International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Sharma A et al. Int J Reprod Contracept Obstet Gynecol. 2018 Mar;7(3):860-863
www.ijrcog.org

pISSN 2320-1770 | eISSN 2320-1789

DOI: http://dx.doi.org/10.18203/2320-1770.ijrcog20180410

Original Research Article

Effect of oral contraceptives on tear film in reproductive age group women

Amita Sharma[1], Surabhi Porwal[1]*, Manoj Tyagi[2]

[1]Department of Obstetrics and Gynecology, Gandhi Medical College, Bhopal, Madhya Pradesh, India
[2]Department of Ophthalmology, Bundelkhand Medical College, Sagar, Madhya Pradesh, India

Received: 14 January 2018
Accepted: 24 January 2018

***Correspondence:**
Dr. Surabhi Porwal,
E-mail: porwalsurabhi@gmail.com

ABSTRACT

Background: According to WHO 2009, 60-70% women use one of the method of contraception. 8.8% to 15.4% women use oral contraceptives. Objective of present study was to investigate the effect of oral contraceptives on androgen profile and tear film parameters in females within child bearing age.
Methods: Present study involve 100 healthy women between 20-45 years, who presented in family planning clinic. Two groups were made according to the use of oral contraceptive pills. Study group consist of 50 women who were on OCPs (Oral contraception pills) and 50 as control group were not taking any hormonal contraceptives. Serum testosterone and DHEA levels of all subjects was done by Enzyme Immuno Assay on blood samples which were collected during 3th to 7th day of menstrual cycle. Quantitative test for tear secretion was done by Schirmer's test. Stability of tear film was measured by Tear Breakup time (TBUT). Statistical analysis was done to determine the correlation between use of OCPs and androgen profile and tear film parameters.
Results: Present results shows decreased androgen levels in women taking oral contraceptives as compared with age matched women who were not taking oral contraceptives. Tear secretion was significantly reduced in study group as indicated by decreased Schirmer's test values in study group as compared to control group, the tear film stability was also significantly decreased in women taking oral contraceptives.
Conclusions: Present study suggest that androgen profile decrease in women taking oral contraceptives. These results support that use of oral contraceptives may be an important etiological factor in pathogenesis of dry eye disease reproductive age group women.

Keywords: Androgen, Dry eye, Oral contraceptives, Schirmers test, Tearfilm breakup time

INTRODUCTION

According to WHO 2009, 60-70% women use one of the method of contraception. 8.8% to 15.4 %women use oral contraceptives.

Estimated 100 million women use oral contraceptive pills world wide.[1] These hormonal pills have combination of estrogen and progesterone. Oral contraceptives have many side effects such as nausea, vomiting, headache, mood changes, abdominal pain, increased risk of cardiovascular side effects and venous thrombosis. Ocular side effects of OCPs are blurring of vision and rarely retinal vascular occlusions. Many women on oral contraceptive have ocular complaints such as dry eye syndrome.[2] Many study on dry eye after menopause have been done but few studies were done on effect of oral contraceptive in reproductive age group.

Dry eye syndrome (DES or keratoconjunctivitis sicca) is a common multifactorial disease of the tears and the ocular surface. Dry eye occurs when there is deficiency in aquous tear production or excessive tear evaporation. Tear film along with ocular surface constitute lacrimal functional unit which is maintained through regulation by neuronal and hormonal mechanisms. Disruption of this functional unit by various causes can lead to dry eye syndrome. It is one of the leading causes of patient visits to ophthalmologists and optometrists in the United States and many parts of the world.[3] Dry eye syndrome (DES) is traditionally considered the disease of old age, female gender and post menopause. Sex steroids hormones (Androgens, Progestin and Estrogens) have been identified in tear film and their levels correlated with serum level. Influence of not only estrogen but also of androgen and other sex hormones in the pathophysiology of DES has been correlated.[4,5]

Many studies had suggested that androgens play a significant role on the structural characteristics, functional, and pathologic features of the lacrimal gland. There have been some suggestions that oral contraceptives (OC) might lead to qualitative and quantitative changes in tear film.[3] Various animal studies shows that androgen receptors are present on various ocular tissues. These hormones regulate the secretary functions of lacrimal and meibomian glands.[6] Several studies suggested that sex hormones had role in structural functional characteristics of ocular tissues and had a etiological role in pathogenesis of dry eye syndrome.[7]

There are few studies those done in reproductive age group of women regarding effect of OCPs on dry eye. Oral contraceptives may be an important cause of androgen deficiency in child bearing age group. It was also suggested that oral contraceptive might decrease mucus production, increase foreign body sensation, reduce contact lens tolerance and increases the risk of dry eye in women using oral contraceptive.[7]

In developing country like india, there is increasing trend of using OCPs by reproductive age group women as method of contraception, so they might be at the risk of dry eye syndrome. In this study we tried to investigate the correlation of OCP and androgen profile with dry eye in women taking oral contraceptives in child bearing age group.

