not increase the risk of thrombosis, but it may increase the risk conferred by Factor V Leiden.[11,23] The reasons for such observations maybe related to the fact that both HR2 haplotype and factor V Leiden decrease the APC co-factor activity, and that in almost all cases the HR2 and Leiden mutations do not reside on the same allele and therefore such patients do not have any normal Factor V.[22] The current study did not include molecular testing for Factor V Leiden, and thus any relevant conclusions

cannot be offered. Having said that, it should be noted that the chance of association of FVL and HR2 haplotype is around 3 in 100 unselected patients with thrombosis, in populations in which both mutations are highly prevalent, unlike in our population where the frequency of Factor V Leiden is only 1.25% and that of HR2 haplotype is only 5.7% among controls.[24]

In conclusion, the current study has documented that among the patients with venous thrombosis in Duhok, the HR2 haplotype does not appear to carry a significant thrombotic risk on its own, further larger studies including screening concomitantly for other thrombophilic mutations may determine whether this mutation may increase the risk associated with these factors.

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# پوختە

## HR2 لناڤ نەخوشێن لگەل خوێن مەیینێ قوول ژەهراوی د ناڤ دهوك هەپلوتیپە

**پێشەکی:** خوێن مەیی و (نەخوشی)ی ژەهراوی ناڕێکیەکی مولتی فاکتە و ریالە، ب زو رێکەکێ پەیدا کرد ئوو هۆکارێ مەترسی بەش دەبات دانەپال. دناڤ کەمتر جێی مشتومر لێ لێکولیەوە هۆکارێ مەترسی بەش دەبات HR2 haplotype. یێ دوماهی نەهاتیە ڤەکولینەڤە د ناڤ کوردێت هەرێمی کوردستانێ عیراقێ.

**رێکێن ڤەکولینێ:** ل سەرجەمێ 70 نەخوش کوئامادەبون ل نەخوشخانا ئاموژگاریێ ئازادی د ناڤ دهوك ب ئامێری Color Doppler تەئکید هاتە کرن ل خوێن مەیینێ قوولّ ئوو 70 کەسێن ساخلەم هاتنە وەرگرتن وەك کونترول ئەوێن ژیو رەگەزێ وان دیار کرایبون. ناڤکێ ترشی (DNA) هاتە دەرئینان ب رێکا فینول کلوروفورم پاشان گەران دیڤ HR2 haplotyp ب بکارئینانا رێکا (PCR- RFLP).

**ئەنجام:** ژیێ نەخوشا مابەینا 12-81 (ناڤەندا ژیێ 45 سال بو) لگەل رێژا مابەینا نێرو مێ 1:1,33. رێژا ژیێ کونترویلژی مابەینا 14-78 سال و ناڤەندا ژیێ 43 وە رێژا مابەینا نێرو مێ 1:1,22. دەرکەفت 4 نەخوشا (5.7%) وە 4 کونترول (5.7%) وەك ئێك هەلگری HR2 haplotype بون. سێ ژ نەخوشا و چار ژی ل کونترولا گورانکاری بشێوێ هەمەجورن (Heterozygous) هەروەسا ئێك بتنێ گورانکاری بشێوێ وەك یەك (Homozygous) بوو. هیچ گهورینەکێ گرنگ دەرنەکەفت مابەینا نەخوشاو کونترولا (p=1.0). بوزانینێن پتر هیچ گهورینەکێ گرنگ دەرنەکەفت ل ناڤ گروپا نەخوشا HR2 haplotype وژیێ وان (p=0.147) وە گرنگیەکی کێم دەرکەفت لناڤ رەگەزێ مێ کو هەلگری نەخوشی HR2 (p=0.03).

**دەرئەنجام:** ڤەکولینی هەنووکە توّمار کریەکو د ناڤ نەخوشێن خوێن مەیی و ژەهراوی د ناڤ دهۆك، دەرناکاڤیت کو HR2 haplotype ترسناکیەکی مەزن هبیت بشێوەیەکی سەربخو، پێویستە ڤەکولینێن زیاتر بهێنە ئەنجام لگەل گورانکاریت دییێت thrombophilic ئەوێن دەستنیشان دکەن کو ئەڤ نەخوشیە ترسناك دێبیت لگەل هوکاریت گەل وێهاتینە گرێدان.

## الخلاصة

### HR2 المتعدد الأشكال في الخثار الوريدي العميق في محافظة دهوك

**الخلفية:** التخثّر الوريدي هو اضطراب متعدد العوامل، مع العديد من عوامل الخطر المكتسبة والموروثة. بين أقل تحرّى عوامل الخطر الموروثة هو haplotyp HR2. الأخير لم يتحرّوا بين الأكراد العراقيين.

**المواد و طرق البحث:** من مجموعه 70 مريضا الذين حضروا مستشفى آزادي التعليمي في دهوك مع جهاز Color Doppler أكد تخثّر وريدي عميق وتم تعيين سبعين شخصا اصحاء ذو العمر والجنس محدود. تم استخراج الحمض النووي باستخدام طريقة الفينول كلوروفورم القياسية، ثم التحقيق في HR2 haplotype من خلال استخدام تقنية تفاعل البلمرة المتسلسل/ تقييد القطع المتباينة الطول (PCR–RFLP).

**النتائج:** وكان المرضى الذين تتراوح أعمارهم 12–81 (متوسط 45 سنة)، ونسبة ذكر للإناث كان 1:1,33. وكانت كونترول من جهة أخرى تتراوح أعمارهم 14–78 سنة بمتوسط 43 سنة، ونسبة ذكر للإناث كان 1.12: 1. وقد تم تحديد 4 مرضى كحاملين (5,7٪) و4 الكونترول (5,7٪)، وحاملة للHR2 haplotype، وكان ثلاثة من المرضى وأربعة من الكونترول متخالف heterozygous للطفرة، في حين كان مريض واحد المتبقية متماثلhomozygous لذلك. لم يكن هناك اختلاف كبير في وتيرة النمط الفردي HR2 بين المرضى والضوابط (P = 1,0). وعلاوة على ذلك، لم يتم العثور على ارتباط كبير داخل مجموعة المرضى بين HR2 haplotype والعمر (P = 0,147) ، على الرغم من وجود عدد أعلى كثيراً من الإناث الناقلات HR2 (P = 0,03).

**الاستنتاجات:** إن الدراسة الحالية وقد وثقت أن من بين المرضى الذين يعانون من تخثر وريدي في دهوك، لا يظهر HR2 haplotype ينطوي على خطر الجلطات كبير من تلقاء نفسها، مزيد من الدراسات بما في ذلك فحص ما يصاحب ذلك للطفراتthrombophilic أخرى قد تحديد ما إذا كان هذا التحول قد يزيد من المخاطر المرتبطة بهذه العوامل.

# CLEANING EFFICACY OF WAVEONE, PROTAPER AND MANUAL INSTRUMENTS IN PREPARATION OF PERMANENT TEETH: A COMPARATIVE IN VITRO STUDY

BAHAR JAAFAR SELIVANY, BDS, MSc, PhD*

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## ABSTRACT

**Background and Objective:** Efficient biomechanical preparation of the root canal system is essential for achieving the biological and mechanical objectives of root canal treatment. This study was aimed to compare the cleaning efficacy of manual instrument, ProTaper and WaveOne rotary systems in the preparation of root canals.

**Materials and Methods:**
Sixty permanent mandibular premolars with single canal were used in this study. Access cavities were prepared using diamond burs and Indian ink was injected into canals. The teeth were randomly divided into three experimental groups and one control group of 15 teeth each. For each experimental group, either manual instruments or rotary instruments (WaveOne and ProTaper) were used to prepare root canals. In the control group, the canals were filled with Indian ink and irrigated with normal saline but not instrumented. After that, the teeth were cleared with Methyl salicylate, and the removal of Indian ink was evaluated in the cervical, middle and apical thirds of the roots by using Stereomicroscope. Kruskal – Wallis and Mann-Whitney U tests were used for Statistical analysis.

**Results:**
The efficacy of Rotary instruments (ProTaper and Wave One) was much better than manual instrument in all thirds of the prepared root canals. Compared to manual and control groups, ProTaper and WaveOne files showed more ink removal with a highly significant difference ($P > 0.05$). Differentially, ProTaper exhibited better results than WaveOne and showed more ink removal, but the difference didn't achieve statistical significance ($P>0.46$).

**Conclusion:**
ProTaper and WaveOne showed better cleaning efficacy when compared to manual instrument in all thirds of the canal. ProTaper files performed better than WaveOne although the difference between them was statistically not significant.

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**Keywords:** Manual instruments, permanent teeth, rotary system, Wave One, ProTaper, Root Canal Preparation, Single file.

Adequate cleaning and shaping of root canals is the key step in root canal treatment procedures, and this can be achieved by using a proper chemo-mechanical preparation[1,2]. This was achieved traditionally, by the use of stainless steel hand files. However, using stainless steel hand files have several drawbacks[3]. Several advances in the techniques for the root canal systems instrumentation have been obtained from the development of nickel-titanium instruments (NiTi), the main properties of these being their super elasticity, flexibility, and shape memory effect[4]. Furthermore, during preparation NiTi

* *Conservative Dentistry Lecturer*
*College of Dentistry, University of Duhok.*
*Phone No. 07504544975 E. mail:Bahar.jaafar@uod.ac*

instruments maintain the original canal shape and reduced tendency to transport the apical foramen .These properties have allowed the development of rotary instruments with a variety of tapers, making biomechanical preparation faster than manual instrumentation[3,5].

NiTi ProTaper files are developed to prepare severely calcified and curved root canals. The flexibility of these instruments is inherent through the progressive taper and advanced flute design which aid in successful cleaning and shaping when faced with these challenges. The convex triangular cross-section which reduces the contact area between the file and root dentin. These instruments also, have a partially active tip which cuts as it moves apically. The greater cutting efficiency has been safely incorporated through balancing the pitch and helical angles[6].

The new single file NiTi-rotary system has been introduced into endodontics as they are time saving ,cost effective, reduce instrument fatigue and possible cross contamination. (NiTi) files such as WaveOne files are claimed to be able to completely prepare root canals with only one instrument. These files are made of M-Wire that is created by an innovative thermal-treatment process, which improved its resistance to cyclic fatigue, and increased flexibility of the instruments [7]. It consists of three single-use files: Small (ISO 21 tip / 0.06 taper) for fine canals, primary (ISO 25 tip / 0.08 taper) for the majority of the canals, and large (ISO 40 / 0.08 tapers) for large canal. Special automated device required to use these files as they moved in a special reciprocal motion[8,9]. It has been stated that the WaveOne has advantages in comparison with conventional rotary systems, as they allow biomechanical preparation to be performed four times faster due to the use of a single instrument[10,11]. However, few studies have reported the cleaning effectiveness of these new systems since the use of only one instrument could compromise the removal of debris from inside the root canals[12].

This study was aimed to compare the cleaning efficacy of manual and different rotary systems by means of stereomicroscope at 10X magnification in roots with single canals. The null hypothesis tested was that there would be no difference between manual and different rotary systems with regard to their cleaning efficacy.

## MATERIALS AND METHODS:

Sixty mandibular premolars extracted for orthodontic purpose were collected for this study, immediately stored in distilled water at room temperature. The debris and soft-tissue remnants were cleaned from external root surface and then 0.5 % sodium hypochlorite was used for disinfecting the teeth by immersing them in it for one week, and again stored in distilled water at 37C° until they were used for the study. Digital radiographs were taken for selection of the single root canal teeth prior to the instrumentation of root canal. Teeth with no abnormalities such as internal or external root resorption or canal calcification were selected. To achieve standard coronal access opening Diamond fissure burs under cooling with distilled water was used; all specimens were then

rinsed with saline. All the canals were checked radio graphically for apical patency and root canal conditions by inserting a number 15 K-file into the canals. The canals were filled with India ink using a 30 gauge needle syringe. To assure penetration of the ink and prevent bubble formation a no. 15 K-file was introduced into the canal. The teeth were left in wet conditions at room temperature for forty eight hours, and were then randomly divided into equal three experimental and one control, each comprising of 15 roots. In the control group, the root canals were filled with ink and irrigated with normal saline but not instrumented, in accordance with the method used by other studies.[13,14] All root canals were prepared by the same operator; the working length was recorded as the length of the initial file at the apical foramen minus one mm. The three experimental groups were assigned to the type of instruments used for canal instrumentation into: Manual, ProTaper and WaveOne groups respectively. In the manual group, all 15 root canals were instrumented manually with K-files (Mani Co,Tokyo,) with step-back technique up to file no.40.and step-back up to a file size 55[15].

In ProTaper group, all 15 root canals were prepared with ProTaper (Dentsply-Maillefer, Switzerland) in a crown down technique using X smartplus motor (Dentsply Maillefer, Ballaigues, Switzerland) in the following sequence: S1 in the coronal third of the root canal, S2 in the middle third, and (F1, F2, F3, F4) along the working length.

In WaveOne group, all 15 root canals were prepared with WaveOne large file (40/08 taper) (Dentsply Maillerfer, Switzerland) in crown down technique in a programmed reciprocating motion using the X smartplus motor (Dentsply Maillefer, Ballaigues, Switzerland) in "WAVEONE ALL" mode. The files were used according to manufacturer's instructions in a special pecking motion (amplitude less than 3 mm, three pecks). The flutes of the instrument were cleaned after three pecking movements. For all groups, the instrumentation was done using very light pressure and instruments never forced to working length. The canals, in all three experimental groups were flushed with 5 ml normal saline and dried with absorbent paper points. The pulp chamber was then filled with temporary cement (Coltosol, Coltene/ Whaledent AG, Switzerland) and then stored in wet conditions.

To analyze cleaning capacity, the teeth were placed separately in 5% Nitric acid for 7 days and the acid solutions were changed daily until the teeth were completely decalcified. The teeth were then washed under running tap water and dehydrated in a series of ethyl alcohol concentrations: 85% alcohol for 12 hours (changed after eight hours) followed by 90% alcohol for 1 hour, 95% alcohol for three hours, and 100% alcohol for 1 hour. After dehydration, the teeth were cleared in methyl salicylate for 6 hours[16].

A stereomicroscope (SMZ-143 series, Motic Company) at 10X magnification was used to examine the cleared roots .The scoring was done by an independent

blinded examiner. They were scored according to the amount of Indian ink remaining in the apicall, middle, and coronal thirds of the canal on a scale of 0-2[17]: Figure (a-c)

score 0: Total clearing in which the whole canal was completely clean.

score 1: Partial ink removal.

score 2: No ink removal.

The scores thus obtained were tabulated and statistically analyzed by Kruskal-Wallis and Mann-Whitney U tests using SPSS Software version 21

(a)  (b)  (c) 

**Figure 1. Grading Scores**

**(a)** Score (0) Total clearing in which the whole canal was completely clean**, (b)** Score (1) Partial ink removal**(c)** Score (2) No ink removal.

## RESULTS:

Comparison between the control and the three experimental groups revealed that files in the three experimental groups were able to remove the Indian ink.Table1.

When the composite score of all three groups were evaluated, ProTaper and WaveOne showed more ink removal than manual K-file with statistically significant difference. The mean amount of remaining ink of both ProTaper (0.66) and WaveOne (0.75) was lower than the manual K-file (1.13) and the differences between the means were statistically significant (P <0.05), while the mean difference between both rotary systems (ProTaper and WaveOne) was statistically non-significant (P value 0.46). Table2 and Figure 2.

Level wise, at the coronal level ProTaper and WaveOne showed more ink removal than the manual group and the difference was highly significant. However, the difference between both rotary systems was statistically not significant. Table 3, Figure 3.

In the middle third of the root canal, ProTaper performed better than WaveOne and K-file. The difference in their cleaning efficacy was found to be statistically significant (P < 0.025) with the manual K-file while showed no significant difference with WaveOne.

In the apical third of the root canal , ProTaper showed higher efficacy than K-file with a highly statistically significant differences between them (P =0.0017). There was also, statistically significant difference between the efficacy of WaveOne and K-file manual instrument (P=0.019). Regarding the difference in the efficacy of both ProTaper and WaveOne, there was no statistically significant difference between them (P =0.46),although ProTaper showed more ink removal than WaveOne .

**Table 1. Efficacy Scores by Groups and Canal Level/Summary statistics**

| Groups | Canal Parts | Mean ± Sd | Median | Mode | p value * |
|---|---|---|---|---|---|
| Control | Coronal | 2 ± 0 | 2 | 2 | |
| | Middle | 2 ± 0 | 2 | 2 | |
| | Apical | 2 ± 0 | 2 | 2 | |
| Manual | Coronal | 1.6 ± 0.48 | 2 | 2 | |
| | Middle | 1.2 ± 0.41 | 1 | 1 | 0.001 |
| | Apical | 0.6 ± 0.63 | 1 | 1 | |
| ProTaper | Coronal | 1.06 ± 0.45 | 1 | 1 | |
| | Middle | 0.86 ± 0.35 | 1 | 1 | |
| | Apical | 0.06 ± 0.25 | 0 | 0 | |
| Wave One | Coronal | 1.13 ± 0.35 | 1 | 1 | |
| | Middle | 0.93 ± 0.45 | 1 | 1 | |
| | Apical | 0.2 ± 0.41 | 1 | 0 | |

* Based on Kruskal Wallis Test

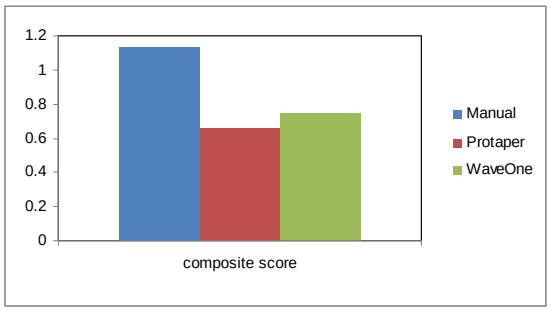


**Figure 2. Composite scores illustrating cleaning efficacy of the experimental groups**

**Table 2. Summary Statistics for the Composite Score of the Studied Groups**

| Composite score | Mean | SD | Experimental groups | P* |
|---|---|---|---|---|
| Manual (n=45) | 1.13 | 0.50 | Manual vs Protaper | 0.0003 |
| Protaper (n=45) | 0.66 | 0.35 | Maunal vs Waveone | 0.0031 |
| WaveOne (n=45) | 0.75 | 0.40 | Protaper vs Wave | 0.46 |

*Based on Mann-Whitney test.

**Table 3. Summary Statistics for the Differential Scores at Different Canal Levels.**

| Canal Level | Mean | SD | Experimental groups | P* |
|---|---|---|---|---|
| Coronal Third | | | | |
| Manual (n=15) | 1.66 | 0.48 | Manual vs Protaper | 0.0053 |
| Protaper (n=15) | 1.06 | 0.45 | Maunal vs Wave One | 0.0050 |
| WaveOne (n=15) | 1.13 | .35 | Protaper vs Wave One | 0.30 |
| Middle Third | | | | |
| Manual (n=15) | 1.2 | 0.41 | Manual vs Protaper | 0.025 |
| Protaper (n=15) | 0.86 | 0.35 | Maunal vs Waveone | 0.011 |
| WaveOne (n=15) | 0.93 | 0.45 | Protaper vs Wave One | 0.66 |
| Apical Third | | | | |
| Manual (n=15) | 0.6 | 0.63 | Manual vs Protaper | 0.0017 |
| Protaper (n=15) | 0.06 | 0.25 | Maunal vs Waveone | 0.0019 |
| WaveOne (n=15) | 0.2 | 0.41 | Protaper vs Wave One | 0.46 |

* Based on Mann-Whitney U test.

