

Short Communication

Assessment of total leukocyte counts, during menstruation

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The objective of the present study was to investigate if menstruation actually alters the quantity of the total population of the leukocytes in the body of females. If it alters the leukocytes counts in the body, the extent to which it affects it was also ascertained using student of the University of Benin as case study. Menstruation is the shedding of the endometrial lining accompanied by the loss of blood through the vagina. Normal blood loss through menstruation has not been cited as a factor that can alter the leukocyte count in healthy females. A randomized selection of female students of the University was carried out. After preliminary medical check-up, blood samples were taken before and during menstruation. A total of thirty (30) students between the ages of 18 to 29 years were included in the study. Estimations of the total leukocytes were carried out. Results presented as mean \pm SEM for pre-menstruation and during menstruation were 5313 ± 22 and 6080 ± 33 , respectively. The increase in total leukocyte count is statistically significant. It is concluded that menstruation causes an increase in the total leukocyte count in the body.

Key words: Granulocytes, agranulocytes, leukocytes, menstruation.

INTRODUCTION

The regular monthly discharge of blood through the female genital tract give rise to the mere thought that there might be an effect on the population of white blood cells in the body. Menstruation occurs primarily in humans and close evolutionary relatives such as Chimpanzees (Strassmann, 1996). White blood cells (WBC) are made up of different types of cells which may be affected differently by menstruation.

Menstruation is defined as the shedding of the uterine lining (endometrium) accompanied by the discharge of blood from the endometrial arteries. Normally, blood loss during menstruation ranges from 10 to 80 ml (David, 2004). White blood cells are also called leukocytes. A condition in which there is a low quantity of leukocytes in the body (low leukocyte count) may occur when either there is a decreased production of leukocytes by the bone marrow or there is a loss of blood as a result of hemorrhage (Bagby, 2007).

MATERIALS AND METHODS

Thirty (30) female students were used for this research after obtaining their consent to be used as subjects. All the subjects selected were free from infections and fever. Questionnaires were distributed to them to find out the usual duration of their menstruation and their menstrual cycle; age, and their diet. Samples were collected from subjects on the morning of the mid-cycle (10th to 14th day) of their menstrual cycle and on the last day of their subsequent menstruation, that is, the day their menstruation was expected to stop. Total population of leukocytes in the blood (total leukocyte count) was taken.

Statistical analysis

Data was presented as mean \pm S.E.M. Results collected before and during menstruation were analyzed using paired sample student t-test and p-values obtained. P-values less than (<0.05) were considered statistically significant. The results were statistically represented using multiple bar charts.

RESULTS AND DISCUSSION

The results are presented in Tables 1 to 6.

Menstruation refers to the shedding of the endometrial lining accompanied by bleeding (blood loss) through the

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Table 1. Granulocyte, agranulocyte, and total leucocyte counts in cells/mm³ before and during menstruation expressed as mean \pm SEM.

Variables	Before menstruation	During menstruation	p-value
Granulocyte count	3375 \pm 165	4024 \pm 242	
Agranulocyte count	1938 \pm 113	2056 \pm 151	P < 0.05
Total leukocyte count	5313 \pm 217	6080 \pm 327	

Table 2. Granulocytes count in cells/mm³ of subjects of different groups of ages, expressed as mean \pm SEM.

Age groups (years)	Number of subjects (n)	Before menstruation	During menstruation	p-value
18-21	8	3300 \pm 257	4389 \pm 447	
22-25	16	3448 \pm 291	3790 \pm 374	P < 0.05
26-29	6	3281 \pm 108	4162 \pm 375	

Table 3. Agranulocytes count in cells/mm³ of subjects of different groups of ages, expressed as mean \pm SEM.

Age groups (years)	Number of subjects (n)	Before menstruation	During menstruation	p-value
18-21	8	1975 \pm 256	1991 \pm 153	
22-25	16	1945 \pm 147	2082 \pm 252	P > 0.05
26-29	6	1869 \pm 277	2071 \pm 333	

Table 4. Total Leukocytes count in cells/mm³ before and during menstruation of subjects of different durations of menstruation expressed as mean \pm SEM.

