IRON STATUS IN WOMEN USING ORAL CONTRACEPTIVES

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ABSTRACT

Objectives: *To assess the iron status of women using oral contraceptive pill (OCP) and compare this status with that of women of non-OCP users.* ***Methods:*** *This prospective cross-sectional comparative study was done in Dhaka Medical College from January 2006 to December 2006. Total 61 apparently healthy women of low socioeconomic class, age ranged 20-40 years were selected from different areas of Dhaka city. Of them 41 women were OCP users (Study group) and 20 women were non-OCP users (for comparison). OCP users again subdivided into subgroups according to duration of OCP use. Serum ferritin and haemoglobin level were taken as parameters of iron status in both groups. Statistical analysis was done by the SPSS 12.0 programme.* ***Results:*** *The mean (±SD) of serum ferritin level were 59.45±24.79ng/ml and 77.36±35.16 ng/ml in non-OCP & OCP users respectively. The difference of mean (±SD) of serum ferritin levels were significant (p:<0.05) between two groups. The mean (±SD) of haemoglobin levels were 11.54±0.76gm/dl and 12.04±0.79gm/dl in non-OCP user and OCP users respectively. The difference of mean (±SD) were significant (p:<0.05) between two groups. Levels of serum ferritin & haemoglobin were 19ng/ml and 10.95gm/dl respectively in women using OCP for 1 year. But their levels became 144 ng/ml and 13.95gm/dl respectively in women using OCP for 12 years.* ***Conclusion:*** *This study suggests that OCP use raises serum ferritin and haemoglobin levels and thus has beneficial effects on iron status of the body.*

Key words: *Oral Contraceptive Pill (OCP), Ferritin, Haemoglobin*

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INTRODUCTION

Anemia is prevalent in women of child bearing age. It is a disorder characterized by abnormally low blood haemoglobin.A variety of factors are known to contribute to the problem including inadequate nutrition, malaria, chronic gastrointestinal bleeding especially from hook worm, congenital haemolytic diseases and multiple pregnancies with short intervals between them[1].

Iron deficiency is highly prevalent worldwide. World Health Organization sponsored surveys have demonstrated iron deficiency in 40-99 percent of pregnant women in various parts of the world and anemia in 21-80 percent of pregnant women[2,3]. Women sustain substantial iron losses throughout their reproductive years from menstruation, pregnancy, child birth and lactation. The most common cause of iron deficiency is excessive menstrual bleeding.

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Oral contraceptives are highly effective and widely accepted means of avoiding pregnancy and they have reduced fertility levels of all socioeconomic group. At present about 60 million women are using oral contraceptives for birth control. The pill is known to cause a wide variety of metabolic changes, including changes in iron status.[4,5]

The most notable effect of oral contraceptives on iron status is the reduction in menstrual blood loss that occurs for about 60-80% of the women who use them[2]. Several studies have shown that blood loss during menstruation is substantially reduced in 50-70% women taking oral contraceptives. It is therefore possible that the use of oral contraceptives might be associated with an improvement in haemoglobin status-an important health benefit for the undernourished anaemic women in developing countries[6].

Iron status was assessed by serum ferritin and haemoglobin. Measurement of ferritin, the main iron storage protein of the body, has been used widely to evaluate disorder of iron metabolism. Ferritin is found in

most tissues, but concentrations are highest in reticuloendothelial cells of spleen, liver and bone marrow. Small amount is found normally in circula- ting plasma. Concentration of ferritin in the serum of normal individuals is directly related to body iron stores. It also reflects iron stores in iron deficiency and iron overload state. So measurement of serum ferritin level can be useful in diagnosis and monitoring of patients with iron deficiency and iron overload. Serum ferritin assay is specially useful in differentiating between the anaemias of chronic diseases and iron deficiency[7]. Serum ferritin levels were strongly dependant on the duration of menstrual bleeding. Women using oral contraceptives had menstrual bleeding of shorter duration than those not using pills. There is a distinct inverse relationship between serum ferritin levels and duration of menstrual bleeding. So serum ferritin level is high in oral contraceptive users [8].

The relationship between serum ferritin concentration and the amount of storage iron was studied in normal subjects. Although there is a good correlation between serum ferritin concentration and iron load in pathological states, there is no evidence that this correlation exists in normal subjects[9]. Serum ferritin and haemoglobin levels are important indicator to assess the iron status of the body[10].