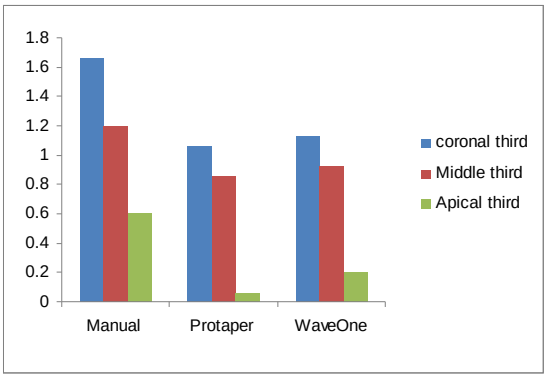


**Figure 3. Cleaning Efficacy (Composite score) of files by Root Canal Levels**

## DISCUSSION:

Removal of vital and/or necrotic pulp tissue, infected dentine and dentine debris to eliminate most of the micro-organisms from the root canal system is one of the most important objectives during root canal instrumentation[18]. Since the introduction of a single file root canal preparation technique[19], the technique has increased in popularity with the introduction of commercial systems that use this concept. Single file systems such as WaveOne are clinically appealing because they are easier to apply and more effective than multi-file approaches[20]. The ability to achieve some of these objectives was examined in this in vitro study on single root canals, involving multi sequence ProTaper and Single file WaveOne systems and manual K- file instrument. Human extracted teeth were used in this study to provide conditions similar to clinical circumstances.

The major aim of this in vitro study was to compare the cleaning efficacy of manual file, multiple –file ProTaper and Single File WaveOne. Only normal saline was used as irrigant solution to avoid any influences of various irrigation solutions. The teeth in all groups, were balanced with respect to the apical diameter and the length. All selected files have a tip diameter equivalent to a size ISO # 40 tip diameter.

Based on the results obtained, it can be affirmed that the tested hypothesis was rejected since the two evaluated rotary systems (ProTaper and WaveOne) showed a better cleaning efficacy than the manual system.

Both ProTaper and WaveOne showed higher ink removal and better performance in comparison with manual instrument with a statistically significant difference ($P < 0.05$). A possible reason for this difference in the debris removal capacity of these rotary instruments is their cross-section design.

K-file showed least ink removal in all thirds of the root canal. 0.02 taper and poor cutting efficacies could be the reasons.

Despite the limitations of this in vitro study, the ProTaper multi - file showed more ink removal followed by single file WaveOne and they have similar cleaning efficacy in all thirds of instrumented root canals and there was statistically no significant differences between their efficacy.

The mean overall scores for ink removal were in the range from (1.13) for K-file to (0.66) for ProTaper and (0.75) for WaveOne.

ProTaper showed higher efficacy in all thirds of the root canals than the manual instrument which can be attributed to the file convex triangular cross section that reduce the contact areas between the file and the root dentin. The greater cutting

efficacy inherent in this design has been safely improved by balancing the pitch and helix angle that prevents the files from inadvertently screwing into the root canal. ProTaper files have a continuously changing helical and pitch and helical angles over the active length of the blades optimize its cutting action together with a negative rake angle that scratches dentin surface[21,11], the ProTaper system works with an active cutting motion that substantially increases the efficacy of the system and reduces tensional strain, these results are in agreement with Katge et al., study[22]. In addition to that, the multi-files ProTaper files work with full rotation which improves its cleaning efficacy, and this agree with the findings of Robinson et al study[23] who showed that a full – sequence rotary system resulted in cleaner canals than with WaveOne which works in reciprocation.

Furthermore, these single-file systems are clinically more attractive, because they allow a significant reduction in the time of their application when compared with multiple instrument systems. However, the reduction in operative time when single-file systems are used, significantly diminishes the time of irrigation and chemical debridement of root canal systems[11,12].

ProTaper performed better than WaveOne and showed more ink removal, although the differences between them was statistically non significant, this may be attributed to the WaveOne reciprocating motion, reverse cutting action, modified convex triangular cross section at the tip end and a convex triangular cross section at the coronal end. This design improves the overall flexibility of the instrument. The tips are modified to follow canal curvature accurately. Along the length of their active portions, these files have two distinct cross-sections. D1-D8 (Apical) Modified convex triangular cross-section and D9-D16 (Coronal) Convex triangular cross-section.

The WaveOne operated with a 6:1 reducing handpiece. The preprogrammed motor is preset for the angles of reciprocation and speed for WaveOne instruments. The counterclockwise (CCW) movement is greater than the clockwise (CW) movement. CCW movement advances the instrument, engaging and cutting the dentin. CW movement disengages the instrument from the dentin before it may lock into the canal. Three reciprocating cycles complete one

complete reverse rotation and the instrument gradually advances into the canal with little apical pressure required[24,25].

While these findings agree with the findings of Katge et al.14 ,they contradict those of other studies, where Wave One showed better performance than ProTaper specially in the apical third of the canals[24,26].

In conclusion ProTaper rotary multi files and reciprocating WaveOne single file systems showed more ink removal and superior cleaning efficacy in all third of root canal as compared to manual instrument K-file. Considering the differences between both rotary systems (ProTaper and WaveOne), ProTaper cleaning efficacy was better than that of wave one but the difference didn’t achieve statistical difference.

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## پوختە

### توانایێن پاقژکرنێ یێ ئامیرێن دەستی و ئامیرێن زڤروك ( WaveOne, ProTaper) بو ئامادەکرنا کەنالین رهین ددانین بە ردەوام: ڤەکولینە کا بەروارداری دەرڤەی لەشی

**ئارمانج:** پاقژکرنا درست یا رەهێن ددانا ئێك ژ ئامانجێن سە رەکینە بو بجهینانا ئارمانجین بایولوجی ئو میکانیکی بو چارە سە ریا نە خوشیێن رە هێن ددانا. ئارمانج ژڤەکولینی بە راوردیا توانایێن پاقژکرنی یێن ئامیرێن دەستی وئامیرێن WaveOne, ProTaper بۆ ئامادەکرنا رهێن ددانێن بەردەوام.

**ڕێکێن ڤە کولینێ:**

شێست رهێن ددانێن بەردەوام یێن ئێك کەنالی هاتنە بکارئینان بۆ ڤێ ڤەکولینێ. بۆشاییا گەهشتنێ هاتە ئامادەکرن ب ئامیرێ ئەلماسێ بورس. هەمی رەھ هاتنە پرکرن بموریێ هندی برێکا شرنقێ. هە می ددان هاتنە دابەشکرن بۆ سێ گروپێن تاقیکردن وئێك گروپا کونترول، ئۆ هەر گروپەك پیکدهات ژ ١٥ ددانا. گروپێن تاقیکرنێ هاتنە پاقژکرن ب ئامیرین دەستی ئو ئامیرێن (WaveOne وProTaper). گروپا کونترول هاتە پرکرن ب موریێ هندی بەلێ نەهاتە پاقژکرن بەلکۆ هاتە پاقژکرن ب ئاڤا خوێ. رەهێن ددانا پاشی هاتنە رونکرن بریکا بکارئینانا کەرەستێ میسال سالیسیلات. هەلسەنگاندنا ژێبرنا موریێ هندی هاتە ئەنجامدان برێکا Stereomicroscope ل هەر سێ پشکێن رەها ددانی، تاقیکرنیێن Mann-Whitney Kruskal –Whallis هاتنە بکارئینان بۆ شروڤەکرنا ئەنجاما.

**ئەنجام:**

ئامێرێن (WaveOne ProTaper) باشتر رهێن ددانی پاقژکرن ژئامیرێن دەستی وگروپێ کونترول ل هەر سێ پشکێن رەهێ ب جیاوازیەکا بەرچاف (P< ٠,٠٥). ProTaper باشترین ئەنجام دانە نیشاندن پاشی ئامیرێ WaveOne هەلبە ت چ جیاوازییێن بەرچاف دنافبەرا وان نەبو (P> ٠,٤٦).

**دەرئەنجام:**

ئامیرێ ProTaper وWaveOne باشترین شیانێن پاقژکرنا رەهێن ددانا دیارکر بەراورد دگەل ئامیرێ دەستی ل هەمی بەشێن رەها ددانی.

## الخلاصة

### فاعلية تنظيف المبارد الدوارة (WaveOne، ProTaper) والمبارد اليدوية لتحضير اقنية جذور الأسنان الدائمية: دراسة مختبرية مقارنة

**الخلفية والاهداف:** إن التنظيف الفعال وتشكيل القناة من الامور الاساسية لتحقيق الاهداف الاحيائية والميكانيكية لمعالجة قنوات جذور الاسنان. تهدف الدراسة الى مقارنة فعالية المبارد اليدوية، والأنظمة الدوارة (ProTaper و WaveOne) في تحضير قنوات جذور الاسنان الدائمية.

**طرق البحث:** استخدم ستين سنا من الضواحك السفلية الدائمية ذوات القناة الواحدة في هذه الدراسة. تم إعداد تجاويف الوصول وحقن الحبر الهندي في القنوات. تم تقسيم الأسنان بشكل عشوائي إلى ثلاث مجموعات تجريبية ومجموعة ضابطة واحدة بواقع ١٥ سن لكل مجموعة. بالنسبة للمجموعة التجريبية، استخدمت المبارد اليدوية أو االمبارد الدوارة (WaveOne و ProTaper) لإعداد القنوات الجذرية. أما المجموعة الضابطة، فقد ملئت القنوات بالحبر الهندي ثم غسلت بمحلول ملحي ولم تستخدم اي اداة او مبرد لاعدادها. بعد ذلك، تم تطهير الأسنان باستخدام ميثيل الساليسيلات، وجرى تقييم إزالة الحبر الهندي في الثلث العنقي والوسطي والقمي لجذور الاسنان باستخدام مجهر Stereomicroscope. تم إجراء التحليل الإحصائي باستخدام فحصي الاحصاء Kruskal –Whallis– و Mann–Whitney U test.

**النتائج:** كانت فعالية الأدوات الدوارة (WaveOne ProTaper) أفضل من ألاداة اليدوية في إعداد كل اجزاء قنوات الجذور. وأظهرت مبارد ProTaper و WaveOne مزيد من إزالة الحبر مع فارق معتوي واضح مع المجموعة اليدوية والضابطة (P< ٠.٠٥). ProTaper أظهرت نتائج أفضل من WaveOne وأظهرت المزيد من إزالة الحبر، ولكن الفرق لم يحقق فروق دالة إحصائيا (P< ٠.٤٦).

**الاستنتاجات:** أظهر ProTaper و WaveOne أفضل فعالية تنظيف بالمقارنة مع ألاداة اليدوية في كل ثلثي القناة. مبارد ProTaper اظهرت أداء أفضل من WaveOne على الرغم من عدم وجود فروقات احصائية معنوية بينهما.

# CLINICAL ANALYSIS OF ANTERIOR DISLOCATION OF THE SHOULDER BY SPASO TECHNIQUE

**DR. JAGER OMAR AHMED, MBChB, FICMS***
**DR. OMAR MOHAMMED RAMADHAN, MBChB****
**DR. MUHANNED ABBAS MOHAMMED, MBChB****
**DR. WISAM KHALID FAYYAD, MBChB****

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## ABSTRACT

**Background and objective:** There are various methods for reduction of anterior shoulder dislocation, most of them are either technically difficult or need general anesthesia. The Spaso technique, a relatively new one, emerges as a reliable, simple and safe method.
The aim of this study is to evaluate this method of reduction for shoulder dislocation in Duhok city hospitals and clinics.
**Patients and methods** 42 patients with anterior shoulder dislocation treated by this method and those who failed then treated by other methods.
**Results** 36 cases (85.7%) out of 42 were reduced successfully by this method without complications, most of them (31 case = 73.8%) done with analgesia and only 5 case (11.9%) need general anesthesia. All cases of recurrent shoulder dislocation (23 case) were reduced by this method, and most of those with first time shoulder dislocation (13 out of 19) were also successfully reduced by this method.
**Conclusion** the Spaso technique is a successful method for reduction of anterior shoulder dislocation in Duhok city hospitals and clinics specially for cases of recurrent attacks.

**Duhok Med J 2015; 9 (1): 30-36.**

**Keywords:** shoulder, dislocation, Spaso

Shoulder joint is the most common joint in the body liable for dislocation (accounting for nearly 50% of all dislocations) due to a number of factors including either bony abnormalities, surrounding soft tissue (ligaments & muscles) abnormalities or its inherited instability to gain wide range of motion. There are four types of shoulder dislocation but the most common one is the anterior one (accounting for about 95% of all shoulder dislocations) which has various methods for reduction. Some of these methods now are of no more than historical interest and others have success rate but with complications.[1-3]

Traditional methods of reduction are either technically difficult that requires special skills and two operators or need heavy sedation and/ or general anesthesia. A relatively new technique, the Spaso technique first published by Spaso Milijesica at 1998, emerges as a reliable, simple and safe method.[4-6]

The Spaso technique is done while the patient in supine position and have received simple analgesia. The operator grasps the affected limb at the wrist and lifts it gently into the vertical position with simple traction over few minutes. While

*Lecturer of Orthopedics, Department of Surgery, Faculty of Medical Sciences, University of Duhok, Kurdistan Region, Iraq.
** resident doctor in orthopedic department , Duhok Emergency Hospital
Corresponding author: Jagar Omar Ahmed. E-mail: jager.doski@yahoo.co.uk

maintaining the limb in this vertical position and traction, the operator externally rotates the shoulder and usually a clunk of reduction is heard or felt and the patient relaxes as his pain subside.[4-6]

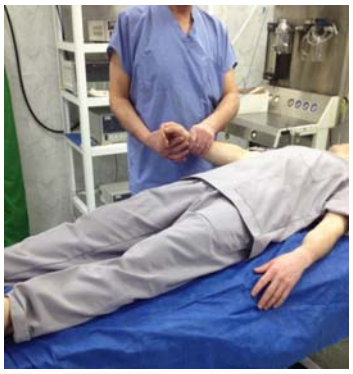
This method of reduction does not need an assistant for reduction, no special skills are required so can be done by residents as mentioned in some literatures, and can be done under simple analgesia without anesthesia.[4,6-10]

The aim is to do a clinical analysis of this method of reduction for anterior shoulder dislocation in Duhok city hospitals and clinics.

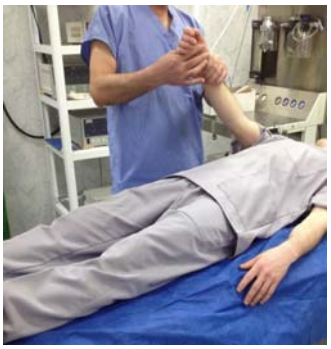
## PATIENTS AND METHODS

Patients with anterior dislocation of the shoulder joint are frequently seen in hospitals and private clinics and most of them are treated by closed reduction by manipulation under general anesthesia. So we thought about another method of reduction that can be done without general anesthesia with a good success rate; and during reviewing these methods, we found that Spaso technique is relatively a new one that can be done without anesthesia and even without assistant.

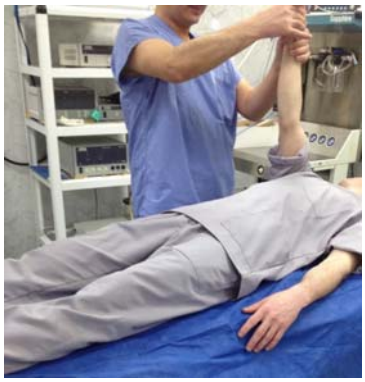
This study was a prospective one and included patients with anterior dislocation of the shoulder joint who presented to the Emergency Hospital, Shelan private hospital and a private clinic in Duhok city. A trial of closed reduction was done for all patients which had been included in this study by giving simple analgesia and sedation (paracetamol or acetyle salisylic acid vial with diazepam ampoule intravenously), then Spaso technique maneuver done (gentle traction and gradual elevation of the arm for few minutes while the patient is in supine position, then external rotation of the arm). Figure 1 (A-D)



**(A)**



**(B)**



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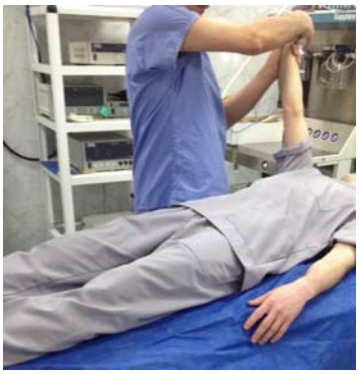

**(D)**

**Figure1. Steps of Spaso technique for reduction of shoulder dislocation**

Reduction was confirmed clinically and radiologically. Those cases that couldn't be reduced by this technique, other methods were tried (like Hippocrat or Kocher). Those cases who didn't reduced with analgesia and sedation by any method, then we took them to the operation room to do reduction for them under general anesthesia, also starting by Spaso technique and if failed then by other methods). Most of the reduction procedures were done by resident doctors of orthopedic branch (except those in the private hospital and clinic).

The total number which had been included in this study were 42 patients over a period extended from June 2014 till February 2015. The data of each patient was reported in a special form that included: his/ her name, age, sex, occupation, frequency of dislocation (first time or recurrent), time interval between the trauma that cause dislocation and beginning of reduction procedure, medicine used during reduction procedure (analgesia or anesthesia), success or failure of reduction procedure and finally any associated complications.

The data of all patients were collected and analyzed to find the clinical efficacy of this reduction method.

## RESULTS

The total number of patients were 42; of them 26 cases (61.9%) were male and 16 (38%) were female. Their age ranged from 17 to 70 years old. They had different occupations (like students, soldiers, labors, housewives,….). Twenty five patients had dislocation of their right shoulder and the rest (i.e. 17 case) in their left side. The time interval from dislocation episode till the reduction procedure began ranged from few minutes till 2 hours with an average of 50 minutes.

Those patients who had recurrent dislocations were 23 cases (54.8%) while the rest 19 cases (45.2%) presented for the first time with this problem. All the cases with recurrent dislocation were reduced by Spaso technique, 21 cases of them with analgesia and the other 2 cases under general anesthesia. While those who presented with first time dislocation of their shoulder, they were 19 cases. Thirteen of them reduced by Spaso technique, 10 cases with analgesia and 3 cases under general anesthesia. The other 6 cases were reduced by other methods, 4 cases with analgesia and 2 cases under general anesthesia. (table 1)

**Table 1. Type of dislocation versus method of reduction for shoulder dislocation**

| | Recurrent dislocation | First time dislocation | Total |
|---|---|---|---|
| **Spaso technique** | **23 (54.8%)** | **13 (30.9%)** | **36 (85.7%)** |
| **Other methods** | **- (0%)** | **6 (14.3%)** | **6 (14.3%)** |
| **Total** | **23 (54.8%)** | **19 (45.2%)** | **42 (100%)** |

Those patients who got successful reduction of their shoulder dislocation with analgesia and sedation were 35 (83.3%), from them 31 case (73.8%) by Spaso technique and the other four (9.5%) by other methods. Those patients who underwent general anesthesia in order to do reduction for them were 7 cases (16.7%), from them 5 (11.9%) cases were reduced successfully by Spaso technique and the other 2 cases (4.8%) by other methods. (table 2)

**Table2. Type of drug used versus methods of reduction for shoulder dislocation**

| | With analgesia | Under anesthesia | Total |
|---|---|---|---|
| Spaso technique | 31 (73.8%) | 5 (11.9%) | 36 (85.7%) |
| Other methods | 4 (9.5%) | 2 (4.8%) | 6 (14.3%) |
| Total | 35 (83.3%) | 7 (16.7%) | 42 (100%) |

The overall cases reduced by Spaso technique were 36 cases (85.7%). Thirty one cases (73.8%) were reduced successfully with analgesia, 21 of them had recurrent dislocations of their shoulder, and 10 cases presented with first time dislocation. For the other 5 cases, the reduction was done under general anesthesia, 2 of them had recurrent attacks and the other 3 patients had first time dislocation. (table 3)

**Table 3. Cases reduced by Spaso technique**

| | Recurrent dislocation | First time dislocation | Total |
|---|---|---|---|
| With analgesia | 21 (50%) | 10 (23.8%) | 31 (73.8%) |
| Under anesthesia | 2 (4.8%) | 3 (7.1%) | 5 (11.9%) |
| Total | 23 (54.8%) | 13 (30.9%) | 36 (85.7%) |

No significant complication was reported for any patient treated by this technique.

