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**Original Article**

# Biochemical Effects of Oral Contraceptive Pill On Total Serum Protein, Hemoglobin and Antioxidants Capacity among Females Athletes

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## ABSTRACT

Total serum protein, hemoglobin and antioxidant system are essential to the body's physiological activities. Oral contraceptive pills influence the level of proteins of both types present in the blood; thus, it is found to change among pregnant women. **Objectives:** To scrutinize oral contraceptive pills' effects (OCP) on total serum protein, hemoglobin and antioxidant capacity among females. **Methods:** The participants were divided into the experimental group (EG-60) and control group (CG,-24). 5 ml of blood was collected from each subject and marked with a different identification code. The collected blood samples were processed through laboratory protocols, and thus the targeted tests were performed to achieve the desired results. The results of tests were processed through a statistical package for social sciences (SPSS, version-26), and thus appropriate statistical tools were applied for analysis. **Results:** Total number of subjects in both groups were 84. Mean of CG in term of hemoglobin was 13.91±.92 and Mean of EG in term of hemoglobin was 14.18±.84. Mean of CG in term of total serum protein was 6.75±.48 and Mean of EG in term of total serum protein was 6.62 ±..31. **Conclusion:** Based on the analysis, the researcher concluded that contraceptive pills significantly affect total serum protein, hemoglobin and antioxidant capacity among females.

## INTRODUCTION

Millions of women around the globe use contraceptive pills (OCP) to avoid unintended pregnancy. Therefore, awareness of the risk and benefits of OCP is essential [1]. Excessive use of OCP causes different health problems. OCP also causes oxidative stress. Oxidative stress refers to an imbalance level of both antioxidants and reactive oxygen Species (ROS) and nitrogen species (NOS); thus, this state negatively influences the antioxidant defence mechanism [2, 3]. Free radicals are harmful because they retrieve electrons from different molecules, which cause the formation of oxidized forms [4]. Other research studies indicate that oxidative stress may cause various inflammatory, muscular, cardiovascular, and neurodegenerative diseases [4, 5]. Many studies reveal that exercise with maximum volume and intensity induces oxidative stress. In addition, several types of medicine also

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cause oxidative stress. OCP therapy (OCT) among pre-menopausal women increases oxidative stress, which causes many cardiovascular health problems. It means that OCT may cause adverse effects on vascular functions [6]. Many vivo and in vitro studies have shown that women with HRT observed antioxidant effects of estrogen [7, 8]. It is also reported that both estrogens and progestin cause oxidative stress. Proteins are the building blocks of cells and tissues of the body. It helps grow and develop health [9, 10]. Blood contains two important types of proteins, i.e. albumin and globulin. Both have their functions, as Albumin proteins possess fluid from leaking out of blood vessels, while Globulin proteins play an essential role in the parts of the immune system [10-12]. Total serum protein is the amount of protein present in the blood. It is used to measure the amount of two significant classes of protein present in the blood, i.e. albumin and globulin [13, 14]. OCP pills influence the level of proteins of both types present in the blood; thus, it is found to change among pregnant women [15]. Mostly hemoglobin is a protein in red blood cells that carry oxygen to various body organs and transports carbon dioxide from organs and tissues to the lungs [16, 17]. A low level of hemoglobin indicates anemia, while a high level indicates blood disorder polycythemia vera, smoking and dehydration, and high altitude. Likewise other proteins, OCP affects the level of hemoglobin [18, 19].

## METHODS

The researcher applied the following procedures to achieve the results of the study. The study subjects were comprised of users of OCP (EG-60) and non-user females of OCP (CG-24). Five (05) ml of blood was taken from each subject, and thus different identification code was given to each blood sample. The collected blood samples were processed through laboratory protocols. Therefore the targeted tests (i.e. Ferric reducing assay protocols (FRAP) for antioxidant capacity measurement and LFTS for diagnosing total serum protein and hemoglobin) were performed to achieve the desired results. The ethical and review board of Gomal University, Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan, approved the protocol of this specific research study. The collected facts or data were arranged and examined using mean, standard deviation, frequency and percentage, etc., through a statistical package for social sciences (SPSS, version-26).