So, present study has been designed to assess the iron status of women using oral contraceptives by evaluating the serum ferritin and haemoglobin levels.

MATERIALS AND METHODS

This cross-sectional comparative study was done prospectively in outpatient Department of Gynecology & Obstetrics in Dhaka Medical college Hospital from January 2006 to December 2006. Permission was taken from concerned Department after getting recommen-dation of ethical committee. Informed consent was taken from all the subjects.

Total 61 subjects of age ranged from 20-40 years were selected from different areas of Dhaka city, who belong to low socio-economic status. Out of total 61 subjects 20 were non-OCP user (Group-A) for comparison and 41 were OCP user (Study, Group-B). Group B was again subdivided in to three sub-groups (B_1- using OCP for 1-5 years, B_2- using OCP for 6-10 years, B_3- using OCP for > 10 years) according to duration of OCP use. Serum ferritin and haemoglobin level were taken as parameters of iron status of both group. Study subjects were selected considering inclusion and exclusion criteria. Inclusion criteria were a) women who are using oral contraceptive pill for at least one year, b) women of child bearing age (20-40 years) group, c) women of low socioeconomic status who have never received specific treatment of anaemia. Exclusion criteria were a) history of blood donation during previous year, b) history of severe illness during the previous year.

All the subjects were explained about the aim and objective of this study. The test procedure was briefed and demonstrated. Written consent was taken before performing the test. Detailed history of each subject was obtained by using a pretested questionnaire. Clinical examination of these subjects was done before taking blood samples.

Under all aseptic condition blood samples were collected from the subject by the help of expert nurse and collected samples were sent to the private pathological laboratory to obtain required reports.

All the results of laboratory investigations were analyzed by the SPSS 12.0 program and significant test were done by unpaired Student's 't' test, 'r' test and ANOVA test.

RESULTS

The mean (± SD) of serum ferritin levels were 59.45±24.79ng/ml and 77.36±35.16 ng/ml in group A and group B respectively. The difference of mean (± SD) of serum ferritin levels were significant ($p<0.05$) between group A and B (Table-I).

Table - I

Relation of serum ferritin level with OCP use

Group	N	Minimum ng/ml	Maximum ng/ml	Mean ± SD ng/ml	t	p
A	20	30.00	110.00	59.45 ± 24.79		
					2.04	< 0.05
B	41	19.00	144.00	77.36 ± 35.16		

N **:** Number of the subject, Group A **:** Non OCP users, Group B **:** OCP users

SD **:** Standard deviation, p **:** Probability value, t: t-test

Correlation between duration of OCP use and serum ferritin levels obtained by 'r' test and results are shown in Table-II and Fig-1.

Table-II

Correlation between duration of use of OCP and S.ferritin (n= 41)

	Minimum	Maximum	Mean ± SD	r	p
Duration (year)	1.00	12.00	4.86 ± 3.50	0.42	<0.01
Ferritin (µg/ml)	19.00	144.00	77.36±35.16		

The results are obtained by ANOVA test and are shown in Table-III and Fig-2. The mean (± SD) of serum ferritin levels were 64.60±27.35 ng/ml, 91.61±38.79 çg/ml, and 122.00±19.47 ng/ml in group B_1, B_2 and B_3 respectively. The differences of means (±SD) of serum ferritin levels were very significant. (p<0.01) among group B_1, B_2 and B_3.

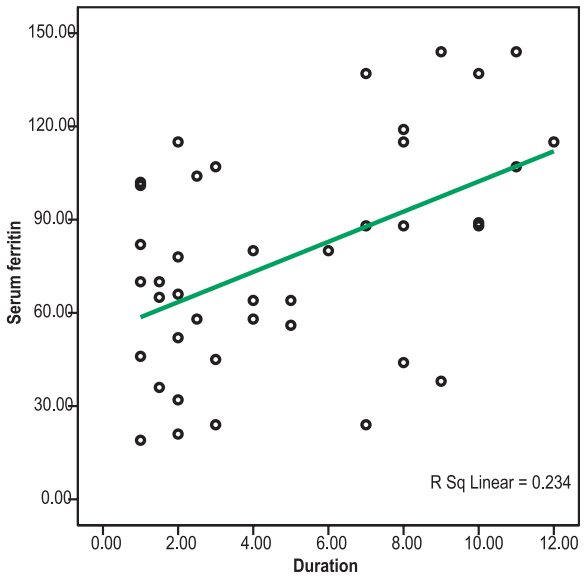

Fig-1: *Scatter diagram showing correlation between duration of OCP use and S. ferritin*