## DISCUSSION

From the total number of the patients which had been included in this study, a good number of cases (36 out of 42, i.e. 85.7%) were treated successfully by this technique whether with analgesia or under anesthesia.

But the important group were those who had a successful reduction with analgesia. They were 31 cases out of 42 which represent 73.8% from the total number. This mean that this technique of reduction is successful in most cases of shoulder dislocation and can be done easily as outpatient with analgesia and sedation only.

Most of the cases which had been included in this study had history of recurrent attacks of shoulder dislocation. They were 23 cases out of 42 cases. All of them were reduced successfully by this new technique and 21 of them with analgesia only. So the Spaso technique is a successful method for reduction of shoulder dislocation specially if they are recurrent.

Also in those patients who presented for the first time with shoulder dislocation, the Spaso technique was successful in most of cases (13 out of 19); 10 cases with analgesia and 3 cases under anesthesia.

The Spaso technique failed in 6 cases out of 42 (i.e. 14.3%), all of them were males and they present with first time episode. Four cases failed to be reduced by Spaso technique with analgesia but later on reduced by other methods. They were at the beginning of this study were our practical experience with this technique was limited. The two cases with failure of reduction of their shoulders with Spaso technique even under anesthesia were elder patients (there ages were around 70 years) and the causes of failure were not explained (the cause of failure of reduction may be that the pathology of anterior shoulder dislocation in old people is mainly tear of the joint capsule rather than Bankart's lesion and the tone of surrounding muscles is weaker than that in

younger age group which also may play a role in reduction).

Yuen et al (2001)[10] had 16 cases of anterior shoulder dislocation in their study. Fourteen of them (87.5%) were reduced successfully by the Spaso technique without any complications.

Ugras et al (2008)[7] also applied this technique for the 52 cases of anterior shoulder dislocation which had been included in their study. Thirty nine cases (75%) were successfully reduced by this method without anesthesia or assistance. They found that those cases who presented late or had concomitant greater tuberosity fracture had a lower success rate. However there were no complications associated with using this technique in their series.

Fernández-Valencia et al (2009)[8] also did a prospective study for 34 cases with anterior dislocation of the shoulder joint. They were successful in reduction of 23 cases (67.6%), and for those with recurrent dislocation only the success rate was 83%.

In conclusion the Spaso technique is simple and safe method of reduction for the cases of anterior shoulder dislocation specially if the patient has history of previous episodes, which can be done easily with analgesia and sedation only.

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# پوختە

## شروڤە كرنەكا كلينيكى بو چارەسەريا خليانا گەها ملى ب ريكا سپاسو

**پێشەكى:** گەلەك رێك بێت هەين بو ڤەزڤرينا خليانا ملى، باهرا پتر يان بزەحمەتن يان پێدڤى بێهوشكرنێ نە. رێكا سپاسو، ئەڤ رێكا نوى، يا ديار بوى كو رێكەكا ب ئاسان و يا ب كێم مشكله يە.

**ئارمانج:** ژ ڤێ ڤەكولينێ هەلسەنگاندنا ڤێ رێكێ بو ڤەزڤرينا خليانا ملى ل باژێرى دهوكێ.

**رێكێن ڤەكولينێ:** 42 نەخوش ئەوێن توشى خليانا گەها ملى بوين هاتنە چارەسەركرن ب رێكا سپاسو، و ئەوێن فايدە نە كرين ب رێكەكا دى هاتنە چارەسەركرن.

**ئەنجام:** 36 نەخوش (85.7٪) ش 42 ب سەركەفتى يانە هاتنە چارەسەركرن ب ڤێ رێكێ و بێ مشكله، باهرا پتر ژ وان (31 نەخوش=73.8٪) بێى كو هەوجەى بێهوشكرنێ بن و بەس 5 نەخوشێت دى ( 11.9٪) هەوجەبونە بێهوشكرنێ. هەمى نەخوش ئەوێت توشى خليانا ملى يا دوبارە (23 نەخوش) هاتنە چارەسەركرن ب ڤێ رێكێ، و بەهرا پتر ژ وان ئەوێن بو جارا ئێكێ توشى خليانا ملى بوين (13 ژ 19) هەر وسا ب سەركەفتانە هاتنە چارەسەركرن ب ڤێ رێكێ.

**دەرئەنجام:** رێكا سپاسو رێكەكا سەركەفتيە بو ڤەزڤرينا خليانا ملى ل باژێرێ دهوكێ نەخاسمە بو وان نەخوشا ئەوێن خليانا ملى لێ دوبارەبيت.

## الخلاصة

### تحليل سريري لعلاج الخلع الامامي لمفصل الكتف بطريقة سباسو

**الخلفية والأهداف:** هناك عدة طرق لرد الخلع الامامي للكتف، معظمها اما صعبة تقنيا او تحتاج الى تخدير عام. طريقة سباسو، الجديدة نسبيا، ظهرت كطريقة بسيطة، امينة و يعتمد عليها.

الهدف من هذا البحث هو تقييم هذه الطريقة لرد خلع مفصل الكتف في مدينة دهوك.

**المرضى وطرق البحث:** 42 مريضا مصابين بالخلع الامامي للكتف تم علاجهم بهذه الطريقة والذين فشلوا تم علاجهم بطرق اخرى.

**النتائج:** 36 (85.7%) مريض من مجموع 42 تم علاجهم بنجاح و بدون مضاعفات بهذه الطريقة، معظمهم (31 حالة =73.8%) بدون تخدير عام و فقط 5 اخرين (11.9%) بتخدير عام. كل حالات الخلع المتكرر للكتف (23 حالة) ردوا بهذه الطريقة و معظم حالات خلع الكتف للمرة الاولى (13 من اصل 19) ايضا ردوا بنجاح بهذه الطريقة.

**الاستنتاجات:** تقنية سباسو طريقة ناجحة لرد الخلع الامامي للكتف في مدينة دهوك خصوصا في حالات الخلع المتكرر.

# IS IT ESSENTIAL TO USE SCOLICIDAL AGENT IN OPEN SURGERY FOR HEPATIC HYDATID CYST?

**Haydar Hussain Ibrahim, MBChB, FRCSEd***

***Submitted 16 April 2015; accepted 31 June 2015***

## ABSTRACT

**Background and objective:** Hydatid disease of the liver is endemic in Iraq and is a common health problem. Although various treatment options have been described with injection of scolicidal agent into cyst cavity to reduce the recurrence but with risk of complication of such agents.

The aim was to assess the open surgical procedure in treatment of hepatic hydatid cyst without injection of scolicidal agents in terms of complication and recurrence rate.

**Patients and methods:** A prospective study of 103 patients with hepatic hydatid cyst operated upon by one consultant surgeon using open surgical approach during the period of 15 years (Feb 2000- March 2014) without intraoperative injection of scolicidal agent into the cyst cavity .

**Results:** The mean age was 33.1.(4–70 years). Sex 35 males, 68 females. M/F 1/1.9. The size of the cyst was variable from 5-17cm in diameter. Number of the cyst per patient was from 1-12 cysts. Location of the cyst was 81 in the right lobe and 12 patients in the left lobe R/L 6.7/1. Both lobes were involved in 10 patients. Uncomplicated cyst in 67 patients and complicated in 36 patients.

Frank rupture into biliary system presented as cholangitis with jaundice was detected in 5 patients and intraperitoneal rupture was seen in one patient presented as acute abdomen with urticaria following blunt trauma .

Post operative morbidity was observed in 58 patients (56.3%) which include chest infection in 10 patients, wound infection in 10 patients, bile leak in 25 patients, hepatic abscess in 3 patients and recurrence rate detected in 10 patients (9.7%)

**Conclusion:** As scolicidal agents are not free from complications (both local and systemic), dealing with hepatic hydatid cysts surgically without using scolicidal agents does not affect the recurrence rate.

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**Keywords:** Hepatic hydatid cyst , Scolicidal agent, Mortality, Recurrence.

Hydatid disease is an important pathogenic, zoonotic and parasitic infection (acquired from animals) of humans, following ingestion of tapeworm eggs excreted in the faeces of infected dogs. Hydatid disease is a major endemic health problem in certain areas of the world, usually affects the liver (50–70%) and less frequently the lung, the spleen, the kidney, the bones, and the brain[1-3].

Complications of the hepatic hydatid cyst such as rupture into the peritoneum or biliary tract, infection of the cyst and mechanical local complications, such as mass effect on adjacent structures[4]

Owing to the lack of symptoms in the early stages, the actual accurate assessment of the growth rate of these cysts is difficult.

There is no clear consensus on the most ideal form of treatment of the hydatid

*Assistant professor in general surgery, school of Medicine, Faculty of Medical Science, University of Duhok, Kurdistan Region, Iraq. E-mail: hayder1950@yahoo.cm

disease. In 1986, a multi-centre study conducted by the World Health Organization concluded that surgery should be the mainstay of treatment for hydatid disease[5].

Surgery for hepatic hydatid cyst (open or laparoscopic) consist of either radical or conservative types. The radical method involves total excision of the cyst by pericystectomy or hepatectomy, with its attendant increase in operative risk for a benign disease. The conservative method includes removal of cyst contents, inactivation of scolices, and management of the residual cavity. Although the radical method has a lower recurrence risk, the conservative method is safer and easier.

The use of scolicidal agents for injection into the cyst and for use in the surrounding peritoneum, such as hypertonic saline, cetrimide, hydrogen peroxide, polyvinyl povidone iodine, silver nitrate and ethyl alcohol are among some of the many agents that have been used. complete aspiration of all cyst content especially multivesicular disease is difficult and complete sterilization with scolicidal agent is uncertain beside that if scolicidal agent enters the biliary tree serious damage also can occur within the liver[6].

There is no ideal scolecidal agent that is both active and safe. The killing action of the scolecidal agents observed in vitro may be affected in vivo by the instability of the substance, an unpredictable dilution of the hydatid fluid and the difficulties in the penetration of the daughter cysts[7]. The safety requirements for the used scolicidal agents rose substantially after detecting in communicating cysts, several such agents caused complications such as sclerosing cholangitis and / or fatal toxicity[8-10].

In this study all patients were operated upon by laparotomy without using any solicidal agent intracavitary and to assess such procedure in terms of local complications and recurrence.

## PATIENTS AND METHODS

A case series study was conducted on one hundered and three patients with hepatic hydatid cyst by one consultant surgeon in Mosul and Duhok hospitals over a period of fifteen years ( Feb. 2000- March 2014) . All patients were subjected to history, physical examination, then complete blood count, liver and renal function tests. Ultrasonography was the main tool for diagnosis, some of patients with equivocal results submitted to Computerised tommography scan and patients with jaundice had magnetic resonance cholangiopancreatograpgy. Patient consent was obtained in all cases. The age, sex, cysts number and size were recorded. All patients had preoperative chest x-ray to exclude pulmonary hydatid cyst. Exclusion criteria was patients with reccurent liver hydatid cysts, pulmonary hydatid cysts and other abdominal organ involvement.

Patients presented with suggestions of recurrence during the first six months postoperatively were considered as cases of missed cysts and not as true recurrence .

The abdomen was opened through right paramedian or subcostal incision, after proper isolation of the cyst by pack from all aspects, the cyst punctured by wide bore needle and suction applied to the

syringe , then edges of the cyst grasped by atraumatic tissue forceps from two sides and an incision made in between with application of suction to evacuate the remianing amount of fluid or daughter cysts or pieces of membrane, followed by using sponge holding forceps or somtimes spoon to clean the remianing content of the cavity. Inspection carfully from inside for any communication or bile leak, then dealing with cavity according to the case (external drainage only, or deroofing and omentoplasty or pericystectomy). At the time of cyst puncture the anesthetist was informed to watch for any reaction such as skin rash, urticaria or change of blood pressure (hypotesion). This study was approved by local Ethical Committee.

## RESULTS

Regarding the age and sex at the time of presentation. The age was from 4- 70 years, mean age was 33.1, 73 patients between the age of 16–45 years (70.8%), Sex 35 males, 68 females. M/F 1/1.9. The size of the cyst was variable from 5 - 17cm in diameter. Location of the cyst was 81 in the right lobe and 12 patients in the left lobe R/L 6.7/1, both lobes were involved in 10 patients. Types of the cyst ; uncomplicated in 67 patients and complicated in 36 patients as in Table 1. Different clinical presentation was observed as in Table 2.

**Table1. Patients demography and distribution of the hydatid cyst in the liver lobes.**

| Age group ( years) | |
|---|---|
| 4 – 15 | 12 |
| 16 – 30 | 39 |
| 31 – 45 | 34 |
| 46 – 60 | 10 |
| ➢ 60 | 8 |
| **Gender** | |
| Male | 35 |
| Female | 68 |
| Right lobe | 81 |
| Left lobe | 12 |
| Both lobes | 10 |
| **Size of the cyst** | |
| 5 - 9 cm | 90 |
| > 9 - 17 cm | 13 |
| **No. of the cyst** | |
| Single | 82 |
| Multiple | 21 |
| Uncomplicated cyst | 67 |
| Complicated cyst | 36 |

**Table 2 Clinical presentation of patients with hepatic hydatid cysts**

| Clinical features | No. of patients | Percentage |
|---|---|---|
| Upper abdominal pain | 21 | 20.3 |
| Hypochondrial mass | 11 | 10.6 |
| Hepatomegaly | 13 | 12.6 |
| Tenderness in the upper abdomen | 10 | 9.7 |
| Jaundice with fever | 5 | 4.8 |
| Shock | 1 | 0.9 |
| Asymptomatic | 42 | 40.7 |

Frank rupture into biliary system presented as cholangitis with jaundice was detected in 3 patients and intraperitoneal rupture was seen in one patient presented as acute abdomen with urticaria following blunt trauma . Bile stained cyst was detected in 21 patients and infected cyst in 8 patients as shown in Table 3.

**Table 3 Uncomplicated and complicated hepatic hydatid cyst**

| Type of the cyst | No. of patients | Percentage |
|---|---|---|
| Uncomplicated cyst | 67 | 65 |
| Complicated cyst | 36 | 34.9 |
| Calcified | 3 | 2.9 |
| Infected | 8 | 7.7 |
| Bile contained cyst | 21 | 20.3 |
| Frank rupture into major duct | 3 | 2.9 |
| Intraperitoneal rupture | 1 | 0.9 |

Type of surgical operation shown in Table 4, most common operation was drainage of the cyst 82 patients, deroofing and omentoplasty in 5 patients, excision of the whole cyst in 7 patients, additional operation as cholecystectomy in 6 patients, and choledochotomy and T-tube insertion in 3 patients.

**Table 4 . Type of operative procedure**

| Operative procedure | No. of patients | Percentage |
|---|---|---|
| External drainage of the cavity | 82 | 79.6 |
| Deroofing and omentoplasty | 5 | 4.8 |
| Total cyst excision | 7 | 6.7 |
| Cyst drainage and T-tube drainage of the common bile duct | 3 | 2.9 |
| Cyst drainage and Cholecystectomy | 6 | 5.8 |

Recurrence was observed in 10 patients (9.7%), 4 of them had complicated cyst , 4 with multiple cysts intially, and 2 patients with uncomplicated cyst .

No mortality was detected in all patients while morbidity rate was 56.3% as shown in Table 5.

**Table 5 . Type of complications**

| Type | No. of patients | Percentage |
|---|---|---|
| Chest infection | 10 | 9.7 |
| Wound infection | 10 | 9.7 |
| Bile discharge | 25 | 24.2 |
| Hepatic abscess | 3 | 2.9 |
| Recurrence of the cyst | 10 | 9.7 |
| Total | 58 | 56.3 |

## DISCUSSION

Although surgery is considered the treatment of choice for liver hydatid cyst, contrversies still exists regarding the preferred operative procedure, management of residual cavity and use of scolicidal agents.

It has been traditional to inject scolicidal agent into the unopened hydatid cyst during the operation because of risk of spillage into the peritoneal cavity leading to recurrent disease. Cyst fluid contains thousands of proctoscolices and each one has the potiential to grow into a new hydatid cyst.

Among the various scolicidal agent advocated in the past, formalin was the first, most frequently used , and effective, it is no longer used because of its associated toxicity[10]. Ethyl alcohol can cause caustic damage to lining epithelium in communicating hydatid cyst leading to sclerosing cholangitis[11].

Hydrogen peroxide is not commonly used because of low efficacy and complications, Hypertonic saline should not be used in hydatid cyst with biliary communication because of risk of caustic sclerosing cholangitis and hypernatremia[12]. Cetrimide can cause sclerosing peritonitis,

metabolic acidosis, and methemoglobinaemia[13]. Iodine preparation can cause sterile peritonitis, sclerosing serositis and renal shutdown[14].

Protection of the operation field by abdominal packs is mandatory before the planned operation on the cyst or before the cyst is emptied. For sterilization of the cyst, several parasiticidal substances have been used. From this point of view, no ideal solution and agents have been described yet because an ideal scolicidal agent is defined as being potent in low concentrations, acting in a short period time, being stable in cyst fluid, not affected by dilution with the cyst fluid, being able to kill the scolex in the cyst, being non-toxic, having low viscosity, and being readily avaliable and easily prepared, as well as being inexpensive[15,16].

The use of scolicidal agent in the complicated hydatid cyst is contraindicated because the possibility of cystobiliary communication. The problem in using the scolicidal agent in uncomplicated cysts or simple and univesicular cyst and even hydatid cyst with clear content can sometimes demonstrate cystobiliary communication after decompression[17].

Recurrence of the cyst was diagnosed in 10 patients (9.7%) .Timing of detecting recurrence in all patients was within first 18 months by using imaging technique ,ultrasounds in all patients and CT scan in 5 patients. In 4 patients the site of recurrence was the same site of first operation while in 6 patients the recurrent cyst was detected also in the liver but not at the same site of first operation .

There is no consensus on the type of follow-up needed after primary interventions or on the management of diagnosed recurrences. Many factors have been suggested to lead to recurrence. Recurrence is defined as the appearance of new active cysts after therapy, including reappearance with continuous growth of live cysts at the site of a previously treated cyst or the appearance of new distant disease resulting from spillage[18,19].

The follow up period was 3-5 years. Postoperative recurrence was diagnosed in patients who presented with suggestive symptoms or signs with an ultrasonographic evidence showing some growth of a cyst at repeat imaging which might be observed first at 3 months, then every 6 months for 3 years. It is suggested that 6-monthly follow-up of operated patients with annual ultrasonography for at least 3 years is essential, as most recurrences are observed in this time period[20].

In current study the incidence of recurrence without scolicidal agents have been similar to other studies with injection of scolicidal agent[21-25].

All the patients in this series received posoperative albendazole 10-15mg/kg body weight for 3 months .

