

Iron status in intrauterine contraceptive device users

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ABSTRACT

The objective of this study is to evaluate the effect of one year use of Copper-T³⁸⁰A intrauterine contraceptive devices (IUCDs) on iron status of the body. It represent a Cohort study that was carried at Family Planning Center in AL-Batool Teaching Hospital, during the period from April ٢٠٠٦ - August ٢٠٠٧. Thirty women enrolled in this study, age ranged between ٢٠-٤٢ years, and with initial level of hemoglobin (Hb) \geq ١٠ g/dl, were followed up at the time just before the insertion, then after ٦ months and one year of the insertion of the IUCDs. Another thirty healthy women age ranged between ٢٠-٤٢ years who did not use neither hormonal contraceptives nor IUCDs were considered as a control group, all followed by measuring Hb level and PCV by Cyanomethaemoglobin method, serum iron and total iron binding capacity (TIBC) using Enzymatic Calorimetric method and percent iron saturation was calculated by equation.

The results of this study showed that IUCDs caused a significant decrease in the mean serum level of Hb, PCV and iron among the IUCDs users after ٦ months and one year of the insertion of the IUCDs compared with the initial serum level at the time of the insertion. But a significant decrease in TIBC and % saturation only after one year of the insertion of the IUCDs. Also there were a significant decrease in mean serum Hb and % saturation of the IUCDs users after ٦ months in comparison with the non users, while a significant decrease in all the iron status parameters of IUCDs users after one year in comparison with the non users. There were no significant difference between the iron status parameters of IUCDs users in relation with number of children the IUCDs users have delivered.

This study concluded that the Copper-T³⁸⁰A IUCDs use for one year cause a significant decrease in the iron status parameters, which is more with the increase duration of use but not affected by the number of children of the users of the IUCDs. It is recommended that iron supplementation, be a part of the IUCDs services provided in Family Planning Centers in the view of the high prevalence of anemia among women in child bearing age in Iraq.

Keywords: contraceptive, hemoglobin, ferritin.

الخلاصة

تهدف هذه الدراسة إلى تقييم تأثير استخدام لولاب منع الحمل ولمدة سنة على مستوى الحديد في الجسم. تصميم الدراسة هو دراسة جماعة. وكان مكان وزمان إجراء البحث هو مركز تنظيم الأسرة في مستشفى البتول التعليمي في الموصل للفترة من نيسان ٢٠٠٦ إلى آب ٢٠٠٧. حيث تمت متابعة ثلاثين امرأة ممن راجعن المركز لوضع اللولاب كمانع للحمل تتراوح أعمارهن بين ٢٠-٤٢ سنة ومستوى الهيموكلوبين لديهن يساوي أو أكثر من ١٠ غرام/ديسيلتر، عند البدء بوضع اللولاب، ثم بعد ستة أشهر ثم بعد سنة و ثلاثين امرأة سليمة أخرى ممن لم يستخدمن موانع الحمل الهرمونية ولا اللولاب كمجموعة سيطرة تتراوح أعمارهن بين ٢٠-٤٣ سنة، أجريت عليهن فحوصات قياس مستوى الهيموكلوبين والحديد واستيعاب ارتباط الحديد الكلي بواسطة الطريقة اللونية باستخدام الأنزيمات ونسبة تشبع الحديد محسوبة بمعادلة.

نتائج هذه الدراسة أظهرت أن لولاب منع الحمل سببت نقصان معنوي في معدل مستوى مصد الدم للهيموكلوبين والحديد والحجم المكندس لخلايا الدم الحمر بعد ٦ أشهر وسنة واحدة من وضعها بالمقارنة مع المستوى البدائي في مصد الدم قبل وضعها ولكن كان هناك انخفاض كبير في مستوى استيعاب ارتباط الحديد الكلي ونسبة تشبع الحديد فقط بعد سنة واحدة

من وضع اللوالب. كما كان هناك انخفاض ملحوظ في مستوى مصلى الدم للهيموكلوبين و استيعاب ارتباط الحديد الكلي من مستخدمات اللوالب بعد ٦ أشهر مقارنة مع غير المستخدمات ، في حين كان هناك انخفاض ملحوظ في مؤشرات حالة الحديد لمستخدمات اللوالب بعد سنة واحدة مقارنة مع غير المستخدمات . لم يكن هناك فرق كبير في مؤشرات حالة الحديد لمستخدمات اللوالب في العلاقة مع عدد من الأطفال الذين أنجبتهن مستخدمات اللوالب.