METHODS

T This study was prospective case control study. This study involves 100 healthy women of child bearing age group within the age of 20 to 45, were visiting the family planning clinic of Gynecology OPD. The 100 participants were equally divided into two groups. The case group consists of 50 females who were currently on oral contraceptives. The control group consists of 50 females who were not using any hormonal contraceptive. The control and case group were demographically matched. Informed consent was obtained from each participant and study was approved by ethical committee of the institute. Detailed history regarding personal data, gynecological history, systemic medication uses and duration of hormonal contraceptive. Any ocular complain was taken. Detailed ocular examination was done in eye OPD to rule out any ocular surface and anterior segment abnormality.

Inclusion criteria for control group: Women of age between 20-45 years, not on hormonal contraceptives and were in follicular phase (3-7 day of menstrual cycle).

Inclusion criteria

Women within age group of 20-45 years who were on oral contraceptive (mala-D and mala–N) at least since last one year and all were on follicular phase.

Exclusion criteria

Pregnancy, menopausal and women underwent for oopherectomy. Women with history of systemic disease and on systemic medication. Ocular factors which were excluded from study are ocular surgery, contact lens use, chronic topical medication, laser treatment, chemical injury, blepheritis and any other obvious ocular disorder.

Hormonal assay

Plasma level of total testosterone and DHEA were measured by EIA using Erba Elisa Reader. For this blood samples were collected from all participants who were in their early follicular phase (3-7 day). Blood was collected in specimen tubes without anticoagulant tubes were left to stand for 1 hour at room temperature and centrifuged at 2500 rpm in microcentrifuge. Serum was collected in new specimen tubes and also kept at -20°C for long term storage.

Schirmer's I test was done to measure the total tear secretion. Schirmer's strip (Whatman filter paper 41) was gently put at the junction of middle and outer 2/3 of lower lid taking care not to touch the cornea or eye lashes. Participants were asked to look up and blink normally or to close the eye whichever the participant feel comfortable. The strip was then removed 5 min after insertion. Three subsequent readings were taken with 10 min interval. The wet portion of strip from bent portion was measured in mm. Average of three readings were taken value less than 10 mm/after 5 min was considered as dry eye.

TBUT- was measured after fluorescein dye is instilled in cul-de-sac and tear film is observed on slit lamp with cobalt blue light. Participants were refrained from blinking and the first dark spot or streak were noticed this discontinuous in fluorescein indicate break in the continuity in tear film. The time elapsing between complete blink and the appearance of first dark spot or streak was measured with stop cloak three successive

measurements were taken and mean value was taken. TBUT reading <10sec was considered as dry eye.

Statistical analysis

The data was analyzed with SPSS software. The effect of oral contraceptives on tear secretion and tear film stability in control and case group were determined by using students unpaired t test and the correlation between plasma androgen (testosterone and DHEA) and tear secretion and tear film stability was determined by pearson correlation. P value <0.05 were taken as significant.

RESULTS

Study consists of 100 women in reproductive age group, these women were divided in 2 groups. Control group of 50 cases and 50 cases in test group. Demographic profile of both groups was similar.

Androgen profile of both groups is shown in Table 1.

Table 1: Mean serum levels of testosterone and DHEA with std deviation and p value between both groups.

	Group	N	Mean (ng/dl)	Std. deviation	t-value	p-value
Serum testosterone levels	Control	50	0.66	0.04	7.01	0.00
	Test	50	0.58	0.06		
Serum DHEA levels	Control	50	9.85	0.77	8.54	0.00
	Test	50	8.62	0.65		

Table 1 demonstrate mean serum levels of Testosterone and DHEA in both groups. The mean serum DHEA levels were significantly reduced in test group as compared with control group and difference was statistically significant.

These findings suggest that the androgen profile (serum testosterone and DHEA) was significantly reduced in women who were on oral contraceptives.

Table 2: Schirmer test.

	Group for Schirrmer's test	N	Mean (mm/5min)	Std. deviation	t value	p value
Schirmer's Test	Control	50	31	7	16.12	0.00
	Test	50	13	3		

Table 2 demonstrate the tear secretion (Schirmer's Test values) in both groups. The mean of Schirmer's test was 31mm/5minutes in control group while in test group it was 13mm/5 minutes. Tear secretion was significantly reduced in test group as compared with control group and difference was statistically significant (p= 0.00). These findings suggest that tear secretion was significantly reduced in women who were on oral contraceptives.

Table 3: TBUT test.

	Group for TBUT	N	Mean (sec)	Std. deviation	t value	p value
TBUT	Control	50	13.6	1.3	0.9	0.35
	Test	50	11.9	1.2		

Table 3 demonstrate mean TBUT test in both groups. The mean of TBUT test was 13.6 seconds in control group while in test group it was 11.9 seconds.

The TBUT values were reduced in test group but the difference was not significantly as compared with control group (p=0.35). In present study we found that serum androgen levels were significantly reduced in women who were on oral contraceptives, similarly the tear secretion was also reduced in these women. We got linear correlation of Schirmer's test and TBUT- test with androgens profile (Serum testosterone level and Serum DHEA level). As serum androgen levels decreased, Schirmer's test and TBUT-test results reduced.