In conclusion, the poor effect of scolicidal agent in preventing recurrence which outweigh their advantages in addition to their local and systemic complications when injected into the cyst cavity during the operation so it is safer to deal with such pathology without injection of currently used scolicidal agents till competent and safer drug will be

discovered providing that the operative field is well protected to avoid contamination . Therefore, we need more effective scolicidal agent and free from side effects in hepatic hydatid disease treatment in future.

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## پوختە

ئەرێ یاپێتڤی یە بکائینانا دەرمانێن نەهێلا سەرێ مشەخۆرێن جوڕکێن ئاڤێ لـ دەمێ کریارا نەشتەگەریێ بۆ جوڕکێن ئاڤێ یێن جەرگی.

**پێشەکی و ئارمانج:** جۆڕکێن ئاڤێ یێن جەرگی ل نەخۆشیێن بەلاڤن ل ئیراقێ و گەلەك رێ یێن هەین بۆ چارەسەریێن نەشتگەری. ئەڤێ ڤەکولینێ بۆ هەلسانگە ندنێ یە کانێ یا پێتڤی یە بـ کارئینانـا دەرمـانێن دژی مـشەخۆرا (طفیلیـات) ل دەمـێ کریـارا نەشـتەگەریێ بـۆ جوڕکێن ئاڤێ لـ جەرگی ژبەر دویر خستنێ لـ وان دەرمانان ئەگەر بینە ئەگەرێ ئالوزبوونێ.

**رێکێن ڤەکولینێ:** نەخۆشێن تووشی جوڕکێن ئاڤێ یێن جەرگی بووین ژماراوان سەد و سێ نەخۆش بوون لـ نەخۆشخانا میسل و دهوك لـ دەمێ پازدە سالآن لـ شبات 2000– هەتا ئادار 2014 ژلایێ ئێك پاۆێزکاری و بێی بکارئینانا دەرمانێت کوشتار بـۆ سـەرێ مـشتەخۆرا بۆ 35 لـ ڕەگەزێ نێر و 68 بۆ ڕەگەزێ مێ .تەمەن لـ هەردو ڕەگەزا لـ 4 – 70 سالێ ( کو 33.1 سال ) ژمـارا جـوڕکێن ئـاڤێ بـۆ ئێـك نەخۆش 1 – 12 جۆڕك بوون . قەبارا جۆرکی 5 – 17 سم بکارئینانا ئامیری شەپۆ لا دەنکی, 81 نەخۆش جوڕکێن ئاڤێ ژلایێ ڕاستا جەرگی بوون و 12 نەخۆش ژلایێ چەپێ بوون و 10 نەخۆش هەر دوو لایێن جەرگی . جۆڕکێن بێ ئاریشە 73 و جـوڕکێن بـ ئاریـشە 30 نەخۆش ژوان ئەوێن جوڕکێن ناڤخو بێن وان پەقین و پەمینا جوڕکێن ناڤـ زەردافـێ و پـەمینا جـوڕکێن ناڤـ بریتـونی و هـەوك بوونـا جوڕکێن بـ کێم . ئالوزیێن پەیدابووین پشتی نەشتەگەریێ بـ ڕێزا 56.3 ٪ ( 58 نەخۆش ) ئەوێن کو برینا وان تووش هەوەکێ بـووین و هەوەکا سی یا و دەرکەفتنا ناسورا زەر و ڤەگەریانا جوڕکێن ئاڤێ لـ هندەکا کو دیتە 10 نەخۆش (9.7 ٪).

**ئەنجام:** پشکا پترێ لـ دەرمانێن دهێنە بکارئینان بۆ کوشتنا مشتەخۆرا لـ دەمـی کریـارا نەشـتەگەریێ یـا بێـی ئـالوزی نینـە ( جهـی و گشتی ) ژبەر هندێ یاباشە خۆ دویر بێخن لـ ڤان جۆرە دەرمانا و بێی زێدەبوونا ڕێژا زفراندنا جوڕکێن ئاڤێ.

**دەرئەنجام:** جوڕکێن ئاڤێ یێن جەرگی، دەرمانێن کوشتیا بۆ سەرێ مشتەخۆرا ,ئالوزی , ڕێزا زفرینا جۆڕکا.

## الخلاصة

### هل من الضروري استخدام المبيدات لرؤوس طفيلي الأكياس المائية أثناء إجراء العملية الجراحية للاكياس المائية في الكبد

**الخلفية والاهداف:** الاكياس المائية في الكبد من الامراض الشائعة في العراق وهناك عدة طرق للعلاج الجراحي هدف هذه الدراسة لتقييم فيما اذا كان من الضروري استخدام المضادات للطفيلي اثناء العملية الجراحية للاكياس المائية في الكبد لتجنب مضاعفات تلك المواد.

**طرائق البحث:** المرضى المصابون باكياس الكبد المائية وعددهم مائة وثلاثة مرضى في مستشفيات الموصل ودهوك خلال خمسة عشر سنة للفترة من شباط 2000–اذار 2014 من قبل استشاري واحد وبدون استخدام المواد القاتلة لرؤوس الطفيلي والتي شملت 35 من الذكور و68 من النساء.

**النتائج:** أظهرت الدراسة ان العمر في كلا الجنسين يتراوح بين 4–70 سنة (المعدل 33.1 سنة). عدد الاكياس المائية للمريض الواحد يتراوح مابين1–12 كيس. حجم الكيس يتراوح بين 5–17سم باستخدام الامواج الصوتية. 81 مريض لديهم اكياس في الفص الايمن للكبد و12 مريض في الفص الايسر و10 مرضى لديهم اكياس في الفصين.

الاكياس الغير معقدة 73 والاكياس المعقدة 30 والتي تشمل انفجار الكيس الداخلي وانفجار الكيس داخل قناة الصفراء وانفجار الكيس داخل البريتون والتهاب الكيس التقيحي.

المضاعفات التي حدثت بعد العملية كانت بنسبة 56.3% (58 مريض) والتي تشمل حالات التهاب الجرح، التهاب الرئتين وظهور ناسور الصفراء وحالات رجوع الاكياس المائية ظهرت في 10 مرضى (9.7%).

**الاستنتاج:** بما ان معظم المواد المستخدمة لقتل الطفيلي اثناء العملية الجراحية لا تخلو من مضاعفات (الموضعية والعامة) فعليه من المستحسن تجنب هكذا مواد وفي نفس الوقت بدون زيادة في نسبة رجوع الاكياس المائية.

# ASSOCIATION OF ABO BLOOD GROUPS AND RH FACTOR WITH PERIODONTAL DISEASE IN DUHOK: ACROSS-SECTIONAL STUDY

**SUZAN M.SALIH, B.D.S, M.Sc***

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## ABSTRACT

**Background:** A link between ABO blood group, Rh factor and periodontal disease has been suggested.

**Aim:** To determine whether there was an association between periodontal diseases and ABO blood groups

Material and Methods: The study was carried on 303 patients, age ≥ 20 who were randomly selected from patients attending Dental Health Polyclinic for treatment of periodontal disease or for other reasons. The patients were divided into three groups: healthy, gingivitis and periodontitis. Blood samples were collected to determine ABO blood groups and Rh factor by simple slide method.

**Results:** A blood group for all patients was correlated with different periodontal groups. There was no significant difference in distribution of ABO blood group, Rh factor with presence of periodontal diseases

**Conclusion:** The results showed that both ABO blood group type and Rh factor were not associated with periodontal diseases.

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**Keywords:** Periodontitis, Gingivitis, Dental Health, ABO blood group, Rhesus factor

Periodontal disease defined as pathologic destruction of the periodontium which comprises a heterogenous group of infections .Periodontal disease can vary with respect to host response, bacterial etiology, and progression of disease. In spite of differences present among the different kinds of periodontal disease, but all kinds participate the general characteristic of complex host–bacterial interactions, disease onset and progression reflect the periodontal tissue[1]. ABO blood group is the most important blood-typing system which is discovered by Landsteiner[2]. agglutination of red blood cell in the serum and recognition of blood groups subject the scientific basis for safe practice for transfusion of blood which has been reported by Yamamoto et al.[3] Rhesus systems ABO have major clinical significance which determined by the nature of various proteins found on red blood cells surfaces. Cancer ,digestive disorders, also infection, show preferences among the ABO blood types[4,5]. These preferences are not usually understood by physicians and the general population. Little efforts have been made to investigate the association between periodontal disease and ABO blood group. A lot of the researchers[6] have proposed that different ABO blood groups constitute an increased chance for occurrence of oral and periodontal diseases; while only one research[7] unable to find such relationship.

* *Assist Lecturer, Department of Clinical biochemistry, Faculty of Medical Science, University of Duhok. E-mail: suzan_bio@yahoo.com*

The aim of this study to determine the association, if present between blood group, Rh factor and periodontal disease in Duhok.

## MATERIALS AND METHODS

Study population: A total of 303 patients (both genders) age ≥ 20 attending Dental Health Polyclinic for dental treatment were chosen on a random basis. The exclusion criteria included systemic disease, e.g. diabetes, hypertension, smoking and antibiotic treatment for dental or medical reasons for at least 3 months before the study. About the nature of the study, patients interviewed and informed and verbal consent was obtained from each subject. The protocol of the study was approved by the Ethical Committee of the General Directorate of Health in Duhok.

Clinical examination: Oral examination was done by calibrated periodontal probe (Williams probe) for both chronic periodontitis and gingivitis. For chronic periodontitis 4 sites were examined for each tooth: distobuccal, mesiobuccal, midlingual and midbuccal (Loe and Brown)[8]. This included clinical attachment loss (CAL) and probing pocket depth (PPD). Measuring the distance from cement-enamel junction (CEJ) to base of the probing pocket depth in millimeters to assessed CAL.

American Academy of Periodontology (1999), classify severity of disease, termed Clinical Attachment Loss is:

Mild: 1-2mm of attachment loss

Moderate: 3-4 mm of attachment loss

Sever :≥ 5 mm of attachment loss

The PPD was assessed from gingival margin to base of the pocket which introduced by Loe and Brown[8]. The gingival index introduced by Loe and Silness was used for gingivitis to assess the gingival heath through inspection by naked eyes and by gentle probing using periodontal probe on a selected teeth for four surfaces: buccal, lingual, mesial and distal (Loe and Silness)[9].

The Gingival Index System:

0= Normal

1= Slight change in color and mild edema

2= Redness,hypertrophy, bleeding on probing, moderate

3= Marked redness, hypertrophy, spontaneous bleeding

Patients were divided into three groups: group I composed from 47 patients with healthy gingival (23 males, 24 females), group II composed from 171 patients with gingivitis (82 males, 89 females) and group III composed from 85 patients with periodontitis (40 males, 45 females).

Data collection: To obtain information, a pre-tested questionnaire was done on age, gender, medical and dental history. Collected of Venous blood samples were done to classify the patients based on their Rh factor and ABO blood groups. Taken of blood samples by a sterile finger prick with a disposable needle. The examination of blood grouping and Rh factor was done by slide method[10]

Statistical analysis: Data were collected and analyzed using SPSS system (SPSS, Chicago; Illinois, USA). Qualitative data were analyzed by chi-square test and quantitative by one way analysis of variance. P–value of 0.05 or less was considered signification for all statistical tests conducted

## RESULTS:

Characteristics of the patients (base line) have been described in Table 1. A total of 303 patients were examined: 47 were healthy, 171 were gingivitis and 85 were periodontitis patients. Of all the normal patients, 7.9% were female and 7.6% were males. The total mean of age was 38.38±9.028 years and it was statistically different among the groups.

**Table 1. Characteristics of the study subjects**

| Variable | Oral Heath State | | | P-value |
|---|---|---|---|---|
| | Normal No.(%) | Gingivitis No.(%) | Periodontitis No.(%) | |
| Male | 23 (7.6) | 82 (27.1) | 40 (13.2) | 0.9* |
| Female | 24 (7.9) | 89 (29.4) | 45 (14.9) | 0.9* |
| Age (years) Mean ±SD | 27.62 ± 5.781 | 40.19 ± 8.049 | 40.67±8.174 | <0.001** |

*Chi-square test .
**One-way analysis of variance

The frequencies of blood groups A, B, AB and O included in the study were 35.6%, 18.8%, 8.6% and 37.0% respectively. The percentage of patients with blood group AB who have periodontitis was 2.6% while percentage of patients with blood group A and O who have periodontitis was 10.6%. Chi-square test showed no significant association between ABO blood groups and study group p >0.05 as in table 2.

The distribution of Rh factor among the study groups is shown in table 3, there is no significant association between Rh factor and study groups (healthy, periodontitis and gingivitis), p =0.7

**Table 2. Percentage distribution of ABO blood groups in study by oral health status**

| Blood group | Oral Health State | | | Total No. (%) |
|---|---|---|---|---|
| | Normal No.(%) | Gingivitis No. (%) | Periodontitis No. (%) | |
| A | 19(6.3) | 57(18.8) | 32 (10.6) | 108 (35.6) |
| B | 7(2.3) | 37(12.2) | 13(4.3) | 57(18.8) |
| AB | 3(1) | 15 (5) | 8 (2.6) | 26 (8.6) |
| O | 18(5.9) | 62 (20.5) | 32 (10.6) | 112 (37) |

P (Chi-square test) >0.05

**Table 3. Percentage distribution of Rhesus factor in the study by oral health status**

| Oral Health State | Rh factor | | Total No.(%) |
|---|---|---|---|
| | Rh (–ve) No. (%) | Rh (+ve) No. (%) | |
| Normal | 3 (1) | 44 (14.5) | 47 (15.5) |
| Gingivitis | 17 (5.6) | 154 (50.8) | 171(56.4) |
| Periodontitis | 8 (2.6) | 77 (25.4) | 85 (28.1) |

P(Chi-square test) = 0.7

## DISCUSSION:

This is the first study conducted in Duhok- Governorate regarding the effect of non-modifiable risk factors, i,e, blood group phenotype and Rh factor, on periodontal tissues.

Periodontal diseases are serious infections that if left untreated, can lead to tooth loss[11,12-18]. The main cause of these diseases is Dental plaque, other factors, age, gender, smoking, oral habits, socio-economic status and education, have been considered as risk factors for periodontal diseases[11,12-22]. Rh system and ABO blood group distribution show highly differences around the world even in the same country those differences happened in different areas[23]. Many workers in India and Western countries have tried to find out the association between different systemic diseases and ABO blood group, and the results showed that some diseases like dental caries has significant association[24]. Low percentage of blood group A and a high percentage of blood group O were noted in caries immune group[25,26]

In the present study, there was no significant difference in the distribution of periodontal diseases between both genders, however, those with normal oral health status were more among younger compared to gingivitis and periodontitis groups which occurred in older age groups, (P-value <0.001). This may be due to systemic and local factors which are more prevalent in older age group, e .g, lack of oral hygiene, smoking, diabetes mellitus, inadequate plaque biofilm control and gingival recession.

In this study, the non-significant difference in the distribution of periodontal disease among ABO blood group which agreed with a study done by Frias and Lopez, who showed that there is no relation between juvenile periodontitis and secretor status of ABO blood group[7].

On the other hand, Pai et al., concluded that there is association between ABO blood group phenotypes and periodontal diseases[27]. Other studies showed that there is association between ABO blood group and periodontal disease[28,29], but this difference may be due to the small size of these studies.

Among comparison of Rh factor distribution status in this study, no significant difference was found regarding distribution of Rh factor between three groups, p-value > 0.05, this agreed with study done by Demir et al[11] and Pai et al.[27]

In conclusion, No significant relationship was found among ABO blood group , Rh factor and periodontal diseases in Duhok population ,longitudinal – epidemiological studies with larger sample size are needed to reach aim of study.

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# پوخته


## پەیوەندی دناڤبەرا گروپبێن خوینێ و فاکتەرێ ریس دگەل ئێشێت پدیی دهوکی دا

**پیشەکی و ئارمانج:** پە یوە ندی دناڤ بە را گروپبێن خوبنێ و فاکتە رێ ریس دگە ل ئێشێت پدیێ هاتە گە نگە شە کر ندا دیار بیت کا پە یوە ندی هە یە یان نە

**رێکێن ڤەکولینێ:** ڤە کولین ل سە ر ۳۰۳ نە خوشا ئە ڤێن زیێ وان دناڤ بە را ۲۰ سالیێ و پتر و هاتنە هە لبزارتن بشێوەکی راندە م ز کومە لگە ها نوزداریا ددانا ئە وێن نە خوشیێن پدیێ و نە خوشیێن دی هە ین ز نە خوش هاتنە دابە ش کر ن بو سێ گروپا گروپێ ئێکی کونترول و گروپێ دوویێ ئە وێن ئێشێن پدیێ هە ین و گروپێ سیێ ئە وێن ئێشێن پدیێ و دورماندورێت ددانی هە ین و خوین ز وان هە می نە خوشا هاتە وە رگرتن دا جوری خوینی دیار بیت ز

**ئەنجام:** گروپێن خوینی بێت هە می نە خوشا هاتنە گرێدان د گە ل گروپێن ئێشێن پدیێ جورا و جور , چ جباوازیێن دیار دناڤ بە را گروپێن خوینێ و فاکتە رێ ریس دگە ل ئێشێت پدیێ نە بو .

**دەرئەنجام:** ئە نجامێت ڤە کولینێ دیار کر کو چ جیاوازی دناڤ بە را گروپێن خوینێ و فاکتە رێ ریس دگە ل ئێشێت پدیێ نینە.

## الخلاصة

### علاقة مجموعة فصائل الدم وعامل RH مع امراض ماحول اللثة في دهوك

**خلفية وأهداف البحث:** العلاقة مابين مجاميع فصائل الدم وعامل RH مع امراض ماحول اللثة تم طرحها لتحديد فيما لو كان هناك علاقة بينهما.

**طرق البحث:** تمت الدراسة على ٣٠٣ من المرضى اعمارهم ٢٠ سنة واكثر وتم اختيارهم بصورة عشوائية من مرضى المجمع التخصصي لطب الاسنان حيث يعالجون من امراض ماحول اللثة او امراض اخرى.وتم تقسيم المرضى الى ثلاثة مجاميع: المجموعة الاولى الاصحاء والمجموعة الثانية عندهم التهاب اللثة والمجموعة الثالثة عندهم التهاب اللثة والانسجة الداعمة للسن وتم سحب عينات الدم لتحديد فصيلة الدم وعامل RH بواسطة طريقة السلايد المبسطة.

**النتائج:** مجاميع الدم لكل المرضى تم ربطها مع مجاميع اللثة المختلفة, لا يوجد اختلاف معنوي لانتشار مجاميع فصائل الدم وعامل RH مع امراض ماحول اللثة.

**الاستنتاجات:** نتائج الدراسة تبين لنا ان لا توجد علاقة نوع فصيلة الدم وعامل RH مع وجود امراض ماحول اللثة.

# POLLUTED NOISE IN ALSALAM TEACHING HOSPITAL IN MOSUL CITY

DR. SAAD SALIH ABBAS ALJARJAREE, MBChB*
DR. HUMAM GHANEM AL-ZUBEER, MBChB MSC, PHD**

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## ABSTRACT

**Background and objective:** Hospitals, medical suites and aged care facilities are all subject to noise pollution. High levels of noise in hospitals may interfere with patient care services, the doctor-patient relationship and medical education activities. The objective was to measure the noise pollution in Alsalam Teaching Hospital in Mosul City and determine the time difference of noise during day and night, furthermore, workdays and weekend days.