أستنتجت هذه الدراسة أن استخدام لوالب منع الحمل نوع ٣٨٠ نحاس لمدة سنة واحدة تسبب في انخفاض كبير في مؤشرات حالة الحديد، وكان الانخفاض أكثر مع زيادة مدة الأستعمال ولكن لم تتأثر بعدد الأطفال الذين أنجبتهن مستخدمات اللوالب. و يوصى بأخذ مركبات الحديد كجزء من خدمة إعطاء اللوالب في مراكز تنظيم الأسرة بالنظر لانتشار فقر الدم بين النساء في عمر الإنجاب في العراق.

The intrauterine contraceptive device is the most commonly used form of reversible contraception worldwide; approximately ١٤٥ million married women currently use it.^١ A local study in Mosul city in Iraq, found that IUCDs form the second most common contraceptive method used (٢٧.٨%) after the oral pills (٤٢.٦%).^٢ The predominant type of product, the copper IUCDs (a plastic T-shaped device with copper affixed to it) was developed over ٣٠ years ago and has become the standard bearer for intrauterine contraception, due to its long-term effectiveness, safety and affordability.^{٣,٤}

For some women, however, copper IUCDs can cause increased menstrual blood loss and pain^{٣,٥,٦,٧}. These side effects often lead to early removal^{٨,٩,١٠}. It was reassuring to note that long term IUCDs use even beyond three years did not have any adverse effect on hemoglobin status. It is possible that women who had severe menorrhagia had the device removed earlier and such a removal parse served to protect women from the risk of developing anemia associated with IUCDs use.^{١١} As bleeding and pain are the most common reasons for removal rates of ١٠% in the first year and up to ٥٠% within ٥ years.^{١٢}

Anemia is one of the major public health problems among women belonging to the reproductive age group. Hemoglobin surveys indicate that a sizable proportion of women is anemic even in the non-pregnant state^(١٣). Population studies have shown that when menstrual loss increased, there was an increased risk of anemia even among non-anemic women in developed countries.^{١٤,١٥}

In countries where a relatively high prevalence of anemia exist, it is of vital

importance to study the effect of various contraceptive methods on iron status of contraceptive initiators so that family planning services may address the problem of anemia as part of the contraceptive services provided to their clients.^{١٦}

The aim of this study was to evaluate the effect of one year use of Copper-T٣٨٠A IUCDs on the iron status of the body and the effect of the period of use and the number of children on it.

Subjects and Methods

This study was conducted from April ٢٠٠٦ to August ٢٠٠٧ in which women who were attending the Center of Family Planning at AL-Batool Hospital in Mosul city for receiving contraception were participated in this study. These women currently married, not pregnant neither lactating nor infertile at the time of the study and ٣٠ of them age ranged between ٢٠-٤٢ years with initial level of Hb equal or more than ١٠ gm/dl, were arranged for insertion of IUCDs.

These women were followed by taking blood samples at the initial time of the insertion then after ٦ months and one year of the insertion of the IUCDs. Another ٣٠ healthy women not pregnant neither lactating nor infertile, age ranged between ٢٠-٤٣ years with regular menstrual period who did not use neither hormonal contraceptives nor IUCDs were selected as control group. The Hb level in the blood was measured by cyanomet-haemoglobin method, iron concentration and TIBC were measured in the serum by spectrophotometric method using (Randox kit, laboratories Ltd, UK). Percent iron saturation was calculated by the following equation^(١٧).

$$\text{Percent iron saturation} = \frac{\text{Serum Iron}}{\text{TIBC}} \times 100$$

Data were analyzed using t test to assess the significant differences between the mean values. Differences between observations were considered statistically significant at P value < ٠.٠٥.

Results

There were significant decrease in Hb, PCV, iron serum level among the IUCDs users after ٦ months and one year of the insertion of the IUCDs compared with the initial serum level at the time of the insertion. But significant decrease in TIBC and % Saturation only after one year of the insertion of the IUCDs shown in table ١.

Table ٢: Shows that there were a significant decrease in the serum Hb and TIBC among IUCDs users after ٦ months of IUCDs insertion in comparison to the non users (control).