Duration of menstruation (days)	Number of subjects (n)	Before menstruation	During menstruation	p-value
3	3	6300 \pm 1229	7933 \pm 1790	
4	6	5567 \pm 518	6267 \pm 757	
5	9	5183 \pm 414	5433 \pm 537	P > 0.05
6	6	5492 \pm 284	5850 \pm 718	
7	6	4600 \pm 283	6167 \pm 457	

Table 5. Granulocytes count in cells/mm³ of subjects of different duration of menstruation, expressed as mean \pm SEM.

Duration of menstruation (days)	Number of subjects (n)	Before menstruation	During menstruation	p-value
3	3	4195 \pm 846	5455 \pm 1100	
4	6	3414 \pm 483	4131 \pm 625	P > 0.05
5	9	3296 \pm 353	3373 \pm 396	
6	6	3440 \pm 99	3777 \pm 498	
7	6	2979 \pm 170	4093 \pm 387	P < 0.05

vagina. The effect of menstruation on leukocyte counts had been a subject of great debate amongst medical practitioners and students since it causes blood loss. Menstruation which is a physiological process that occurs at the beginning of the menstrual cycle of females can

influence the general physiological state of an individual. This is because; it involves the interplay of different levels of hormones responsible for the occurrence and maintenance of the menstrual cycle.

In this study, we recorded a total leukocyte count of

Table 6. Agranulocytes count in cells/mm³ of subjects of different duration of menstruation, expressed as mean \pm SEM.

Duration of menstruation (days)	Number of subjects (n)	Before menstruation	During menstruation	p-value
3	3	2103 \pm 440	2479 \pm 1073	P > 0.05
4	6	1985 \pm 277	2153 \pm 267	
5	9	1887 \pm 254	2060 \pm 236	
6	6	1855 \pm 250	2073 \pm 275	
7	6	1621 \pm 175	2074 \pm 353	

subjects being within the normal range of 4000 to 11000 cells/mm³ as reported by Bagby (2007). Also, the granulocyte count make up about 63.5% and agranulocyte count make up about 36.5% of the total leukocyte count before menstruation. During menstruation, there was a significant increase in the total leukocyte and granulocyte count. However, the agranulocyte count shows only minute increase during menstruation which was not statistically significant. Also the percentage increase in the agranulocyte count was as low as 6% while the total leukocyte count shows 14.4% increase and the granulocyte count shows 19.2% increase during menstruation.

The significant increase in the total leukocyte and granulocyte counts is as a result of the release of tremendous number of leukocytes during menstruation (Guyton and Hall, 2000). As a result of this increased in total leukocyte and granulocyte counts, the body and specifically the genital region (organs) is highly resistant to infections. Since the spiral arteries supplying the endometrium are broken and the endometrial surface denuded as reported by Moore and Persuade (2003), there is increased risk of occurrence of infections, hence the need for an increase in leukocytes (mainly granulocytes) to fight any occurrence of infections.

Comparison of three different age groups reveals that there was a significant increase in the total leukocyte and granulocyte counts of subjects between the ages 18 to 21 years. This implies that subjects between 18 to 21 years of age are more resistant to infections during menstruation.

Changes in leukocytes and its differential counts were

observed with the different durations of menstruation of the subjects (John, 2007). There was a statistically significant increase in the total leukocyte and granulocyte counts in subjects whose menstruation lasted for seven days. This could be as a result of prolonged exposure of the female genital system to infections during menstruation. This implies that individuals whose menstruation last for seven days are more exposed to infections and thus their body produces a stronger immune system in the form of tremendous number of leukocytes to help attack any form of infections.

We conclude that, during menstruation, there is an increase in the total leukocyte count in the body and this increase is as a result of the increase in the granulocytes. Age and the duration of menstruation influence the increase in the total and differential leukocyte count in the body during menstruation.

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