**Material and methods:** the noise level is measured in patients' bedroom of medical ward Alsalam Teaching Hospital, by using digital sound level meter (DSLM). The times of measurements of the noise level were at 9:00 AM, 11:00 AM, 2:00 PM, 5:00 PM and 7:00 PM. A total number of 97 readings have been taken in patients' bedroom of medical ward. The parameters that selected in decibel (dB) were the equivalent sound level (Leq), the maximum sound level (Lmax) and the minimum sound level (Lmin). In addition, there is a comparison of noise levels between workdays (Sunday to Thursday) and weekend days (Friday and Saturday). There is a trial for identifying the possible source of (toxic or harmful) noise in Alsalam Teaching Hospital.

**Results:** the mean Leq sound levels in Alsalam Teaching Hospital was 69.2 dB, while the Lmax sound level was 76.7 dB and the Lmin sound level was 56.4 dB. There is a higher reading in Leq sound level during daytime than nighttime, however it is not significant. A comparison between workdays and weekend days by the Leq sound level reveals 69.6 dB and 67.3 dB, by Lmax sound level reveal 77.2 dB and 74.6 dB, all these readings shows that there were no significant differences ($P \geq 0.5$). While by Lmin sound levels, they were 56.7 dB and 54.7 dB ($P = 0.039$). The visitors contribute the major source of noise (68.04%) followed by teaching process (21.6%) then conversation (7.21%).

**Conclusion:** It was concluded that in the Alsalam Teaching Hospital, by all types of noise level measures exceed the WHO and EPA acceptable limits on hospital buildings.

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**Keywords:** noise pollution, teaching hospitals.

Noise is an unwanted or undesirable sound that lacks agreeable musical quality; it is noticeably unpleasant, interferes with one's hearing of something. Noise pollution is annoying or harmful noise in an environment. Noise exceeding a quite level of 40-50 decibel (dB) is known to cause emotional reaction (annoyance), disturb sleep, delirium, elevation in blood pressure, tachycardia and possibly IHD. A noise level of 55-60 dB is typical environmental stressors triggering acute and chronic increase in catecholamine levels (fight-and-flight reaction) and cortisol level (defeat reaction)[1, 2]

High levels of noise in hospitals may interfere with patient care services, the

* *General Practitioner/ Nineveh Directorate of Health*
** *Assistance Professor/ Department of Family and Community Medicine/ College of Medicine/ University of Mosul*
*Corresponding: Dr. Humam Ghanem Al-Zubeer E-mail:* humamalzubeer@yahoo.com

doctor-patient relationship and medical education activities[3]. "The noise in the operating room in hospitals frequently exceeds that of a freeway, and more frequently approximates that of a kitchen with a food-blender in operation, a train, or a truck. Indeed, the noises of the operating room approximate the 90 decibels (A scale) maximum permissible noise exposure (for eight hours) of the United States Federal Occupational Safety and Health Act."[4] The World Health Organization (WHO) has drawn up guidelines to promote a community noise management plan and to reduce the effects of noise exposure on health. According to these guidelines, the recommended noise levels in hospital areas should be 35-40 dB in the daytime and 30-40 dB in the evening and the acceptable noise levels in indoor spaces (dwellings) are set to 35 dB, whereas limits are set to 30 dB for bedrooms to avoid sleep disturbances. The Environmental Protection Agency (EPA) recommends that noise levels in the hospital setting do not exceed 45 dB during the day and 35 dB at night[5].

As a reference, there are lists of common sources of noise taken from an article published in the American Family Physician in 2001[6]. Approximate sound levels for various sources can be described, for example, quiet residence (40 dB), private office (50 dB), conversational speech (60 dB), vacuum cleaner (70 dB), heavy traffic (80 dB), pneumatic hammer (100 dB), and jet aircraft (120 dB)[7,8]. However, perception of sound is complex and these approximations are given only for reference.

The source of noise could be divided into two types, firstly the external source like nearby highways and roadways, emergency generator, and construction equipment used for hospital addition or adjacent buildings. Secondly the Internal source like worker and patient-occupied spaces which could be small, ventilator noise and heart monitor alarms, nebulizers, pulse oximeter tones and alarms. None sounds absorbing with highly reflective surfaces and high levels of 24 hours all days of the week activity[9]. Ulrich and Zimring[10] indicate that many studies have reported high noise levels in most hospitals in USA. They reviewed these articles and summarized two general sources of noise in hospitals. The first sources are the noises from paging systems, alarms, bedrails, telephones, staff voices. The second sources include the surfaces of the floors, walls and ceilings hospitals.

Noise in a public hospital is unavoidable but at the same time, long-term noise exposure is regarded as a health hazard because it has deleterious physical and psychological effects[11] like sleep disturbance[12], cardiovascular manifestation[13,14], psychological and CNS manifestation[15], GIT manifestation[16] and noise induce hearing loss (NIHL)[17,18].

The aim of this study is to measure the noise pollution in Alsalam Teaching Hospital in Mosul City. In addition, identifying the possible source of noise.

## MATERIALS AND METHODS

Administrative agreement and design: Before starting data collection, administrative and ethical agreements were obtained from the College of Medicine/

University of Mosul and from Alsalam Teaching Hospital that involved in this study in addition to the agreement of Nineveh Directorate of Health.

Study settings: The medical ward (patients' bedrooms) in the fourth floor in Alsalam Teaching Hospital.

Method of data collection: The instrument used in the present study is Digital Sound Level Meter (DSLM) Model 2900 a product of QMEST Technology. A hand-held sound level meter can be used for assessing the noise levels within the hospital or medical center. It takes away the need to rely on one person's perception of the noise levels and can be useful when setting up noise warning signs. For the measurement, the sound level meter was placed at body level, at least 1.0 m from walls and about 1.5 m from the windows, and stay for about 5 minutes to take reading[5], associated with unawareness of the staff. The main outcome measure was noise level in decibel-A (dB) which is the average rate of reading obtained by taking measures in the same place, at the same time but in different days in order to calculate the mean sound level. The type of reading involved in this study was the equivalent sound level (Leq), the maximum sound level (Lmax) and the minimum sound level (Lmin).

To diagnose the time-pattern difference, a selection of 9:00 AM, 11:00 AM, 2:00 PM, 5:00 PM and 7:00 PM during workdays (Sunday-Thursday) and weekend days (Friday and Saturday). A total number of 97 readings were collected during study from Alsalam Teaching Hospital.

During data collection periods, there was a trial to diagnosing the possible source of noise in place of measurement.

Data Analysis and Statistical Tests: Data tabulation and coding have been performed by Excel version 2007. Descriptive and analytic statistics have been done by Minitab software statistical program version 16. Analytic statistics include independent T-test for differences between two means and one-way ANOVA test. p-value $\leq$ 0.05 was considered statistically significant throughout data analysis.

## RESULTS

Regarding the mean Leq sound level in patients' bedrooms of Alsalam Teaching Hospital, reveal higher reading during daytime than nighttime, however it was non-significant. While high Lmax sound level was recorded at 9:00 AM (77.9 ± 4.9 dB), and it decreases to 73.6 ± 4.9 dB and 73.7 ± 5.7 dB at both 5:00 PM and 7:00 PM respectively, (p = 0.147). Regarding Lmin sound level there was a slightly difference in level of noise all over the day as shown in Table 1.

Regarding the comparison between workdays and weekend days, one can notice that there was no significant difference in Leq and Lmax sound levels in the medical wards. Nevertheless, during measuring of the Lmin sound level a significant difference between workdays and weekend days was recorded (P = 0.039), (Table 2).

The data of Figure 1 revealed that, the visitors contribute the major source of noise (68.04%) followed by teaching process (21.6%) then conversation (7.21%).

**Table 1. The mean and standard deviation of sound levels in patients' bedrooms of Alsalam Teaching Hospital according to time pattern.**

| Time | No. of reading | Leq Mean ± S.D | Lmax Mean ± S.D | Lmin Mean ± S.D |
|---|---|---|---|---|
| **9:00 AM** | 27 | 69.6 ± 4.8 | 77.9 ± 4.9 | 55.9 ± 3.5 |
| **11:00AM** | 28 | 70.0 ± 5.4 | 77.4 ± 6.0 | 56.8 ± 5.9 |
| **2:00 PM** | 24 | 68.9 ± 5.0 | 76.4 ± 5.9 | 56.6 ± 6.6 |
| **5:00 PM** | 9 | 66.9 ± 4.1 | 73.6 ± 4.9 | 54.9 ± 3.9 |
| **7:00 PM** | 9 | 67.1 ± 4.1 | 73.7 ± 5.7 | 56.5 ± 3.7 |
| ***P-value* *** | --- | 0.363 | 0.147 | 0.889 |

* One-way ANOVA test was used.

**Table 2. Comparisons in sound levels between workdays and weekend days in Alsalam Teaching Hospital.**

| Type of reading | Workdays Mean ± S.D | Weekend days Mean ± S.D | *P-value** |
|---|---|---|---|
| **Leq** | 69.6 ± 4.8 | 67.3 ± 5.3 | 0.086 |
| **Lmax** | 77.2 ± 5.4 | 74.6 ± 6.3 | 0.095 |
| **Lmin** | 56.7 ± 5.5 | 54.7 ± 3.2 | **0.039** |

* Independent t-test for two means.

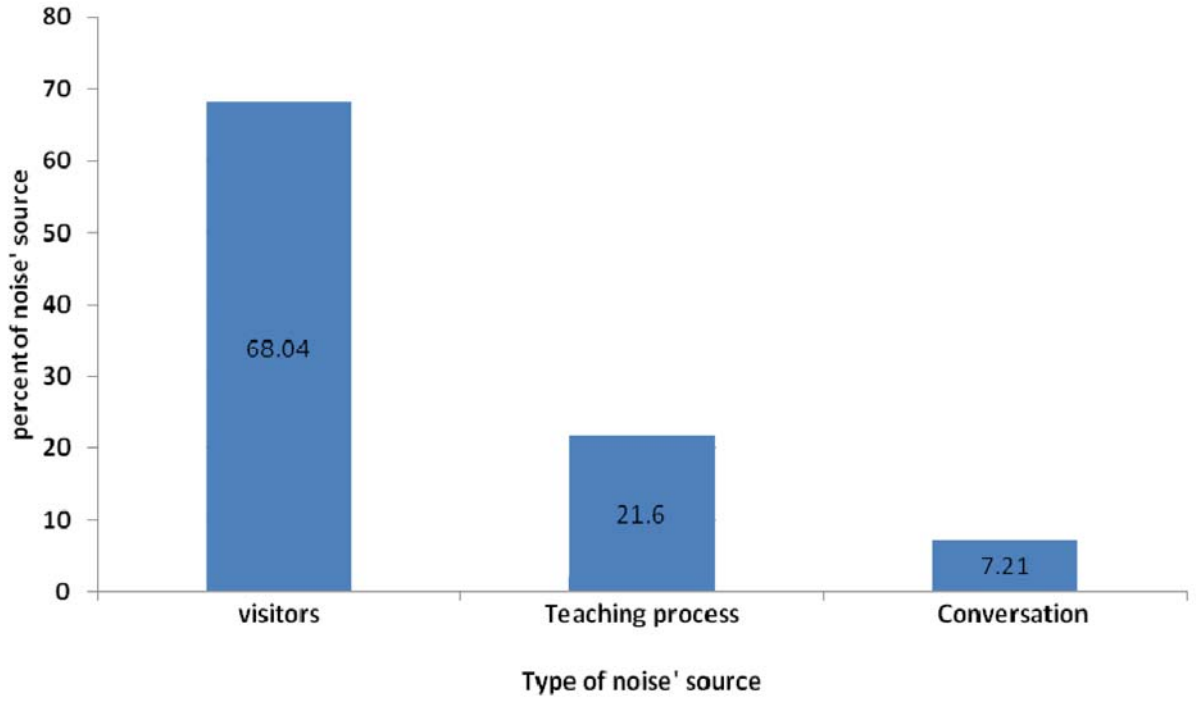


**Figure 1: The possible source of noise in patients' bedrooms of medical ward in Alsalam Teaching Hospital.**

## DISCUSSION

In the patients' bedrooms in medical ward of Alsalam Teaching Hospital, the Leq sound level is louder during the first shift (between 68 and 70 dB), but it decreases in a minor degree during the second shift (between 66 and 67 dB). This narrow range was developing due to the restriction of visitors and patients' relative by reception system at all times of day. At

2:00 PM. These readings are lower than those found by Al-Zubeer et al[19] during the study of noise pollution in Mosul Medical City Center Teaching Hospitals in 2013, where the Leq sound level in Iben-Sena Hospital floor was 85.65 dB. Lower readings were collected by Juang et al[20] during 2010, who investigated the levels of noise pollution in some hospitals in Taiwan at 8:30-9:30 and 11:30-12:30 and 16:00-17:00. In hospital (A) the Leq sound level was 57.3 dB, 57.6 dB and 56.9 dB respectively, but in hospital (B) was 46.0 dB, 53.6 dB and 52.3 dB respectively, while in hospital (C) was 45.1 dB, 53.8 dB and 52.1 dB respectively. In addition, a lower reading was found by Pai[21] during 2007 where the noise level in the wards was 50.3 dB. Bharathan et al[22] revealed that the time pattern of noise in nursing home was at early morning and evening hours (58.9 dB); it was louder than the middle of day (56.5 dB).

In the present study, regarding Lmax sound levels, it is clear that there was a stepladder decrease in noise level at 9:00 AM to 7:00 PM (from 77 to 73 dB respectively), reveals that during morning the doctors touring and staff working with the presence of visitors produced noise. Anna et al[3] describe slight elevation of noise level in medical wards during afternoon (64 dB) when compared with evening and morning time (63.14 and 61.86 dB) respectively. Park et al[23] study the noise level in the Internal Medicine Department at Dankook University Hospital in USA during 2014; they found that the median Lmax was also higher during day (86.1 dB) than during night (80.4 dB). The differences between noise levels during day and night were statistically significant. All the above readings are higher than the normal values recommended by WHO and EPA.

During monitoring of the Lmin sound level, one can recognize that there was a very narrow range between readings throughout daytime and nighttime (ranging around 55 dB). A higher Lmin levels was found by Al-Zubeer et al[19] where the noise levels in hospital floor of Aljamhory, Iben-Sena and Albatool maternity Teaching Hospitals records 72.8, 71.67 and 74.59 dB respectively.

In the present research, the Leq and Lmax sound level shows noise level slightly lower in weekend days than workdays, because of the reception system in each hospital and control of visitors was the same during the whole days of week, also there was no difference in staff activities, resulting in a non-significant difference ($P \geq 0.05$). This finding disagrees with the result of Bharathan et al[22] where the noise level was higher during weekdays (69.5 dB) than weekends (67.2 dB), ($P < 0.001$).

In Alsalam Teaching Hospital, the visitors were the main source of noise (68.04%), followed by teaching processes (21.6%) which occurs during morning readings then conversation (7.21%). From the overall results, the visitors were the major problem for elevation of noise level in hospital by their crowding and door banging and use of hospitals' furniture. Teaching processes was ranked the second possible source of noise. Allaouchiche et al[24] during 2002 found that the staff

conversation caused 56% of sounds greater than 65 dB and other noise sources (alarm, telephone, nursing care) each was less than 10 % of these sounds.

It was concluded that in Alsalam Teaching Hospitals, all types of noise measures exceed the WHO and EPA acceptable limits on hospital buildings. In addition, even during the weekend days when the crowding in hospital was less than the workdays, it was still high. Finally, it was observed that the visitors were the important contributor to baseline noise levels on medical ward.

The study recommended that, the control of visitors' number with activation of quite time protocol for each hospital play an important role. In addition, education of staff about noise effect and how to minimize it, with using of curtains between patients' beds when there was no ability to isolate them in a private room.

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## پوختە

# مشەدەنگییا پیس ل نەخۆشخانا سەلام یا فێرکرنێ ل باژێرێ مووسل

**پێشەکی:** نەخۆشخانەو لایێن نەخۆشان و بنگەهێن چاڤدێریا دەستپێکی هەمی ئامادەنە بۆ مشەدەنگیێ. بلندبوونا ئاستێن مشەدەنگیێ ل نەخۆشخانان دبیت کارتێکرنێ ل سەر خزمەتێن ساخلەمیێ بکەن ئەوێن خزمەتێن ساخلەمی بۆ نەخۆشان دهێنەپێشکێش کرن یان پەیوەندیا نوژداران دگەل نەخۆشان سەرباری کاراییا فێرکرنا نوژداری.

ئارمانجا ڤەکۆلینێ: پێڤەرێ پیسبوونا مشەدەنگیێ ل نەخۆشخانا سەلام ل باژێرێ مووسل و دەست نیشانکرنا ناکۆکیێ ل دووڤ دەمی و دەست نیشانکرنا شێوازێ مشەدەنگیێ ب رۆژ و شەڤ، زێدەباری رۆژێن کاری و رۆژێن بێهنڤەدانا دووماهیا هەفتیێ.

رێبازا ڤەکۆلینێ: پێڤەرێ ئاستێ مشەدەنگیێ ل ژۆرێن نەخۆشان ل قایشا هناڤان ل نەخۆشخانا سەلام ب رێکا پێڤەرێ ئاستێ دەنگی یێ نمرەیی (Digital Sound Level Meter) . دەمێن پێڤانا ئاستێ مشەدەنگیێ ژ ٩:٠٠ سپێدێ و ١١:٠٠ سپێدێ و ٢:٠٠ پشتی نیڤرۆ و ٥:٠٠ ئێڤاری و ٧:٠٠ ئێڤاری. و ٩٧ خواندن ل نەخۆشخانا فێرکرنێ ب یەکا پێڤانا دسی بل (dB) و خواندنا بکارهاتی د ڤێ ڤەکۆلینێ دا تێکرایێ دەنگێ تەمەت (Leq) و پێڤەرێ دەنگێ بلند (Lmax) و پێڤەرێ هنگێ نزم (Lmin) سەرباری کو هەڤبەرکرنا ئاستێن مشەدەنگیێ دناڤبەرا رۆژێن کاری (ئێکشەمب هەتا پێنجشەمب) و رۆژێن بێهنڤەدانا دووماهیا هەفتیێ (ئەیینی و شەمبی) هندەك بزاف هەبوون بۆ دەست نیشانکرنا ئەگەرێن مشەدەنگیا مگرتی ل نەخۆشخانا سەلام یا فێرکرنی.

ئەنجام: تێکرایێ دەنگێ وەکهەڤ (Leq) ل نەخۆشخانا سەلام ٦٩.٢ دسی بل بو، و پێڤەرێ دەنگێ بلند (Lmax) ٧٦.٧ دسی بل بو، و پێڤەرێ دەنگێ نزم (Lmin) ٥٦.٤ دسی بل بو، و سەرەرایی کو مشەدەنگی د دەمێ سپێدێ دا بلندتر بو ژ دەمێ ئێڤاری، لێ چ ناکۆکیەکا دناڤبەرا واندا گرنگ نەهاتەتێبینیکرن. پشتی هەڤبەرکرنا تێکرایێ دەنگێ وەکهەڤ دناڤبەرا رۆژێن کاری و بێهنڤەدانێن دووماهیا هەفتیێ دا مەل نەخۆشخانا سەلام ئاشکراکر ٦٩.٦ دسی بل و ٦٧.٣ دسی بل و ب هەڤبەرکرنا پێڤەرێ دەنگێ بلند دیاربوو ٧٧.٢ دسی بل و ٧٤.٦ دسی بل بو، دگەل تێبینی کرنا نەبوونا ناکۆکیەکا گرنگ د هەردوو خواندنان دا (p_0:05). لێ ب هەڤبەرکرنا پێڤەرێ دەنگێ نزم تێبینی دکەین کو ئاستێ مشەدەنگیێ د رۆژێن کاری دا ٥٦.٧ دسی بل و د رۆژێن بێهنڤەدانا دووماهیا هەفتیێ دا ٥٤.٧ دسی بل دگەل هەبوونا ناکۆکیەکا دیار (p=0.039) بو. ئەوێن سەرا نەخۆشخانێ ددەن ب رێژا (٦٨.٠٤%) ل نەخۆشخانان و ددوڤدا خواندن ب رێژا (٢١.٦%) و پاشان (٧.٢١%).