## RESULTS

Figure 1 indicates the total number of subjects in both groups were 84 (CG=24, EG=60) and level of hemoglobin in both groups. Mean (M) and standard deviation (SD) of CG in term of hemoglobin was 13.91 ±.92 and thus Mean (M) and standard deviation (SD) of EG in term of hemoglobin was 14.18 ±..84, Df was -1.28 and P values was .203.

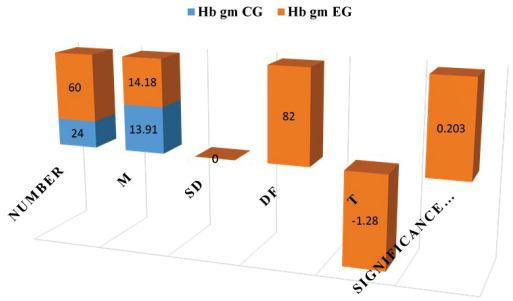


**Figure 1:** Hemoglobin level in both EG and CG

Figure 2 indicates the total number of subjects in both groups was 84 (CG=24, EG=60) and the total serum protein in both groups. The Mean (M) and standard deviation (SD) of CG in term of total serum protein was 6.75 ±.48 and thus Mean (M) and standard deviation (SD) of EG in term of total serum protein was 6.62 ±..31, Df was -1.48 and P values was 0.142.

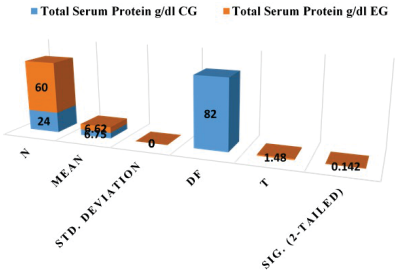


**Figure 2:** Level of total serum protein in both EG and CG

Figure 3 indicates the total number of subjects in both groups was 84 (CG=24, EG=60) and oxidative stress in both groups. The Mean (M) and standard deviation (SD) of CG in term of FRAP was 137.95 ±.20.87 and thus Mean (M) and standard deviation (SD) of EG in term of FRAP was 110.54 ±..31, Df was -82 and P values was .002.

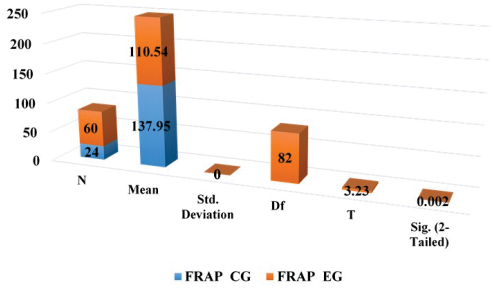


**Figure 3:** Level of oxidative stress in both EG and CG

## DISCUSSION

After a critical assessment of all the above discussion, it is clear that OCP and other medicines affect the physiology of different enzymes and hormones. What are the effects of OCP on hemoglobin and total blood protein and antioxidants system? To discover this fact, the researcher intends to carry out a study titled "Biochemical effects of contraceptive pill on total serum protein, hemoglobin and antioxidants capacity among female athletes. The current result reveals that OCP has significant effect upon

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antioxidants capacity. In line with this finding, the study conducted by Adejumo et al indicates that OCP among females' levels of serum antioxidants thus it caused oxidative stress [20]. The study conducted by Khan et al. showed that OCP, as well as other types of vaccination like Covid-19 vaccination, also causes oxidative stress among female athletes [21]. The study indicates that OCP alter the level of hemoglobin. The same finding is drawn by other studies that OCP affects females' menstrual cycle and hemoglobin levels [22, 23]. The result also indicates effects of OCP on total serum protein. This emerging finding is supported by previous finding that OCP alters the blood serum protein level [15, 24].

## CONCLUSIONS

Based on analysis and findings, the researcher concluded that OCP significantly affects total serum protein, hemoglobin and antioxidant capacity among female athletes.

## Conflicts of Interest

The authors declare no conflict of interest

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