Table ٣ shows that there were a significant decrease in the mean of serum Hb , PCV, Fe, TIBC and percent of iron saturation among IUCDs users after one year of IUCDs insertion in comparison to the non users (control) .

Table ٤: Shows that there were a non significant difference between the iron status parameters of IUCDs users after one year of use in relation with number of children they have delivered.

Table ١. Changes in iron status parameters among IUCDs Users

Parameters	Mean ± SD of IUCDs Users (n=٣٠)		
	At time of insertion	After ٦ months	After one year
Hb (g/dl)	١٢.٢٧ ± ٠.٩٥ a	١١.٧٦ ± ٠.٨٣ b	١١.١٨ ± ١.٠٣ c
PCV %	٣٧.٦٣ ± ٢.٦٢ a	٣٦.٠٣ ± ٢.٣١ b	٣٣.٦ ± ٣.١٦ c
Fe (µg/dl)	٧٨.٢٣ ± ١٤.٣١ a	٦٩.٤٣ ± ١٢.٥٦ b	٦٢.٥ ± ١١.٥ c
TIBC(µg/dl)	٢٣٢.٤٤ ± ٥٢.٢٤ a	٢٢٠.٥ ± ٣٦.٢٢ ab	٢٠٢.٥٧ ± ٢٩.٠٣ b
% Saturation	٢٢.٠٣ ± ٥.٢٢ a	٣٠.٥٠ ± ٦.٤٨ ab	٢٨.٩٨ ± ٤.٠٦ b

*(a,b,c) different letters (horizontally), means significant differen

Table 2. Comparison between iron status parameters among IUCDs users & non users (Control) after 3 months.

Parameters after 3 months	Mean ± SD		P-value
	IUCDs users (n=30)	Control (n=30)	
Hb (g/dl)	11.76 ± 0.82	12.26 ± 1.10	<0.05*
PCV %	37.02 ± 2.21	37.12 ± 2.28	>0.05
Fe (µg/dl)	79.42 ± 12.06	76.42 ± 10	>0.05
TIBC(µg/dl)	220.0 ± 27.22	229.2 ± 24.07	<0.05*
% Saturation	20.0 ± 1.48	22 ± 0.12	>0.05

* significant level.

Table 3. Comparison between iron status parameters among IUCDs users & non users (Control) after one year.

Parameters after one year	Mean ± SD		P-value
	IUCDs users (n=30)	Control (n=30)	
Hb (g/dl)	11.18 ± 1.02	12.22 ± 1.12	<0.001**
PCV %	32.7 ± 2.16	36.87 ± 2.02	<0.001**
Fe (µg/dl)	72.0 ± 11.0	78.8 ± 12.80	<0.001**
TIBC (µg/dl)	202.07 ± 29.02	237.0 ± 21.86	<0.001**
% Saturation	28.98 ± 4.06	21.77 ± 0.16	<0.05*

Table 4. Relationship between iron status parameters among IUCDs users after one year and the number of children.

Parameters	Mean ± SD			p-values
	1-2 (n=10)	3-5 (n=10)	> 5 (n=10)	
Hb (g/dl)	11.21 ± 0.8	11.11 ± 1.21	11.22 ± 1.04	>0.05
PCV %	32.7 ± 2.27	32.7 ± 4.4	32.7 ± 2.76	>0.05
Fe (µg/dl)	71.9 ± 8.49	74.7 ± 10.06	71 ± 10.92	>0.05
TIBC (µg/dl)	209.2 ± 22.21	200.8 ± 27.28	197.7 ± 17.29	>0.05
% Saturation	29.2 ± 2.08	29.9 ± 4.70	27.80 ± 4.42	>0.05

Discussion

In premenopausal women, serum ferritin levels were strongly dependent on the duration of menstrual bleeding, which in turn was related to the method of contraception.¹⁶ Several investigators^{17,18} have reported persistent excessive menstrual loss among IUCDs wearers. It has been suggested that continued excessive blood loss in long term IUCDs wearers were exacerbate the existing anemia among women in developing countries.¹⁹ Even though data available from developed countries have not revealed any alteration in hematological profile in IUCDs wearers.²⁰

This study found a significant decrease in Hb, PCV, iron serum level among the IUCDs users after 6 months and more after one year of the insertion of the IUCDs compared with the initial serum level at the time of the insertion. But significant decrease in TIBC and % Saturation only after one year of the insertion of the IUCDs which indicates that this effects increase with the duration of use of IUCDs in the first year. These results are in agreement with a study done by Heikkinen et al.,²¹ who found that 41% of IUCDs users had reached iron deficient levels by the end of the follow up period (6 months).

