

## ORIGINAL ARTICLE

## HAEMOGLOBIN STATUS IN REPRODUCTIVE AGE GROUP WOMEN USING HORMONAL CONTRACEPTIVES

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**Background:** Hormonal contraceptive use can be a trigger to altered levels of haemoglobin in reproductive age group women leading to anaemia. The objective of this study was to evaluate levels of haemoglobin in women of reproductive age using hormonal contraceptives. **Methods:** It was a case control study conducted in Family Health Hospital, Johar Town, Lahore. The study group women attending the Family Planning Unit were using low dose COC pills, Depomedroxyprogesterone acetate (DMPA) 3-monthly injection, or Norethisterone-enanthate (NET-EN) 2-monthly injections. Blood samples were obtained and haematological tests were run on the samples. **Results:** Tests revealed that women using injectable hormonal contraceptives were more prone to decreased haemoglobin levels after prolonged use as compared to those using COC pills. **Conclusion:** Long term use of progestin only injections can lead to anaemia as compared to COC pills in women of reproductive age group.

**Keywords:** Progestin only injection, COC pills, haemoglobin, anaemia, weight gain, pill, contraceptives

Pak J Physiol 2016;12 (1):10-2

## INTRODUCTION

Pakistan is one of the most populated countries after China and India. Population has been on increase due to either refusal or discontinuation of family planning methods. The contraceptive prevalence rate (CPR) in Pakistan is 27.6%; in urban areas 39.7%, and 21.7% in rural areas.<sup>1</sup> Hormonal contraceptive use can be a trigger to altered levels of haemoglobin in reproductive age group women leading to anaemia. Anaemia is clinically defined as decreased haemoglobin levels of blood below normal range. It can be mild (Hb=10-10.9 gm/dl), moderate (Hb=7-9.9 gm/dl) or severe (Hb=5-7 gm/dl). Prevalence of anaemia in Pakistan is 35% in non-pregnant and 51% in pregnant women.<sup>2</sup>

The hormonal contraceptives in use are of three types: low dose combined oral contraceptive (COC) pills, Depomedroxyprogesterone acetate (DMPA) and Norethisterone-enanthate (NET-EN) injections. Injections contain synthetic progesterone (progestin), but are devoid of estrogens. They belong to different group of steroids, equally effective but with different side-effects.<sup>3</sup> Progestins are chemically similar to progesterone but they act differently. Progesterone receptor complex has a very specific sequence, a change of even one carbon atom changes the message delivered to target tissues. Progestin being similar to progesterone binds to its receptors and alters the message hence creating a roadblock to the cascade of reactions. Long term use of progestin only injections causes irregular uterine bleeding which is the major reason for discontinuing these injections.<sup>4</sup> Naturally oestrogen and progestin act by balancing each other. In progestin only contraception decidualization leading to endometrial atrophy could be the cause of irregular bleeding pattern.<sup>5</sup> Abnormalities in endothelial cells, extracellular matrix

proteins<sup>6</sup> and fragile superficial endometrial blood vessels<sup>7</sup> are seen in these cases. Progestins have anti estrogenic effect leading to suppression of estrogenic receptors along with activation of enzymes in oestrogen metabolism.<sup>8</sup> This imbalance causes instability of endometrium.

In COC there is low dose combination of oestrogen and progestin which is effective contraceptive but is insufficient to maintain the endometrial integrity. 17- $\beta$ -estradiol is inactivated in endometrium to estrone. This process is catalysed by an enzyme which is stimulated by progestin and converts estradiol to estrone, which is in turn unable to proliferate endometrium, hence creating an imbalance leading to irregular bleeding. After prolonged use regular patterns in COC pills follow, which is not the case in progestin only contraceptives.<sup>9</sup>

The present study aimed to evaluate levels of haemoglobin in women of reproductive age using hormonal contraceptives.

## MATERIAL AND METHODS

For this case control study 110 healthy women were selected from the outdoor of Family Health Hospital, Johar Town, Lahore. They were chosen by purposive sampling technique. Fifty-five of them were using progestin only injections, while 25 were on low dose COC pills for more than 6 months. Control group was of 30, married, of same age group but not using any contraceptives. All subjects were healthy, not on treatment for any disease, and not lactating. Diabetics, epileptics and any pelvic pathology subjects were excluded. The subjects were divided into 4 groups; group 1 nonusers (Control), group 2 DMPA users, group 3 NET-EN users, and group 4 COC pill users. After obtaining informed consent, 5 ml blood samples

were taken in EDTA coated tube. Complete blood analysis was done using Hemolytic Seismic Analyzer.

Data analysis was performed using SPSS-16. Results were described in terms of Mean±SD for quantitative continuous variables, and in frequencies and percentages for qualitative variables. Statistical comparison of means of study variables were analysed using one way analysis of variance (ANOVA).

**RESULTS**

Present study comprised of 110 subjects of mean age 30.8±5.4 year. Twenty-three percent of the subjects were using Inj. NET-EN, 27% were using Inj DMPA, and 23% used oral contraceptives. Twenty-seven percent of the subjects were controls who were nonusers of any medicinal contraceptives. Table-1 describes the details of basic characteristics and haematological variables of the study population.

Basic characteristics and biochemical variables of all four groups were compared on ANOVA and Statistically significant differences were noted between the four study groups with respect to BMI, weight, hemoglobin, RBCs and MCH. There were no significant differences in age, height, MCHC, and WBCS of the study population. (Table-2).