دەرئەنجام: ژ ڤێ ڤەکۆلینێ دیاردبیت کو ئاستێن مشەدەنگیێ ل نەخۆشخانا فێرکرنێ یا ژ سنوورێن وەرگرێن دەنگان ژلایێ رێکخراوا ساخلەمیا جیهانی و ئاژانسا پاراستنا ژینگەهێ یا ئەمریکی دەربازبوویی.

## الخلاصة

### الضوضاء الملوثة في مستشفى السلام التعليمي في مدينة الموصل

**مقدمة:** المستشفيات وأجنحة المرضى ومراكز الرعاية الأولية جميعها معرضة للضوضاء. ارتفاع مستويات الضوضاء في المستشفيات قد يؤدي إلى التأثير على الخدمات الصحية المقدمة للمرضى وعلى علاقة الأطباء مع المرضى بالإضافة إلى فاعلية التعليم الطبي.

**هدف الدراسة:** قياس التلوث الضوضائي في مستشفى السلام في مدينة الموصل و تحديد الاختلاف حسب الزمان و تعيين نمط الضوضاء أثناء النهار و الليل, علاوة على ذلك أيام العمل و أيام عطلة نهاية الأسبوع.

**طريقة الدراسة:** قياس مستوى الضوضاء في غرف المرضى في ردهة الباطنية في مستشفى السلام التعليمي بواسطة مقياس مستوى الصوت الرقمي (Digital Sound Level Meter). أوقات قياس مستوى الضوضاء كانت ٩:٠٠ صباحا و ١١:٠٠ صباحا و ٢:٠٠ بعد الظهر و ٥:٠٠ عصرا و ٧:٠٠ مساءا. تم أخذ ٩٧ قراءة في المستشفى التعليمية بوحدة قياس الدسي بل(dB) و القراءة المستخدمة في هذه الدراسة هي معدل الصوت المكافئ (Leq) و مقياس الصوت المرتفع (Lmax) و مقياس الصوت المنخفض (Lmin). بالإضافة, هنالك مقارنة مستويات الضوضاء بين أيام العمل (الأحد إلى الخميس) و أيام عطلة نهاية الأسبوع (الجمعة و السبت). توجد محاولة لتحديد سبب الضوضاء المحتمل في مستشفى السلام التعليمي.

**النتائج:** معدل الصوت المكافئ (Leq) في مستشفى السلام كان 69.2 دسي بل. بينما مقياس الصوت الأعلى (Lmax) كان ٧٦.٧ دسي بل و مقياس الصوت المنخفض (Lmin) ٥٦.٤ دسي بل.على الرغم من أن الضوضاء أعلى خلال الفترة الصباحية منها في الفترة المسائية و لكن لم يلاحظ وجود أي اختلاف هام بينهما. بعد مقارنة معدل الصوت المكافئ بين أيام العمل و أيام عطلة نهاية الأسبوع نكتشف في مستشفى السلام ٦٩.٦ دسي بل و ٦٧.٣ دسي بل وبمقارنة مقياس الصوت المرتفع يتبين ٧٧.٢ دسي بل و٧٤.٦ دسي بل, مع ملاحظة عدم وجود اختلاف هام في هاتين القراءات ( p 0.05). ولكن بمقارنة مقياس الصوت المنخفض نلاحظ أن مستوى الضوضاء في أيام العمل ٥٦.٧ دسي بل وفي أيام عطلة نهاية الأسبوع ٥٤.٧ دسي بل مع وجود اختلاف ملحوظ (P = 0.039). يساهم الزوار في مصدر الضوضاء الرئيسي (٦٨.٠٤ %) في المستشفيات يلي ذلك التدريس (٢١.٦ %) و من ثم المحادثة (٧.٢١ %).

**الاستنتاجات:** من هذه الدراسة يتبين أن مستويات الضوضاء في مستشفى السلام التعليمي قد تعدت الحدود المقبولة للصوت من قبل منظمة الصحة العالمية و وكالة حماية البيئة الأمريكية.

# ASSESSMENT OF INFLAMMATORY MARKERS AND MALONDIALDEHYDE IN PATIENTS WITH POLYCYSTIC OVARY SYNDROME

**SHIREEN A. IBRAHIM, MBChB, MSc, PhD***
**IHSAN H. M. ALI, BVM&S, M.Sc****
**HAZHMAT .A. ALI, BVM&S, MSc (UK)*****

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## ABSTRACT

**Background and objective:** Polycystic ovary syndrome (PCOS) is an endocrine disorder of unknown etiology characterized by anovulation and hyperandrogenemia associated with other symptoms mainly insulin resistance. The aim of the present study is to evaluate the role of inflammation and oxidative stress in the pathogenesis of PCOS.

**Methods:** Sixty clinically diagnosed PCOS women according to Rotterdam criteria and thirty apparently healthy individuals have been included in this case control study. History and clinical examination were done along with laboratory tests. Statistical analysis was done using SPSS version 18 (Chicago, USA).

**Results:** There were significant increases in inflammatory markers including high sensitivity CRP (P=0.001), total WBC count (P=0.03) and Erythrocyte sedimentation rate (P=0.001) in PCOS group compared to control subjects. Furthermore, mean serum malondialdehyde (MDA) level was significantly higher in PCOS patients (P=0.005) compared to controls.

**Conclusion:** There is existence of low grade inflammation as well as oxidative stress represented by malondialdehyde that may play a pivotal role in PCOS pathogenesis.

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**Keywords:** Polycystic ovary syndrome, Malondialdehyde, oxidative stress.

Polycystic ovary syndrome (PCOS) is an endocrine and metabolic disorder affecting around 8-10 % of women in their reproductive age characterized mainly by hyperandrogenism and chronic anovulation associated with other variable manifestations such as insulin resistance, dyslipidemia and hirsutism[1]. Even though the etiology of PCOS is not well understood, genetic analysis showed that polymorphisms in certain genes developing insulin resistance and hyperinsulinemia seems to have a notable influence on hypothalamo-pituitary-ovarian axis. Moreover, this results in excessive ovarian androgen synthesis and consequently altering luteinizing hormone/follicular stimulating hormone (LH/FSH) ratio and eventual outcome is anovulation[2,3]. Nowadays, the clinical diagnosis of PCOS is done based on Rotterdam criteria (PCOM; Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group, 2004)[4]. Accordingly, the accurate diagnosis may be achieved if at least two out of three of the following criteria are met; hyperandrogenism; oligomenorrhea or amenorrhea or anovulation and polycystic ovary represented by multiple immature

* *PhD, Lecturer, Dept. of Physiology, College of Medicine, University of Duhok.*
** *M.Sc, Assistant Lecturer, Dept. of Physiology, College of Medicine, University of Duhok.*
*** *M.Sc (UK), Assistant Lecturer, Dept. of Physiology, College of Medicine, University of Duhok.*
*Correspondent author: Hazhmat A. Ali, email: hazhmat.ali@uod.ac*

ovarian follicles at the day of ovulation[5].

Although the majority of previous studies focused on the clinical, biochemical, metabolic and cardiovascular aspects of PCOS as well as their risk factors[6], recent studies have been studying the contribution of inflammation and oxidative stress to the pathogenesis of PCOS and the mechanisms underlying their direct influence on anovulation[7]. Despite the role of oxidative stress is well documented in these studies, the exact evaluation of inflammatory mediators is still unknown[8]. Generally, studies have shown conflicting results, some of them emphasized the significant elevation in inflammatory markers whereas others did not represent clear conclusions[9,10]. In this study, we aim to evaluate the status of both inflammation and oxidative stress in the pathogenesis of PCOS with a particular focus on the possible mechanisms underlying their contribution to infertility.

## METHODS:

This case control study was conducted at Department of Physiology, College of Medicine, University of Duhok, Kurdistan Region of Iraq from January, 5th to May, 1st, 2014.

Two groups of subjects were included in this study, the first one composed of sixty (60) patients who had been clinically diagnosed as polycystic ovary syndrome (PCOS) according to Rotterdam criteria (oligo- and/or anovulation or clinical and/or biochemical hyperandrogenism or polycystic ovaries on ultrasound)[11]. After the approval of research ethical committee of Duhok Directorate of Health (DOH), appropriate form was given to all participants for obtaining their written consent. The second study group comprised of thirty (30) apparently healthy individuals as controls. To confirm the control subjects are free of obvious inflammatory conditions, necessary laboratory and clinical investigations were carried out. In addition, Measurement of arterial blood pressure, height, weight and body mass index (BMI) were calculated for each participants.

Five ml of blood was collected from each subject and divided into two parts; the first part collected in EDTA tube and used for hematological assessments whereas the rest of the sample placed into a plain tube and centrifuged. The serum samples were collected into epindorff tube followed by labeling and eventually frozen under – 28 Co to be used for biochemical measurements later. Serum levels of high sensitivity C-reactive protein were measured by ELISA (Monobind Inc., USA Kit), erythrocyte sedimentation rate (ESR) in the first hour by Westergreen method in addition to manual total WBC count were used as markers of inflammation. In contrast, Malondialdehyde (MDA, nmol/ml) which is the end product of lipid peroxidation was used for quantitative measurement of oxidative stress in serum samples using thiobarbituric acid method[12]. Hormonal assays including follicular stimulating hormone, luteinizing hormone and were performed using enzyme immunoassay technique (Biomerieux manufacturer, France).

Statistical analysis was done using SPSS version 18 (Chicago, USA). All

variables were expressed as mean ± standard deviation (SD) and the independent t-test used to determine the statistical significance of difference in mean between two groups. P values of 0.05 or less were considered statistically significant.

## RESULTS:

Based on body mass index (BMI), PCOS patients had a statistically significantly higher BMI (27.03 vs 23.9) compared to control subjects (P= 0.005). Among PCOS group, the percentage of patients who had positive hirsutism was %80 and was significantly higher compared to controls (P= 0.04) (Table 1). Regarding arterial blood pressure measurement, results showed a significant increase in systolic blood pressure (P= 0.03) in PCOS group compared to control whereas the diastolic blood pressure did not show a significant difference.

**Table 1. Demographic characteristics of PCOS patients and controls**

| Parameters | PCOS | Control | P Value |
|---|---|---|---|
| Body Mass Index (BMI) | 27.03 ± 3.24 | 23.9 ± 2.06 | 0.005 |
| Number and % of Positive hirsutism | (48) 80 ± 3.71 | (3.3) 12 ± 2.54 | 0.04 |
| Duration of infertility (years) | 3.34 ± 2.57 | NA | NA |
| Age (years) | 29.1 ± 4.71 | 29.7 ± 3.88 | 0.9 |
| Systolic Blood Pressure | 120 ± 9.09 | 100 ± 6.67 | 0.03 |
| Diastolic Blood Pressure | 80 ± 4.91 | 75 ± 5.67 | 0.82 |

Hormonal profile of PCOS subjects showed a statistically significant decrease in follicular stimulating hormone (FSH) levels compared to controls (P < 0.05) however, luteinizing hormone (LH) showed an obvious significant increase (P=0.01) in PCOS patients compared to controls (Table 2).

**Table 2. Hormonal profile among study groups**

| Parameters | PCOS patients | Control | P value |
|---|---|---|---|
| FSH | 5.43 ± 2.33 | 7.57 ± 1.53 | <0.05 |
| LH | 9.72 ± 2.18 | 4.52 ± 1.82 | 0.01 |

With respect to inflammation, all inflammatory markers including total WBC count, erythrocyte sedimentation rate (ESR) and high sensitivity C-reactive protein (hs-CRP) showed significant increases in PCOS patients compared to control group (P=0.01, P=0.03 and P=0.01) respectively. Interestingly, mean serum level of malondialdehyde (MDA) was statistically significantly higher in PCOS group (P= 0.005) compared to control subjects (Table 3).

**Table 3. Inflammatory markers and Malondialdehyde assay among study groups**

| Parameters | PCOS patients | Control | P value |
|---|---|---|---|
| Total WBC Count (Cells / $mm^3$) | 8800 ± 2.66 | 7389 ± 1.28 | 0.001 |
| ESR (mm/1st hour) | 15.6 ± 7.71 | 6.75 ± 4.31 | 0.03 |
| hs-CRP (mg / dL) | 4.05 ± 2.81 | 1.5 ± 4.59 | 0.001 |
| Malondialdehyde nmol / ml | 2.08 ± 7.23 | 0.76 ± 4.07 | 0.005 |

## DISCUSSION:

To display the association between BMI and hyperandrogenemia in this study, BMI (P=0.005) as well as the percentage of positive hirsute were significantly higher in PCOS group. This is indicated in previous literature showing a positive correlation between obesity and excess androgen levels and have been regarded as key players in orchestrating PCOS pathogenesis[13]. Although absence of androgen measurement could be one of the possible limitations of the present study, this is compensated by measuring the number and percentage of patients having positive hirsutism which is a consequence of hyperandrogenemia. In addition, current study have paid attention to the arterial blood pressure as one of the cardiovascular risk factors in PCOS which showed a significant increase in systolic blood pressure in PCOS patients and this is clearly stated in earlier studies[14]. To further confirm the hormonal profile of PCOS patients, present results showed a significant decrease in FSH in concordance with a significant elevation in LH in PCOS patients which indicates altered LH/FSH ratio. This is consistent with other studies concluding that altered LH/FSH ratio prevents follicular maturation during follicular phase[15].

Despite the involvement of oxidative stress in initiating and progressing PCOS pathogenesis is well documented, the association between inflammation and PCOS is still unclear. Surprisingly, results of the present study showed a significant increase in all inflammatory parameters including high sensitivity hs-CRP, total WBC count and erythrocyte sedimentation rate (ESR) among study group compared to healthy subjects regardless of their normal ranges. This indicates persistence of low grade chronic inflammation exerting a direct influence on anovulation. These results are consistent with previous literature concluding that low grade inflammation is demonstrated by moderately elevated levels of hs-CRP concentrations[16,17]. The possible mechanism underlying the relevancy of elevated CRP levels to PCOS pathogenesis may be due to its crucial role in endothelial dysfunction and complement activation in addition of releasing chemo-attractants such as intracellular adhesion molecules (ICAM) resulting in to recruitment of innate immune cells particularly macrophages[18, 19].

Other studies stated that obesity and insulin resistance seem to play a key role in initiation of the inflammatory immune response because they result in accumulation of free fatty acids (lipotoxicity) which leads to nuclear factor kB (NF kB) activation and subsequently release of inflammatory cytokines including IL-6 and TNFα[20]. Moreover, other studies emphasized our results regarding elevated total leukocyte count and concluded that WBC count is slightly elevated in PCOS patients who had insulin resistance although they were within the normal range[21].

Malodialdehyde which is the end product of lipid peroxidation also showed a significant elevation in PCOS patients compared with women with normal ovulation. This is consistent with previous

studies concluding that there is a remarkable elevation in various oxidative stress markers including lipid peroxidation (malondialdehyde) in PCOS patients who have insulin resistance and high androgen levels[22-24]. Studies concluded that reactive oxygen species are produced in response to hyperglycemia and hypertriglyceridemia[25,26]. The proposed impact of oxidative stress particularly reactive oxygen species (ROS) on ovarian functions may be due to its direct influence on ovulation through decreasing granulosa cells luteinization and oocyte maturation which eventually leads to anovulation[27].

In conclusion, we have demonstrated the impact of inflammatory mediators along with the oxidative stress on ovarian functions in women having PCOS. This indicates existence of low grade inflammation represented by mild elevation of inflammatory mediators particularly CRP accompanied with significantly elevated malondialdehyde that may play a critical role in ovarian dysfunction that eventually cause anovulation. For that reason, targeting inflammation and oxidative stress could improve ovarian functions and subsequently improving or restoring normal ovulation to a great extent.

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## پوختە

### رۆڵ کولبون و ئەکسەدێ و کاریگەریا وێ لسەر کارێ هێکلدانێ لجەم نەساخێن کیسبونا هێکلدانێ

**پێشەکی و ئارمانج:** کیسکبونا هێلکەدانێ ئێکە ژنەخوشیێن بەربەلاڤ لجەم ژنا و تا نوکە ئەگەرێن وێ ددیار نینن, ژنا نەساخ بقێ نەخوشیێ دەورا وێ یا هەیڤانە گیرو دبیت و هێك دروست نا چێبیت. ئارمانج ژڤێ ڤەکولینێ دیارکرنا رۆڵ ئینفلامەیشنێ و ئەکسەدێ و کاریگەریا وێ لسەر کارێ هیلکەدانێ.

**رێکێن ڤەکولینێ:** ئەڤ ڤەکولینە هاتە ئەنجامدان ل کولپژا پزیشکی بەشێ فسیولوجی و پشکدار هاتنە دابەش کرن لسەر دوو گروپا: گروپێ ئیکێ نەساخ و ژمارا وان 60 کەس بون و گروپێ دووێ ژنێن نورمال بون و ژمارا وان 30 کەس بون. تاقیکرنێن لابورێ یێن پێدڤی هاتنە ئەنجامدان و هەرهوسا پێزانینێن کلینیکی برێکا فورمەکا تایبەت هاتنە وەرگرتن.

**ئەنجام:** ئەنجامین ڤەکولینێ دیارکرن کو خوینا نەساخێ کیسکبونا هێلکەدانێ لیڤەلێن پتر ژ نورمال بێن مارکەرێ اینفلامەیشنێ هەنە و ئەڤ چەندە کاریگەریەکا نەرێنی لسەر کارێ هێکلدانێ دکەت.

**دەرئەنجام:** کولبون و ئەکسەدێ کاریگەریەکا خراب لسەر کارێ هێکلدانێ هەیە و دبیتە فاکتەرەکێ سەرەکی ژبو کارکرنا وێ بشێوەکێ نە نورمال.

## الخلاصة

### دور الالتهاب والاكسدة وعلاقتها بوظائف المبيض في المصابين بمتلازمة تكييس المبايض

**خلفية وأهداف البحث:** متلازمة تكييس المبايض هو خلل افرازي أيضي غير معروف السبب يتميز بعدم الاباضة و زيادة في مستوى الاندروجين في الدم واحيانا تترافق مع اعراض اخرى مثل خلل في افراز الانسولين. الهدف من هذه الدراسة هو تحديد دور الالتهاب والاكسدة وعلاقتهما بمتلازمة التكييس.

**طرق البحث:** تضمنت هذه الدراسة تسعون مشاركة وقد تم تقسيمهن الى مجموعتين، المجموعة الاولى تألفت من ستين مريضة مشخصة كلينيكياً بمتلازمة تكييس المبايض، أما المجموعة الثانية تضمنت ثلاثين حالة (أصحاء) كمجموعة ضابطة. تم اجراء جميع التحليلات المختبرية في مختبر الفسلجة بكلية الطب والحصول على المعلومات الاكلينيكية الاضافية حول حالات المرضى من خلال أستبيان. تم تحليل المعلومات واجراء الاحصاء الطبي باستعمال البرامج المختصة.

**النتائج:** أظهرت نتائج الدراسة وجود ازدياد ملحوظ في الماركرات الالتهابية في دم المرضى مقارنة بالمجموعة الضابطة اضافة الى وجود ازدياد ملحوظ في المادة الموكسدة (مالون دايألديهايد) في دم المرضى المصابين بمتلازمة تكييس المبايض.