Table-III

Relation of S. ferritin level with duration of OCP use (Subgroup)

Group	D year	N ng/ml	Minimum ng/ml	Maximum ng/ml	Mean ± SD	f	p
B_1	1-5	25	19.00	115.00	64.60±27.35		
B_2	6-10	13	24.00	144.00	91.61± 38.79	6.56	< 0.01
B_3	> 10	3	107.00	144.00	122.00±19.47		

D: Duration, N: Number, SD: Standard Deviation, f: f-test, p: Probability value

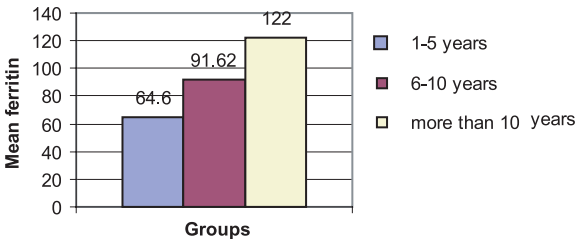

Fig-2: *Bar diagram showing relation of S. ferritin level with duration of OCP use (Subgroup).*

Table-IV shows the means (± SD) of haemoglobin level were 11.54 ± .76 gm/dl and 12.04 ± .79gm/dl in group A and groupB respectively.

The difference of means (± SD) of haemoglobin levels were significant (p<0.05) between group A and group B.

Correlation between duration of use OCP and haemoglobin level were obtained by "r" test and results are shown in Table-V and Fig-3.

Table-IV

Relation of Hemoglobin level with OCP use

Group	No.	Minimum gm/dl	Maximum gm/dl	Mean± SD gm/dl	t	p
B	41	10.95	13.95	12.04±0.79	2.35	<0.05
A	20	10.00	12.68	11.54±0.76		

Table-V

Correlation between duration of use of OCP and Hemoglobin (n= 41)

	Minimum	Maximum	Mean±SD	r	p
Duration (Year)	1.00	12.00	4.86± 3.50	0.48	< 0.01
Haemoglobin (gm/dl)	10.95	13.95	12.04±0.79		

The mean (± SD) of haemoglobin levels were 11.69± 0.47 gm/dl**,** 12.46±0.93 gm/dl and 13.11±0.71 gm/dl in group B_1, B_2 and B_3 respectively

The difference of means (± SD) of haemoglobin levels were very significant (p<0.01) among group B_1, B_2 and B_3 as shown in Table-VI and Fig.-4.

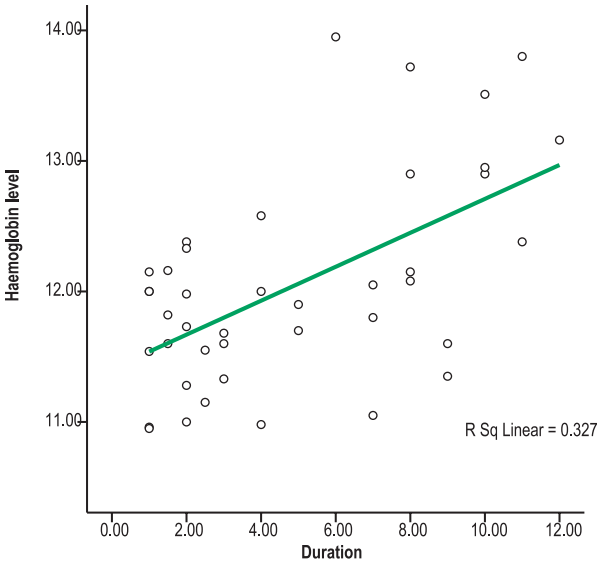

Fig-3: *Scatter diagram showing correlation between duration of use of OCP and Hemoglobin.*

Table-VI

Relation of Haemoglobin level with duration of OCP use (Subgroup)

Group	D year	N	Minimum gm/dl	Maximum gm/dl	Mean±SD gm/dl	f value	p
B1	1-5	25	10.95	12.58	11.69± 0.47		
B2	6-10	13	11.05	13.95	12.46±0.93	10.03	< 0.01
B3	>10	03	12.38	13.80	13.11± 0.71		

D: Duration, N: Number, SD: Standard Deviation, f: f-test, p**:** Probability value