**Table-1: Basic characteristics and haematological variables of the study population (n=110)**

VARIABLES	Mean±SD	Maximum	Minimum
Age	30.8±5.4	45.0	22.0
Height	152±11.2	165.0	47.5
Weight	53.8±6.6	68.0	38.0
BMI	24.7±15.8	18.6	16.6
RBCs	4.0±0.60	5.02	2.33
Hb	9.9±1.6	13.6	7.4
MCH	24.4±2.2	28.9	20.2
MCHC	31.1±15.8	34.7	23.2
WBC	8.3±1.4	10.6	5.2

**Table-2: Comparison of variables between groups by one-way ANOVA (n=110)**

Variables	Control	Inj DMPA	Inj NET-EN	COC pills	p
BMI	27.5±3.10	21.9±2.4	24.8±3.0	24.6±3.5	0.02
Height	1.52±5.29	1.49±9.9	1.54±5.5	1.52±3.6	0.55
Weight	50.6±6.3	51.6±6.6	58.4±4.0	56.0±6.2	0.00
Age	30.4±5.3	31.9±6.6	31.5±5.0	29.1±4.2	0.25
RBC	4.38±0.42	3.73±0.61	3.67±0.50	4.32±0.50	0.00
Hb	11.12±1.44	8.85±0.94	8.56±0.63	11.2±1.46	0.00
MCH	26.85±1.37	22.7±1.59	22.3±0.83	24.3±1.31	0.00
MCHC	32.11±1.49	30.1±3.5	30.6±3.6	31.2±1.58	0.07

**DISCUSSION**

Population is growing at an alarming rate in developing countries. Case studies reported that increase in population is because of discontinuation of contraceptive methods. According to Pakistan demographic and health survey 2012–2013, only 29% of women aged 15–49 years in Punjab were using different contraceptive methods including injections, OCP, sterilization etc. out of which only 3% were on contraceptive injections.<sup>10</sup> In addition to social pressures

the adverse effects include disrupt menstrual cycle causing breakthrough bleeding, heavier bleeding leading to anaemia and amenorrhoea, abnormal systemic hormonal levels and higher incidence of weight gain being the major cause of discontinuation of contraceptives.<sup>11</sup>

The results of previous studies regarding anaemia and its association with contraceptives have always been conflicting, biased and a topic still being debated upon. Present study indicates that the women using contraceptive injections experienced heavy, prolonged bleeding causing mild to moderate type of anaemia which is microcytic normochromic in morphology. These findings are contradictory to another study which shows that women on contraceptive had scanty bleeding followed by amenorrhea not leading to any type of anaemia or any other medical complication.<sup>12</sup> The difference between findings of studies of developed and developing countries is because of the fact that Pakistani women have faced poor socioeconomic factors including under-nutrition, poor health, early teenage marriages and multiparity which may prove to be aggravating factors for anaemia beside the menstrual irregularities which is not true for developed countries.<sup>13</sup>

Current study indicates that the women using DMPA experienced prolonged menstrual bleeding and moderate anaemia as compared to those who were on NET-EN injection or oral pills. This shows that NET-EN and oral pills are safer contraceptive than DMPA injections. This observation of the current study is in disagreement with Hickey M<sup>14</sup> who reported that DPMA injection is safe and has less unwanted side-effects as compared to other injectable and oral contraceptives.

Some Indian authors had reported mild to moderate anaemia in Indian women on contraceptives, the present study supports their observations. This is because of the fact that both countries are developing and women of these countries have faced same socioeconomic factors mentioned above. In case of low dose COC pills bleeding irregularity is settled after 6 months use but it is not the same in progestin only injections. According to a study<sup>15</sup>, it is the fear of side-effects leading to anaemia and weakness which is the major reason of discontinuation in India. This is in agreement with the present study. Some studies<sup>16,17</sup> have shown no change in haematological parameters in female hormonal contraceptive users although they did agree with the irregular bleeding pattern more severe in case of progestin only users as compared to low dose COC pills.

In majority of cases bleeding irregularity does not revert back to normal after 6–9 months predisposing the women to low Hb levels. Our study is in agreement

with a previous study<sup>18</sup> in which Hb levels were unaffected by use of COC pills.

This study showed that there was relevancy between weight and hormonal contraceptive use. Weight gain was reported after prolonged use of these contraceptives. Same observations were confirmed by Espey E<sup>11</sup> that DMPA use is directly related to weight gain. Another study<sup>19</sup> was also in agreement that use of DMPA and oral pills caused weight gain. Work of another study group<sup>20</sup> showed significant increase in body weight in progestin only users especially the DMPA users.

There was decrease in Hb levels in our subjects after prolonged use of hormonal contraceptives. DMPA users were more at risk than NET-EN users. DMPA users were more prone to frequent irregular bleeding compared to NET-EN users which was the cause of decreased Hb levels leading to anaemia. COC pills had no such effects as compared to progestin only injections because of supportive effect of oestrogen. The use of these hormonal contraceptives was related to weight gain after prolong use. The physicians can always weigh the benefits of the hormonal contraceptive use against their side-effects and can guide when to stop while it is still time to prevent irreversible damage.

## CONCLUSION

Prolonged use of progestin only contraceptives leading to decreased haemoglobin level can be an aggravating factor to development of anaemia through irregular and heavier bleeding patterns. Baseline evaluation of anaemia in women prior to using the hormonal contraceptive methods may help in preventing onset of anaemia in our women.

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Received: 12 Nov 2015

Revised: 26 Dec 2015

Accepted: 10 Jan 2016