DISCUSSION

Dry eye is a generic term for a group of conditions characterized symptomatically by irritated, gritty, burning eyes and clinically by alteration in the tear film and anterior surface of the eye.[2] Sex hormones appear to influence structural and functional aspects of the eye and contribute to ocular surface disorders such as DED.[1]

In a normal menstrual cycle, the follicular phase (day 1-14) is marked by low levels of progesterone and levels of estrogen rises gradually, ovulation occurs mid-cycle (day 13-16) after the estrogen peak, and the luteal phase is marked by rising progesterone levels and less steep rise in estrogen levels.[3,6,8]

Hormonal contraceptives, most commonly combined synthetic estrogen and progesterone, work by inhibiting ovulation.[1] Tear is a fluid that covers the cornea and the conjunctiva. Tears lubricate, nourish and protect the eyes from dust, irritants and infections. The primary role of the tear film is to establish a refractive surface of high quality for the cornea and to ensure the well-being of the corneal and conjunctival epithelium. The imbalances in the composition of tears, may either decrease tear production or encourage excessive tear evaporation.[3,4]

The results of this study revealed that there was significant difference in tear secretion ($P<0.05$) but not in tear stability between women on oral contraceptives and women not using hormonal contraceptives. The results were consistent with the observation various studies who carried out a similar study on the correlation in androgen profile in pre-menopausal women with dry eye syndrome.[9-12] They reported that the oral contraceptives in pre-menopausal women may contribute to dry eye syndrome. They also inferred that oral contraceptives may be an important cause of androgen deficiency in this age group.

There are controversial reports on the effects of oral contraceptives in pathogenesis of dry eye. Sullivan et al. suggested androgen deficiency may be an important etiological factor in pathogenesis of evaporative dry eye in women. Oral contraceptives may be an important cause of androgen deficiency in child bearing age group.[6]

Few studies observed that there is no significant correlation between serum levels of progesterone level and tear secretion and tear stability. They also did not found any correlation between tear film stability, secretion and use of injectable hormonal contraceptives in child bearing age.[13,14]

CONCLUSION

Present study shows that androgen levels decrease in women taking oral contraceptives. These results support that androgen deficiency and oral contraceptives may be an important etiological factor in pathogenesis of dry eye syndrome.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Christin-Maitre S. History of oral contraceptive drug and their use world wide. Best Pract Res Clin Endocrinol Metab. 2013 Feb;27(1):3-12.
2. Petitti DB, Sidney S. Four decades of research on hormonal contraception. Perm J. 2005;9(1):29-34.
3. Sullivan DA, Yamagami H, Liu M, Steagall RJ, Schirra F, Suzuki T et al. Sex steroids, the meibomian gland and evaporative dry eye. Adv Exp Med Biol. 2002;506:389-99.
4. The definition and classification of dry eye disease: report of the Definition and Classification Subcommittee of the International Dry Eye Workshop. Ocul Surf. 2007;5(2):75-92.
5. Sullivan DA. Tearful relationships? Sex, hormones, the lacrimal gland, and aqueous-deficient dry eye. Ocul Surf. 2004;2(2):92-123.
6. Versura P, Fresina M, Campos EC. Ocular surface changes over the menstrual cycle in women with and without dry eye. Gynecol Endocrinol. 2007; 23(7):385-90.
7. Schaumberg DA, Sullivan DA, Buring JE, et al. Prevalence of dry eye syndrome among US women. Am J Ophthalmol. 2003; 136(2):318-26.
8. Seymenoglu G, Baser EF, Zerdeci N. Corneal Biochemical properties during the menstrual cycle. Curr Eye Res. 2011;36(5):399-403.
9. Nanavaty MA, Long M, Malhotra R. Transdermal androgen patches in evaporate dry eye syndrome with androgen deficiency: apilot study. Br J Ophthalmol. 2014;98:567-9.
10. Chen SP, Massaro-Giordano G, Pistilli M, Schreiber CA, Bunya VY. Tear osmolarity and dry eye symptoms in women using oral contraception and contact lenses. Cornea. 2013 April;32(4):423-8.
11. Azcarate PM, Venincasa VD, Feuer W, Stanczyk F, Schally AV, Galor A. Androgen deficiency and dry eye syndrome in the aging male. Invest Ophthalmol Vis Sci. 2014;55:5046-53.
12. Ding J, Sullivan DA. Aging and dry eye disease. Exp Gerontol. 2012;47:483-90.
13. Foster CS. Dry eye syndrome. Medscape. http;//emedicine.medscape.com/article/1210417-overview#showall. Updated February 20,2014.Accessed October 10, 2013.
14. Burkman R, Bell C, Serfaty D. The evolution of combined oral contraception: Improving the risk to benefit ratio. Contraception. 2011;84(1):19-34.

Cite this article as: Sharma A, Porwal S, Tyagi M. Effect of oral contraceptives on tear film in reproductive age group women. Int J Reprod Contracept Obstet Gynecol 2018;7:860-3.