**الاستنتاج:** تلخصت الدراسة بوجود حالة التهابية خفيفة وأكسدة في دم المرضى المصابين بمتلازمة تكييس المباييض والتي من المرجح ان يكون لها دوراً فعالاً وتأثيراً مباشرا على وظائف المبايض.

# PREVALENCE AND RISK FACTORS OF DENTAL CARIES AMONG SECONDARY SCHOOL STUDENTS IN ZAKHO, KURDISTAN REGION, IRAQ

**HUDA J. KASSIM, BDS., MSc***
**SAMIM A. AL-DABBAGH, MBChB, DTM&H, D.Phil, FFPH****
**NADIA A. AL- DERZI, MBChB, MSc*****

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## ABSTRACT

**Background and objective:** Dental caries is an important public health problem. It is widely distributed globally affecting two thirds of children and young adults. Several risk factors have been incriminated in the etiology.
The aim of this study was to estimate the prevalence and risk factors of dental caries among secondary school students.
**Methods:** A cross sectional study was conducted by selecting a random sample of 400 secondary school students from Zakho city, to estimate the risk factors and the prevalence by dental caries index (Decayed, Missed, Filled, Surfaces) DMFS.
**Results:** The study showed that the prevalence of dental caries was 92.5% with a mean caries index of 7.47 which was significantly higher in females (8.31) than males (6.65). Significant association was observed between sugar intake and high caries rates for both genders. No significant associations were detected with other suspected risk factors.
**Conclusion:** Secondary school students in Zakho city experienced a high prevalence of dental caries. The mean caries index was significantly higher in females in comparison to males; and significantly associated with sugar consumption.

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**Keywords:** Dental caries, risk factors, prevalence, students, Kurdistan region.

Dental Caries is an important public health problem. It is a widely spread progressive disease; with a high cost to treat and a negative impact on the quality of life.[1] It is a worldwide health distress affecting all ages in both developed and developing countries.[2] A decline in the level of dental caries has been observed over the past four decades in developed countries. This pattern has been the result of a number of public health measures, including effective use of fluorides.[3,4] In developing countries dental caries prevalence remains high and increasing, affecting different age groups.[5,6] Several epidemiological studies have been conducted in Iraq concerning dental caries in regard to different age groups and in different Iraqi cities.[7,8] All these indicated a high caries experience and considered it the primary oral health problems. Similarly a study was conducted in Kurdistan Region of Iraq in Duhok governorate among 12 years aged school students and showed a DMFS index of ( 3.77 ± 0.10 )[9] The disease is multi factorial in origin that

* *Specialist Dentist, Duhok Directorate general of health,Zakho*
** *Professor and chairman Family and Community medicine department, School of Medicine, Faculty of Medical Sciences, Duhok*
*** *Assistant Professor, Microbiology department, School of Medicine, Faculty of Medical Sciences, Duhok University*
*Correspondence author Samim A Al-Dabbagh, E-mail: samimaldabbagh@yahoo.com.*

starts with microbiological shifts within the complex biofilm (dental plaque)[10] Several risk factors have been incriminated in the etiology including: increase in age,[11] sugary foods,[12] low socioeconomic status,[13] bad oral hygiene,[14] overweight and obesity.[15] Tooth brushing is considered to be a very effective procedure for controlling plaque and gingivitis.[16] Tooth brushing, however, has been inconsistently linked to caries. Many studies have failed to found a significant association between brushing and caries;[17] others, found that tooth brushing is a very effective way in the preventing of dental caries.[18] On the other hand a consistent negative association was observed with water fluoridation as well as the wide use of fluoridated topical products as fluoridated tooth paste and mouth rinse.[19]
The aim of this study was to estimate the prevalence of dental caries among secondary school students in Zakho city together with possible risk factors

## PARTICIPANTS AND METHODS

A cross sectional study was carried out during the period from the beginning of October 2013 to the end of November 2013 in Zakho city. Zakho is the second largest city of Duhok governorate of Kurdistan Region, Iraq. Two secondary schools, one for boys and the other one for girls, were selected randomly out of a total of ten schools for boys, eight for girls. The boys school included 786 students and the girls school included 643 students. After that each school was visited several times and students who had no lectures at the time of visit were included until the proposed sample of (200) for each gender was achieved. All the names were checked to exclude any duplication in the sample. A total of 400 students (202 males and 198 females) were finally selected.

The clinical dental examination took place during school hours in the class room on a comfortable chair. Uniform artificial light used for all students. The examination was done by using disposable dental mirrors and probes. This oral examination was done to assess the main outcome measure which is dental caries index (DMFS). The Universal/National System for permanent (adult) dentition (1-32) adopted by the American Dental Association was used[20]. Examination was carried out in a systematic manner from one tooth or tooth space to the adjacent tooth or tooth space and ending with the lower second molar. A tooth was considered present in the mouth when any part of it is visible or can be touch with the tip of the explorer without excessively displacing soft tissue. A numerical coding system designed by WHO was used for recording the status of permanent teeth.[21]
A specially designed questionnaire was used to asses suspected risk factors. It contained questions about demographic characteristics which include the age, gender and socioeconomic status. Also it contained questions about dental health status which included the frequency and method of brushing, frequency and cause of visiting dentist per year. Other questions were involved including frequency of sugar intake.

The socioeconomic status (SES) was estimated using the following scores (Al- Dabbagh S, Duhok School of Medicine, 2014, personal communication):

| Parents | Employment | | | | |
|---|---|---|---|---|---|
| | Civil servant | Self employed (business) | Self employed (manual) | Retired | Non employed |
| Father | 10 | 8 | 4 | 2 | 0 |
| Mother | 10 | 8 | 4 | 2 | 0 |
| | Education level | | | | |
| | Postgraduate | Baccalaureates | Interm. / Secondary | Primary | Nil. |
| Father | 8 | 6 | 4 | 2 | 0 |
| Mother | 8 | 6 | 4 | 2 | 0 |

| House | Owned | Rented |
|---|---|---|
| | 10 | 0 |

| Car | ≥3 / family | 2 /family | 1 / family | Nil |
|---|---|---|---|---|
| | 6s | 4 | 2 | 0 |

The scores ranged between (0- 52) and accordingly SES was divided into three levels:

Low SES level ranged (0 -15).

Medium SES level ranged (16-30).

High SES level ranged (> 30).

The BMI was taken for every student. The weight was measured by using electrical balance, and the height was measured by using scaled measure. The measurement was done without shoes and with light clothes.

BMI= weight / height2 in meters.

The cut off points for overweight and obesity are body mass index of 25 kg/m2 and 30 kg/ m2, respectively.

Before the start of the study an inter examiner calibration was performed to assess the reliability of caries experience. It was carried out among 20 students, who were examined twice, once by the researcher and the second by a specialist in the preventive department. No significant differences were found between the first and the second observation (P= 0.7). Statistical analyses were done by using computer soft ware SPSS version 22.0 .The descriptive statistics included means, standard deviation, frequencies and percentages. The inferential statistics included t-test, one-way ANOVA and Fishers test for testing the differences among subgroups. The differences were considered significant at p -value ≤ 0.05.

## RESULTS

The study found that only 30 students (21male, 9 female) out of the total studied population were caries free. Table (1) illustrates caries experience by DMFS with mean total value (7.47 ± 4.52) with their components; mean Ds value (5.73 ± 3.65), mean Ms value (0.95 ± 1.79) and mean Fs value (0.80 ± 1.44). The mean DMFS for females was significantly higher than males. Also the mean values of Ds, Ms and Fs were significantly higher in females in comparison to males.

**Table 1. Study population by Gender and DMFS Components**

| Gender | No. | Ds m(SD) * | *p*-value | Ms m(SD) | P-value | Fs m(SD) | *p*-value | DMFS m(SD) | P- value |
|---|---|---|---|---|---|---|---|---|---|
| Male | 202 | 5.36 (3.86) | 0.041 | 0.76 (1.49) | 0.035 | 0.53 (1.13) | <0.001 | 6.65 (4.70) | <0.001 |
| Female | 198 | 6.11 (3.39) | | 1.14 (2.03) | | 1.07 (1.65) | | 8.31 (4.17) | |
| Total | 400 | 5.73 (3.65) | | 0.95 (1.79) | | 0.80 (1.44) | | 7.47 (4.52) | |

* Mean ± SD

Table (2) shows that the mean DMFS was significantly higher in females than males. While there was no significant difference between S.E.S and mean DMFS,(P= 0.82).

**Table 2. Study Population by DMFS and Socio-Demographic Characteristics**

| Socio-demographic characteristics | | No. | Mean (± SD) | *p*-value |
|---|---|---|---|---|
| Genders | Male | 202 | 6.65 (4.70) | < 0.001 * |
| | Female | 198 | 8.31 (4.17) | |
| Socioeconomic status | Low | 39 | 8.87 (5.40) | 0.82 ** |
| | Medium | 337 | 7.38 (4.43) | |
| | High | 24 | 6.50 (3.81) | |
| Total | | 400 | 7.47 (4.52) | |

* Using unpaired t-test

** Using one-way ANOVA

Table (3) reveals that there was no significant differences among the scales of BMI in regard to Mean DMFS (P=0.658).

**Table 3. Study Population by DMFS and BMI**

| BMI | No. | Mean (± SD) | P*p*-value |
|---|---|---|---|
| Thin | 63 | 7.86 (4.71) | 0.658 * |
| Normal weight | 263 | 7.33 (4.28) | |
| Over weight / obese | 74 | 7.65 (5.18) | |
| Total | 400 | 7.47 (4.52) | |

* Using one-way ANOVA

Table (4) shows that (44.75%) of the study population had the habit of sweet intake once or more daily with a highly significant difference in Mean DMFS and frequencies of sweet intake (p=0.001)

**Table 4. Study Population by DMFS and frequency of sweet intake**

| Frequency of sweet intake | No. (%) | Mean (± SD) | P-value |
|---|---|---|---|
| Once or more daily | 179 (44.75%) | 8.08 (4.67) | 0.001 * |
| 2-3 times / week | 95 (23.75%) | 8.03 (4.79) | |
| Once weekly or less | 126 (31.5%) | 6.18 (3.81) | |
| Total | 400 (100%) | 7.47 (4.52) | |

* Using one-way ANOVA (the first two groups are significantly different from the third group with LSD P-values of < 0.001 and 0.002, respectively, but the first two groups themselves are not significantly different).

Table (5) reveals that more than 10% of the study population were not with the habit of tooth brushing while only a third were brushing their teeth twice daily or more. It also reveals that more 30% of the study population did brush their teeth in a mixed manner. Table (5)also illustrates that there was no significant difference neither among the frequencies of tooth brushing nor among the methods of tooth brushing (P=0.074), (P= 0.066) respectively.

**Table 5. Study Population by DMFS and the frequency and method tooth brushing**

| | | No. (%) | Mean (± SD) | *p*-value |
|---|---|---|---|---|
| Frequency of tooth brushing | No brushing | 42 (10.5%) | 6.86 (4.49) | |
| | Once daily | 225 (56.25%) | 7.16 (4.49) | 0.074 * |
| | ≥ 2 daily | 133 (33.25%) | 8.19 (4.52) | |
| Method of tooth brushing | Horizontal | 77 (19.25%) | 8.53 (5.24) | |
| | Vertical | 119 (29.75%) | 7.54 (4.54) | 0.066 * |
| | Mixed | 162 (31.5%) | 7.07 (4.07) | |
| Total | | 400 (100%) | 7.47 (4.52) | |

* Using one-way ANOVA

Table (6) shows that 33.8% of the students had never visited dentist; while 34% and 32.25% of study population visited dental clinics once a year and more than once respectively. The mean DMFS was significantly higher among those who have more frequent visits to dentist. Table (6) also reveals that DMFS was significantly lower among students who visited dentist for checkup in comparison with those who visited dentist for specific complain.

**Table 6. Study Population by DMFS and Dental Care**

| | | No. (%) | Mean (± SD) | *p*-value |
|---|---|---|---|---|
| Frequency of visiting dentist / year | None | 135 (33.75%) | 4.41 (3.42) | < 0.001 * |
| | Once / year | 136 (34.0%) | 7.79 (4.22) | |
| | More than once/year | 129 (32.25%) | 10.33 (3.80) | |
| Reason of visiting dentist | Check up | 31 (7.75%) | 5.61 (3.43) | < 0.001 ** |
| | Complaint | 234 (58.5%) | 9.48 (4.10) | |
| Total | | 400 (100%) | 7.47 (4.52) | |

* Using one-way ANOVA.

** Using unpaired t-test.

## DISCUSSION

This is the first study conducted in Zakho city regarding dental caries and associated risk factors among secondary school students and may be considered as a base line data for the targeted area. The study was conducted on secondary school students. The usual age range of those students is between 15-18 when all teeth are expected to be permanent. Also surveying students in their schools will facilitate the follow up and tracing for the evaluation. Adolescence is considered important for oral health, as individuals

during this period become independent in making personal and diet related choices. So they are considered as an important target group for oral health promotional activities as behaviors and attitudes formed during adolescence may last into adult life.[22] The DMFS has been recognized as a strong interpreter for future caries and superior to the old index DMFT as DMFS deals with the severity of dental caries and every carious surface of the tooth.[23] The present study showed that, the mean DMFS for the studied population was (7.47) .The percentage of caries free students was (7.5 %) which means that the prevalence of dental caries for the studied population was (92.5%). This percentage was higher than that reported in other studies among the same age group.[6,24] This difference may be due to many health and social factors including: oral hygiene, carbohydrate consumption, fluoride application, dental education, socioeconomic status, preventive programs and social habits. The prevalence of dental caries in the present study was higher than that reported in Mosul city among the same age group (DMFT=5.1, DMFT =3.08)[25,26] This might be due to the different indices used and different time of conducting these studies as sugar intake is expected to increase significantly in recent years in most developing countries.[27]

The study showed that the mean DMFS was significantly higher in females (8.31) than males (6.65). This is in agreement with the results reported in other studies[28],[29] but disagreed with others who showed no significant difference between the two genders.[7,30] The higher prevalence of dental caries among females can be explained by the fact that earlier eruption of teeth in girls gives longer exposure to environmental factors and easier access to food supplies by women and frequent snacking during food preparation in addition to the effect of pregnancy at later age.[29] The mean values of Ds, Ms and Fs were significantly higher in females in comparison to males and this was in agreement with AL-Azawyi.[7]

The study found no significant difference between SES and mean DMFS. Other studies found controversial findings.[31,32] The association between SES and dental caries has been thoroughly investigated and several explanations have been adopted. The direct mechanism suggested was more access to sugars by the rich which will increase the prevalence of dental caries among them. Nevertheless with industrialization there was an increasing sugar consumption for all populations, not only rich persons which makes sugars and candies more available to all population. In Kurdistan the income of medium SES has increased significantly in recent years. The high expendable income can have increased exposure to fermentable carbohydrates and may be at an increased risk of dental caries.[33] On the other hand high income can give more access to dental services, to fluoridated water and oral products and to information about oral health.[34]

The study showed no significant association between BMI and dental caries. Controversial results have been reported in other studies[35,36] and might be explained by the fact that the majority of

the studied population were with normal BMI .

The study showed that there was a significant association between sugar intake and high caries rates. This is in agreement with the results reported in several studies.[37, 38]

The study found no significant correlation between dental decay and tooth brushing (methods and frequency )and this may be due to improper tooth brushing regarding duration, frequency and/or time and this is in agreement with the result reported in a study done by Julihn and his colleagues in Sweden.[39] The study also revealed that those with higher caries rate had significantly more visits to dentists. Moreover the majority of those visits were due to complaint rather than to usual checkup. This indicates a poor attitude of students toward the preventive dentistry.[40]

In conclusion Secondary school students in Zakho city experienced a high prevalence which was significantly higher in females and those with high frequency of sugar intake. The results pointed out to the necessity of adopting a proper dental health education program within student health services in the region.

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# پوختە

## ڕێژا بەلاڤبوونا کرمیبونا ددانا و هوکارێن مەترسیا وی دناڤ قوتابییێن قوتابخانێن ناڤنجی ل زاخو، هە ریما کوردستان، عیراق

**بێشەکی و ئارمانج:** کرمیبونا ددانان ئاریشەکا ساخلەمیا گشتی یە و یا گرنگە و نیزیکی دوو سێکا بجیکا و گە نجا ییت توشی ڤێ ئاریشی بووین ل سە رانسە ری جیهانی و گە لەك هوکارێن مەترسیدار ییت فی نە خوشیی ییت هاتی دە ست نیشان کرن.

ئارمانجێن ڤەکولینێ دوێ چەندێ دانە راوەستیان ل سەر بلاڤبوونا هوکارێن مەترسیا کرمیبونا ددانا دناڤ قوتابییێن قوتابخانێن ناڤنجی.

**ڕێکین ڤەکولینێ:** ڤەکولینە کا ڤەبری دەهلبژارتنا (٤٠٠) قوتابیا ل قوناغی نافنجی ل باژێرێ زاخو هاتیە ب کارئینان بو هەلسەنگاندنا هوکارێن مەترسیدار و بەلاڤبونا کرمیبونا ددانا یا کودێ (DMFS).

**ئەنجام:** ڤەکولینێ دیارکر کو ڕێژا کرمیبونێ ٩٢,٥٪ دگەل کودێ (DMFS) برێژا (٧,٤٧) و ئاستێ وێ پتر بو دناڤ رەگەزێ مێ ب ڕێژا (٨,٣١) بەرامبەر رەگەزێ نێر کو ڕێژا وێ (٦,٦٥). وەهروەسا دیاربو کو پەیوەندیە کا بهێز هە بوو ناف بە ینا وەرگرتنا شەکرێ و ڕێژا کرمیبونا ددانا بو هەر دوو رە گە زا.

**دەرئەنجام:** ڕێژا بەلاڤبوونا کرمیبونا ددانا یا بلند بوو ل ناف قوتابییێن قوتابخانێن ناڤنجی ل با ژێری زاخو , هە روە سا کودێ کرمیبونا ددانا (DMFS) یابلئد تر بوو ب شیوە یە کی گرنك ل ناف رەگەزێ مێ بە رامبە ری رەگەزێ نێر و بوو قوتابیین گە لە ك شە کری وە ر دکرن

## الخلاصة


### معدل انتشار تسوس الأسنان وعوامل الخطورة
### لدى طلبة المدارس الثانوية في زاخو، أقليم كوردستان، العراق

**الخلفية والاهداف:** ان تسوس الاسنان يعد من مشاكل الصحة العامة المهمة حيث يصيب حوالي ثلثي الاطفال واليافعين حول العالم، حيث تم تحديد عدة عوامل خطورة للمرض.

تهدف الدراسة الى قياس نسبة الانتشار و معدل شيوع عوامل الخطورة لتسوس الأسنان لدى طلبة المدارس الثانوية.

**طرق البحث:** تم اجراء دراسة مقطعية باختيار عينة عشوائية من (٤٠٠) طالب من مدينة زاخو لدراسة عوامل الخطورة ومعدل شيوع تسوس الأسنان حسب مؤشر (DMFS).

**النتائج:** أظهرت الدراسة بأن معدل انتشار تسوس الأسنان كان ٩٢.٥% وكان مؤشر معدل التسوس بنسبة (٧.٤٧) والتي كانت أعلى معنويا في الإناث بمعدل (٨.٣١) عنه في الذكور بمعدل (٦.٦٥). كذلك كان هناك ترابط معنوي بين كمية السكر المأخوذة ومعدلات التسوس العالية لكلا الجنسين, بينما لم تظهر الدراسة اي ترابط معنوي مع عوامل الخطورة الاخرى.