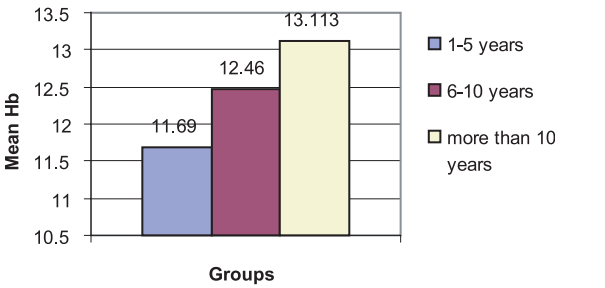

Fig-4: *Bar diagram showing relation of Haemoglobin level with duration of OCP use (Subgroup).*

Table-VII

Relation between duration of menstrual bleeding and OCP use

Group	No.	Minimum Day	Maximum Day	Mean± SD Day	t	p
B	41	1.00	7.00	3.22± 1.04	3.99	<0.001
A	20	2.00	10.00	4.091±1.87		

Table-VII shows the mean ± SD of duration of menstrual bleeding were 4.09±1.87 days and 3.22±1.04 days in group A and group B respectively. The difference of means (± SD) of duration of menstrual bleeding were highly significant (p <0.001) between two groups.

DISCUSSION

Anaemia is one of the major public health problems among women belonging to the child bearing age group. Population studies have shown that when menstrual loss increased, there was a risk of anaemia even among non-anaemic women[11,12,13]. Reduced menstrual blood loss among the OCP users cuts the risk of iron deficiency anaemia by 50%[14]. Several studies have shown that blood loss during menstruation is substantially reduced in 50-70% of women taking oral contraceptives[6]. It is therefore possible that the use of oral contraceptives might be associated with an improvement in haemoglobin status[15].

Serum ferritin and haemoglobin levels are important indicator to assess the iron status of the body[10]. Women using oral contraceptives have menstrual bleeding of shorter duration. There is a distinct inverse relationship between the serum ferritin levels and duration of menstrual bleeding. So serum ferritin level is high in OCP users [8].

In this study, the serum ferritin levels were higher in OCP users than in non-OCP users. The higher serum ferritin levels in OCP users were may be due to 1) decreased menstrual blood loss 2) hormonal stimulation of apoferritin biosynthesis in liver and /or 3) increased iron absorbtion5. These findings are in agreement with those reported by several studies[5,10-16,17]

Haemoglobin level was significantly higher (p< 0.05) in OCP usres than in OCP nonusers (Table-VI). This result is similar to those reported by other workers of different countries [6,8,10,17]. Higher haemoglobin level in OCP users than in non-OCP users is due to reduced menstrual blood loss among the OCP users [14]. Steroid hormones increase the number of red blood cell [18]. This may also contributes to raise haemoglobin level in OCP users. This result is similar to those reported by other workers of different countries[6,8,10,17].

An observation showed that the use of OCP was not associated with any improvement in haemoglobin status. It is possible that the extent of decrease in menstrual blood loss was too small to make any impact. It is also possible that some of the metabolic alteration, like changes in folic acid metabolism may have an adversed effect which neutralizes the possible beneficial effect of decreased menstrual blood loss[6].

In this study, the mean duration of menstrual bleeding in women using OCP was shorter than those of not using OCPs as shown in Table-VII. Also the volume of menstrual blood loss significantly decreased in OCP users than those of non-OCP users. These findings are also similar to those reported by other workers in different countries[3,5,14].

Longer duration of OCP use was also very significantly ($p<0.01$) associated with higher level of haemoglobin as shown in Table-VI and Fig-4. Prema K,[6] reported that mean haemoglobin level in subjects who had use OCP upto 18 month were essentially similar to those seen in the control group. But in a study by Ghoneim et al,[19] showed that anaemic women using OCP had an improved haemoglobin level, specially after long term use. Higher level of serum ferritin was very significantly ($p<0.01$) associated with the duration of OCP use.(Table-III & Fig-2). Similar results was found in a study by Milman N et al,[10].Thus the observed higher serum ferritin and haemoglobin levels in OCP users indicate beneficial effect of OCP on iron status.

CONCLUSION

From the results obtained in the present study and their comparison with those of published reports, it may be concluded that OCP has beneficial effects on iron status of the body as it raises the serum ferritin and haemoglobin levels.

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