Hassan et al.²² found that the use of IUCDs for one year were significantly associated with the highest prevalence of anemia among all contraceptive users (15.9 %) and IUCDs users had lowest level of Hb compared to non users or users of other methods. In another study by Hassan et al.,⁽²³⁾ showed that the use of IUCDs produced a statistically significant drop in the Hb content and percent iron saturation levels after 12 months of use, as compared to the use of combined oral contraceptive pills for the same period and the drop was greater with longer IUCDs use and recommended that iron supplementation be part of the IUCDs services provided in the family planning units.

In agreement with our study it found that menstrual was bleeding in women using hormonal contraception was significantly shorter than in those using IUCDs and ferritin levels were highest in present and former users of oral contraceptives, lower in those who currently used other methods, and lowest in

current IUCDs users^{24,25}. It was concluded that iron stores can be quickly exhausted in a large majority of premenstrual women, which means that guidelines for dietary iron intake and supplementation (of a daily tablet containing 15-20 mg of ferrous iron), should take special needs of members of a population into consideration, such as women whose menstruation lasts 9 days or more, who have menstrual bleeding of strong intensity, who use an IUCD without gestagen, and who are blood donors.

Imperato *et al.*,²⁶ found increasing uterine bleeding and a consequent significant drop in Hb level in women inserted with Cu-IUCDs than those inserted with levonorgestrel-releasing IUCDs and suggested that the main reason of menorrhagia in women inserted with Cu-IUCDs probably is due to the shape of device and to copper surface area and concluded that levonorgestrel-releasing IUCDs is a new contraceptive method combining the advantages of both hormonal and intrauterine contraception. In addition, it can be considered as alternative method in the treatment of menorrhagia and dysfunctional uterine bleeding.

On the other hand, our results in our developing country are in contrast with the result obtained by other studies^{27,28} who found no significant changes in Hb level or likelihood of anemia have been noted with copper IUCDs. Milsom *et al.*²⁹ studied the influence of the Gyno-T 380S IUCDs on menstrual blood loss and iron status and found that there were no significant changes recorded in iron status parameters during the 12 months observation period following IUCDs insertion indicating that women from developed countries apparently tolerate an increase menstrual blood loss of about 20% without developing iron deficiency anemia. Iron stores were unchanged as in this study indicating an adequate increase in intestinal iron absorption. Accordingly, copper IUCDs can generally be used by women with anemia.³⁰

This study demonstrated a significant decrease in mean serum Hb and % saturation of the IUCDs users after 6 months in

comparison with the non users, while a significant decrease in all iron status parameters of IUCDs users after one year in comparison with the non users. While in our previous case control study.^{١٧} on the effect of the use of different contraceptives (hormonal and IUCDs) for the period ٠.٢٥-٦ years on iron status, found that IUCDs use caused only a significant decrease in PCV and statistical increase in percent of saturation of iron among IUCDs users than control. These results can be explained by a study performed by Prema^(١١) who showed that there is no detorious effect on Hb status after long term use of IUCDs even beyond ٣ years and it is possible that these long term IUCDs users were those privileged individuals who had the least menstrual disturbance. It has also be shown that incidence of menorrhagea progressively decreases with increasing duration of use of IUCDs.^{١٨}

This study demonstrated a non significant difference between the iron status parameters of IUCDs users in relation with number of children they have delivered. In a study done on Danish women found that iron deficiency anemia was found in ٢.٦% of pre and ٠.٣٦% of postmenopausal women and the pre menopausal multipara had lower serum ferritin than nulli and unipara.^{١٩}

This study concluded that the use The Copper-T٣٨٠A IUCDs for one year causes a significant decrease in the iron status parameters, which is more with the increase duration of use but not affected by the number of children of the users of the IUCDs. It is recommended that iron supplementation, be a part of the IUCDs services provided in Family Planning Centers in the view of the high prevalence of anemia among women in child bearing age in Iraq. Further studies are required to evaluate the relation between the parity and gravity of the IUCDs users and iron status of the body.

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