**الاستنتاجات:** كانت نسبة انتشار تسوس الأسنان عالية لدى طلبة المدارس الثانوية في زاخو وكان معدل شيوع تسوس الأسنان عاليا بصورة معنوية لدى الاناث مقارنة مع الذكور و لدى متناولي السكريات.

# ORAL IVERMECTIN VS TOPICAL PERMETHRIN 5% CREAM IN THE TREATMENT OF SCABIES: A RANDOMIZED CLINICAL TRIAL

DILDAR FATTAH AL-DOSKY, MBChB,HDD*
ZEYAD SAMIM AL-DABBAGH, MBChB, FCABMS, FJMC**

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## ABSTRACT

**Background and Objective:** Scabies is a common health problem in Duhok; with a considerable burden on patients, families, communities and the health system. Currently, different types of treatments are available, oral and topical.The study aims to compare the efficacy of oral ivermectin versus topical permethrin 5% cream in treating scabies.

**Patients and Methods:** A randomized control clinical trial was conducted in the dermatology outpatient clinic at Azadi General Teaching hospital in Duhok city, between April 2014 and August 2014. A total of 100 patients clinically diagnosed with scabies were divided randomly into two groups. The first group received topical 5% permethrin cream while the second group received 200 micrograms/kg oral ivermectin. The two groups were followed up for one week and those who did not achieve cure were given a second dose of either treatment and their clinical status was evaluated after two weeks.

**Results:** A total of 16 patients were excluded(8 from each group) during the course of the study because they did not show up during the follow up or received another treatment for scabies. The mean age of patients was 29.4 years. Treatment of patients with oral ivermectin resulted in curing 50% of patients, while only 42.9% of patients were cured by using topical permethrin after one week following a single dose of either treatment. The overall cure rate increased after a second dose for uncued cases to 95% with oral ivermectin and 88.1% with topical permethrin; after another two weeks of follow up. However, those differences were statistically not significant.

**Conclusion:** The study concluded that oral ivermectin was as effective as topical permethrin cream in the treatment of scabies.

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**Keywords:** Scabies,Ivermectin,5% permethrin.

Scabies is a highly contagious skin disease which is commonly encountered in tropical countries, where scabies is endemic.[1] The disease is also common in during unfavorable events such as migrations and wars.[2] In Iraq, a prevalence of 3.3%, 1.2%, 1.9%and 2.7% were reported in Basrah , Tikrit, Samara and Kirkuk respectively.[3-6] In recent years, scabies appear to have become endemic in Iraq.[7]

Scabies is also a common dermatological problem in Duhok as it is commonly seen in dermatology clinics and primary health care centres.[8]

In recent years the prevalence has even increased due to the mass migration to the province where the number of migrants has increased to constitute above 40 % of the original population of Duhok governorate.[9,10] Topical treatment is currently the only method used for its

*Specialist dermatologist, Duhok General Directorate of Health, Kurdistan Region, Iraq
**Lecturer, Dermatology Section, College of Medicine, University of Duhok, Kurdistan Region, Iraq
Corresponding author: Dr Zeyad Samim Al-Dabbagh Email: ziad_samim@yahoo.com. Mobile: +9647507513373

management in Kurdistan Region. A 5% permethrin cream is considered to be the most effective treatment and is usually the most commonly used treatment. This cream is safe and effective which can be used for all ages and also for pregnant and lactating patients. Nevertheless several difficulties of this method are encountered. All household members, including asymptomatic members should be treated. Additionally, clothing, linen and towels should also be washed by water and soup or bagged for 10 days, resulting in a poor compliance.[11,12] Moreover those measures are now particularly more difficult to be achieved in the migration camps in Duhok. In addition a decreased sensitivity to permethrin, as well as to other topical scabicidal agents, has been recently documented.[11] On the other hand, oral ivermectin is a safe and easy treatment. It has recently been licenced in several countries, including France. The drug has also been effective with a single or two doses of treatment.[13]

The study aimed to compare the effectiveness of oral ivermectin versus topical permethrin 5% cream in treating scabies in Duhok, Kurdistan Region

## PATIENTS AND METHODS:

The study was done in the Dermatology Outpatient Clinic in Azadi General Teaching Hospital in Duhok city between the period April 2014 to August 2014. This is a tertiary care hospital where all dermatology patients are referred to from all over Duhok governorate.

Approval of the Scientific Research Committee at the University of Duhok and Research Ethics Committee at Duhok Directorate General of Health was obtained prior to conducting the study. The aim of the study was explained to each patient and an oral consent was taken.

The study was a randomized clinical trial. The inclusion criteria was all patients with scabies attending the clinic during the work time. The exclusion criteria were patients less than 5 years old, pregnant and lactating ladies and all those who received treatment for scabies in the last week

Scabies was diagnosed by specialist dermatologist who also verified the severity of the disease and of pruritus.

The study was designed to include all patient who will fulfill the selection criteria until 100 cases achieved. After that the 100 clinically diagnosed scabies patients were randomly allocated into two groups of 50 patients. The first group received 5% permethrin cream for 8 hours topically(P- thrin- ALKEM labortaries - India). While the second group received ivermectin orally with a dose of 200 microgram per kilogram body weight. (Ivermectol, Ranbaxy labortaries limited ,India).All patients were given an appointment to come 1 week after treatment to be re examined for cure by the specialist. All patients who did not cured were given a second dose of either treatment and were asked to return after another 2 weeks for cure assessment.

A structured questionnaire form was filled in for each patient for basic information, such as name, age, gender, family members and number of rooms, residency, educational level, type of scabies treatment given previously and its type .

Overcrowding index was estimated as the total number of co-residents perhousehold, excluding the new born infant divided by the total number of rooms, excluding the kitchen and bathrooms and more than 2 persons per a room was considered overcrowded .[14]

Patients were classified on the basis of severity of pruritus into: mild (if the total score between 0 and 5), moderate (if the total score between 6 and < 11) and severe (if the total score between 11 and 19.[15]

Severity of disease based upon the number of lesions (burrows and papules) was divided into mild (less than 10 lesions), moderate (10 to 50 lesions) and severe (more than 50 lesions) .[16]

Cure was observed by the clearance of lesions and disappearance of itching. Patients were given a second dose of treatment in the second week if they were not cured.

Data were analyzed using SPSS version 20 and summarized using mean (standard deviation) for continuous variables and count (percentage) for categorical variables. Test for statistical significance was done using Chi-square test or Fisher Exact test (if there was violation of assumption of Chi-square test). Level of significance was set at $p \leq 0.05$.

## RESULTS

During the course of the study, 16 patients were excluded from the study, 8 patients from each group. In the first group, 5 patients were discontinued because they did not show up in the next follow ups and 3 patients were excluded from the study due to the usage of other topical treatments for scabies. For the second group, 8 patients were excluded because they did not show up from the follow ups.

In the first group, the age ranged from 6 to 46 years (with a mean of 27.52 year), while for the second group, the age ranged from 5 to 76 years (with a mean of 30.19 year).

Table (1) shows that there were no significant differences between the socio-demographic characteristics of the two groups including: gender, residency, education levels and overcrowding in houses. Table (1) also reveals that more than 60% of the patients were male coming from Duhok urban area ,with primary/intermediate education and living in overcrowded houses.

**Table 1. Sociodemographic characteristics of the study population**

| Character | Permethrin Group (42) | Ivermectin Group (42) | Total (84) | *P*-value |
|---|---|---|---|---|
| Male | 24 (57.1%) | 29 (69%) | 53 (63.1%) | 0.258 |
| Female | 18 (42%) | 13 (31%) | 31 (36.9%) | |
| Urban | 32 (76.2%) | 29 (69.0%) | 61 (72.6%) | 0.463 |
| Rural | 10 (23.8%) | 13 (31.0%) | 23 (27.4%) | |
| Illiterate / Read & Write | 8 (19.0%) | 13(31.0%) | 21 (25.0%) | |
| Primary/ intermediate School | 26 (61.9%) | 26 (61.9%) | 52 (61.9%) | 0.177 |
| Secondary School + | 8 (19.0%) | 3 (7.1%) | 11 (31.1%) | |
| Overcrowded | 29 (69.0%) | 32 (76.2%) | 61(72.6%) | |
| Not overcrowded | 13 (30.1%) | 10 (23.8%) | 23(27.4%) | 0.463 |

Table (2) reveals no significant differences regarding clinical histories of both groups including: previous treatment taken by patients, severity of the disease and severity of pruritus. Table (2) also shows that about half of the patient have had previous scabies treatment with 69.0% and 73.8% of them were suffering from severe disease with severe pruritus respectively.

**Table 2. Clinical characteristics of the study population**

| **Previous Treatment** | **Permethrin** | **Ivermectin** | **Total** | ***P*-value** |
|---|---|---|---|---|
| **Yes** | **18 (42.9%)** | **21 (50%)** | **39 (46.4%)** | **0.512** |
| **No** | **24 (57.1%)** | **21 (50%)** | **45 (53.6%)** | |
| **Severity of disease** | **Permethrin** | **Ivermectin** | **Total** | |
| **Moderate** | **13 (31%)** | **13 (31%)** | **26 (31%)** | |
| **Severe** | **29 (69%)** | **29 (69%)** | **58 (69%)** | **1.000** |
| **Total** | **42 (100%)** | **42 (100%)** | **84 (100%)** | |
| **Severity of pruritus** | **Permethrin** | **Ivermectin** | **Total** | |
| **Mild/ Moderate** | **12 (28.4%)** | **10 (23.8%)** | **22 (26.2%)** | **0.620** |
| **Severe** | **30 (71.6%)** | **32 (76.2%)** | **62 (73.8%)** | |
| **Total** | **42 (100%)** | **42 (100%)** | **84 (100%)** | |

Table (3) shows that eighteen patients (42.9%) from the first group and 21 patients (50%) from the second group were considered cured from scabies one week after the first dose; with no significant difference between the two groups(p value= 0.512).

**Table 3. The cure rate after one week of the first dose**

| **Cure rate** | **Permethrin** | **Ivermectin** | **Total** |
|---|---|---|---|
| **Yes** | **18 (42.9%)** | **21 (50 %)** | **39 (49.4%)** |
| **No** | **24 (57.1%)** | **21 (50%)** | **45 (53.6%)** |
| **Total** | **42 (100%)** | **42 (100%)** | **84 (100%)** |
| ***Non-significant difference (p value 0.512)*** | | | |

Table (4) reveals that the overall cure rate increased considerably after weeks of giving the second dose for uncured cases with 37 patients (88.1%) from the first group and 40 patients (91.7%) from the second group considered to be cured from scabies; with no significant difference between the two groups(p value= = 0.433).

**Table 4. The overall cure rate after two weeks of the second dose**

| **Overall cure rate** | **Permethrin** | **Ivermectin** | **Total** |
|---|---|---|---|
| **Yes** | **37 (88.1%)** | **40 (95.2%)** | **77 (91.7%)** |
| **No** | **5 (11.9%)** | **2 (4.8%)** | **7 (8.3%)** |
| **Total** | **42 (100%)** | **42 (100%)** | **84 (100%)** |
| ***Non-significant difference (p value 0.433)*** | | | |

## DISCUSSION:

Azadi Teaching General Hospital is considered a pooling point for all referral dermatology cases from all over Duhok Governorate. This explains why most cases attend the clinic have moderate to severe form of scabies.

Due to the lack of safety evidence the study excluded patients less than 5 years old, pregnant and lactating ladies.[11,12]

The follow up phase of the patients, after one and three weeks on initial treatment was difficult. Though patients were contacted by phone and reminded about their follow up,13 patients failed to attend their follow up appointments and hence excluded from the study.

The majority of patients recruited in this study were males, reflecting the high rate of male's attendance to outpatient dermatology unit. Higher male prevalence was also reported in Tikrit, Iraq.[7]

Most of patients in this study were young with a mean age of 27, 52years. Other study in Kurdistan Region and Iraq also concluded that more than 50% of patients with scabies fall within young age group[7-9]

The study found that 72.6% of selected patients were living in overcrowded conditions. This is consistent with other studies.[11]

This study has also found that 72.6% of patients were from inside Duhok city. This might reflect the availability of treatment options in rural areas. The study found that 69% of patients had sever form of the diease and 73.8% had severe pruritus. This again might be a selection effect for severe cases to seek treatment at Azadi tertiary care hospital.

Oral ivermectin was as effective as topical permethrin,a when single dose was used assessed one week after the first dose ;where 50% and 42.9% of patients were cured respectively. This is similar to the findings of Mushtaq et al.[16] who found that similar cure rates were 54.5% and 47.6% respectively. The cure rates were lower ,however, than another study conducted by Goldust et al.[17] This might be due to the longer follow up which gave more opportunity for signs and symptoms to disappear. A marked increase in cure rate was observed in both regimes after giving the second dose for those who were not cured by the first dose. The overall cure rate with oral ivermectin reached about 95% and with topical permethrin 88.1%. This is similar to the findings of other studies.[16-18] Moreover in a study conducted in endemic area of India found that mass treatment with two doses of ivermectin was more efficacious than topical permethrin application in reducing the baseline prevalence, transmission and reinfection.[19]

The two weeks period given to patients after the second dose to achieve disappearance of signs and symptoms which usually took some time after cure from the parasite

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# پوختە

## حەبکێن ئایڤرمکتین بەرامبەر کریما پیرمترین ٥٪ بو چارەسەریا گوریاتیێ ڤەکولینەکا کلینیکی یا بەرەلایی

**پێشەکی وئارمانج:** گوڕیاتی ئێکە ژ ئاریشێن ساخلەمی یێن مشە لدھوکێ، ئەڤ نەخوشیە بارگرانیەکێ پەیدادکەت ل سەر نەخوشی و خێزانا وی و جڤاکی ب گشتی و سیستەمێ ساخلەمی. ژبو چارەسەرکرنا ڤێ نەخوشیێ ڕێکێن جوداجودا یێن چارەسەریێ ھەنە. ئارمانج ژڤێ ڤەکولینێ بەراوردکرنا چارەسەری ب حەبکێن ئایڤرمکتین دگەل کریما پێرمترین ٥٪ بو چارەسەریا نەخوشیا گوڕیاتیێ.

**ڕێکێن ڤەکولینێ:** ڤەکولینەکا کلینیکی یا بەرەلایی یا کونترولکری ھاتە ئەنجامدان ل راوێژکاریا نەخوشیێن پیستی ل نەخوشخانا ئازادی یا فێرکرنێ ل دھوکێ دناڤبەرا نیسانێ ھەتا تەباخێ ٢٠١٤. سەرجەمێ ١٠٠ نەخوشێن دەستنیشانکری ب گوریاتیێ بەشداری کر و ھاتنە دابەشکرن ل سەر دوو گروپا. گروپا ئێکێ کریما پێرمترین ٥٪ وەک چارەسەری وەرگرت و گروپا دووێ حەبکێن ئایڤرمکتین ٢٠٠ مایکروگرام بو ھەر کیلوگرامەکا سەنگا لەشی. دویڤچوونا ھەردوو گروپا ھاتەکرن پشتی حەفتییەکێ و ئەوێن چارەسەرنەبووین دوبارە دەرمان وەرگرت و دویڤچوونا پشتی دوو حەفتییا ھاتە کرن.

**ئەنجام:** شازدە نەخوش ھاتنە لادان ژڤەکولینێ ژبەر نە ئامادەبوونا وا ل دویڤچوونێ یان بکارئینانا ھندەک چارەسەریێن دی یێن گوڕیبوونێ. تێکرایێ ژیێ وان ٢٩,٤ سال بوو. پشتی جارەکێ بکارئینانا دەرمانی ٥٠٪ ژئەوێن حەبکێن ئایڤرمکتین وەرگرتین چارەسەربون وبتنێ ٤٢,٩٪ ژئەوێن کرێما پێرمترین بکارئینای پشتی حەفتییەکێ ژ دویڤچوونێ. ڕێژا گشتییا چارەسەریێ زێدەبوو بو ٩٥٪ دگەل حەبکێن ئایڤرمکتین و٨٨,١٪ دگەل کرێما پێرمترین پشتی جارا دووێ ژکارئینانێ بو ئەوێن چارەسەرنەبووین، ھەرچەندە ئەڤ جیاوازیە نەیا ب بھا بوو ژلایێ ئاماریڤە.

**دەرئەنجام:** بکارئینانا حەبکێن ئایڤرمکتین ھەمان ئەنجامێ چارەسەریێ یێ ھەی وەکی بکارئینانا کریما پیرمترین بو چارەسەریا گوڕیاتیێ.

## الخلاصة

### حبوب آيفرمكتين مقابل كريم بيرمثرين ٥% لمعالجة الجرب؛ دراسة سريرية عشوائية

**الخلفية والأهداف:** الجَرَب من المشاكل الصحية الشائعة في دهوك ويشكل عبئاً كبيراً على المريض وأسرته والمجتمع والنظام الصحي. هناك أنواع مختلفة من العلاج للمرض منها ما يُتناول عن طريق الفم ومنها العلاج الموضعي. تهدف الدراسة إلى مقارنة فعالية حبوب آيفرمكتين مع كريم بيرمثرين ٥% في علاج الجرب.

**طريقة البحث:** البحث عبارة عن دراسة سريرية عشوائية مع الشاهد أجريت في العيادة الخارجية للأمراض الجلدية في مستشفى آزادي التعليمي العام في مدينة دهوك في الفترة بين نيسان ٢٠١٤ وآب ٢٠١٤. شملت الدراسة (١٠٠) مريضٍ ممن شخصوا سريرياً بداء الجَرَب، تم تقسيمهم إلى مجموعتين عشوائياً، حيث تم علاج المجموعة الأولى باستخدام كريم بيرمثرين ٥% والمجموعة الثانية باستخدام حبوب آيفرمكتين ٢٠٠مايكروغرام لكل كغم من كتلة الجسم. تمت متابعة المرضى في المجموعتين بعد الاسبوع الأول من العلاج، وقد اعطيت جرعة ثانية من طريقتي العلاج لمن لم يشفى من المرض و تمت متابعتهم بعد اسبوعين.

**النتائج:** تم استبعاد ١٦ مريضاً من الدراسة (٨ من كل مجموعة) بسبب تسربهم من المتابعة أو استلامهم لنوع آخر من العلاج أثناء البحث. كان معدل الأعمار للمرضى (٢٩.٤) سنة. كانت نسبة الشفاء ٥٠% لمن استخدموا حبوب آيظرمكتين مقارنة ب ٤٢.٩% فقط لمن استخدموا كريم ثيرمثرين أثناء المتابعة الاولى بعد اسبوع من استخدام جرعة واحدة من الدواء. ارتفعت النسبة الاجمالية إلى ٩٥% بالنسبة للآيظرمكتين و ٨٨.١% لثيرمثرين بعد اعطاء جرعة ثانية لمن لم يشفوا أثناء متابعتهم بعد اسبوعين، رغم أن هذا الفرق لم يكن ذا أهمية إحصائية.

**الاستنتاجات:** توصلت الدراسة الى أن حبوب آيظرمكتين لها فعالية مماثلة لاستخدام كريم ثيرمثرين الموضعي في علاج الجرب.

پەربەندا ٩ ژمارە ١

خــزیــران ٢٠١٥


زانكویا دهوك
كولیژا پزیشكی

# گوڤارا پزیشکی یا دهوکێ

## گوڤارا فەرمی یا کولیژا پزیشکی یا دهوکێ

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