



**MADONNA UNIVERSITY JOURNAL OF MEDICINE AND HEALTH SCIENCES**

ISSN:2814-3035

2024:01(1)25-31

RECEIVED: 09-09-2024

ACCEPTED:19-08-2024

PUBLISHED:25-09-2024

MUJMHRS-RV-003



## **THE IMPACT OF MENSTRUATION ON HAEMATOCRIT AND SERUM TRANSFERRIN LEVELS IN FEMALE STUDENTS OF MADONNA UNIVERSITY, ELELE, RIVERS STATE**

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### **Abstract**

There had been an incident of dizziness or fainting and irregular menstrual cycle among menstruating female students in Madonna University, there is therefore a need to evaluate serum transferrin level and haematocrit value to ascertain the causative effect of such incidents. A total of Sixty subjects were enrolled for the study within the age range of 18 to 26 years in which thirty subjects were used as tests and thirty subjects were used as control. All subjects were apparently healthy with none having any form of illness. Blood samples were collected from subjects and were analyzed of serum transferrin (g/dl) and haematocrit (%) value using Enzyme-linked Immunosorbent assay (ELISA) method and Microhematocrit method respectively. The result obtained showed that Haematocrit (%) values in females not on menstruation ( $38.1333 \pm 1.73$  %) were significantly higher than females on menstruation

(33.80±2.93 %)( $p < 0.05$ ). The result also obtained from the comparison of menstruating females and non-menstruating females showed a significant decrease ( $p < 0.05$ ) in serum transferrin (g/dl) levels in non-menstruating females (2.54 ± 0.91 g/dl) when compared to menstruating females (3.92±0.524 g/dl). In conclusion, this study contributes to our understanding of the dynamics of haematocrit and serum transferrin levels in menstruating females in Madonna University, Elele Campus, Rivers state. These findings suggest a physiological adaptation in response to menstrual blood loss, which may contribute to understanding the hematological profile of menstruating females. It is therefore recommended that iron supplement should be advocated among female menstruating students to avert the adverse effect associated with menstruation.

Keywords: Menstruation, Haematocrit, Transferrin, Iron Metabolism, Female Health, SPSS

## **Introduction**

Transferrins are glycoproteins found in vertebrates which bind to and consequently mediate the transport of iron (Fe) through blood plasma. They are produced in the liver and contain binding sites for two  $\text{Fe}^{3+}$  ions. Human transferrin is encoded by the *TF gene* and produced as a 76 kDa glycoprotein (1). The haematocrit (Ht or HCT), also known by several other names, is the volume percentage (vol%) of red blood cells (RBCs) in blood, measured as part of a blood test. The measurement depends on the number and size of red blood cells. It is a part of a person's complete blood count results, along with hemoglobin concentration, white blood cell count and platelet count (2). Menstruation is the regular discharge of blood and mucosal tissue from the inner lining of the uterus through the vagina. The menstrual cycle is characterized by the rise and fall of hormones. Menstruation is triggered by falling progesterone levels and is a sign that pregnancy has not occurred (3). The first period, a point in time known as menarche, usually begins between the ages of 12 and 15. Menstruation starting as young as 8 years would still be considered normal. The average age of the first period is generally later in the developing world, and earlier in the developed world. The typical length of time between the first day of one period and the first day of the next is 21 to 45 days in young women. In adults, the range is between 21 and 31 days with the average being 28 days. Bleeding usually lasts around 2 to 7 days. Periods stop during pregnancy and typically do not resume during the initial months of breastfeeding. Menstruation stops occurring after menopause, which usually occurs between 45 and 55 years of age (4). There had been an incident of dizziness or fainting and irregular menstrual cycle among menstruating female students in Madonna University, there is therefore a need to evaluate serum transferrin level and haematocrit value to ascertain the causative effect of such incidents.

## **MATERIALS AND METHODS**

### **Study Area**

This study was conducted in Madonna University, Elele, Rivers state, Nigeria. Madonna University, Elele, is located along Owerri and Port-Harcourt road and is situated in Ikwerre local government area of Rivers state. This study was carried between the periods of May to October 2023.

### **Study population**

A total number of Sixty (60) menstruating female students at Madonna University, Elele Campus, Rivers State were recruited for the study, comprising 30 menstruating female students and 30 non-menstruating female students who were used as control.

### **Research design**

This research is an experimental study, a cross sectional study designed to determine the serum transferrin and hematocrit value among menstruating females in Madonna University, Elele Campus, Rivers state.

### **Selection Criteria**

#### **Inclusion Criteria**

1. Students who gave their consent.
2. Female students on menstruation.
3. Students not on folic acid or iron supplements.
4. Students who did not eat within 8 hours before the sample collection.

#### **Exclusion Criteria**

1. Students who did not give their consent.
2. Students on folic acid or iron supplement.
3. Students who ate within 8 hours before the sample collection.

### **Informed Consent**

Individual consent was sought for and obtained from the subjects prior to sample collection.

### **Ethical Approval/Consideration**

Before the commencement of the study, ethical approval was obtained from the department of Medical Laboratory Science, Madonna University Nigeria, Elele Campus, Rivers state. The participants were briefed on the objectives and procedure of the study and they were reassured of confidentiality and anonymity. Subjects who were not willing to participate were withdrawn from the study without any negative consequence.

## Sample Collection and Analysis

5mls of venous blood was collected from the participant by venipuncture from the anterior cubital vein. 3mls of venous blood were dispensed into clean, sterile labeled plastic plain containers, centrifuged, serum was obtained for the estimation of serum transferrin and 2mls of venous blood into Ethylene diamine tetra-acetic acid (EDTA) containers for haematocrit value estimation .

## Method of Analysis

Serum Transferrin Assay was analyzed using Enzyme-linked Immunosorbent assay (ELISA) method and Haematocrit value by Microhaematocrit centrifugation method

## RESULT

Table 1 shows the demographic and characteristic of menstruating and non-menstruating females students of Madonna University, Elele, River State with mean age of  $20.47 \pm 1.25$  and  $21.87 \pm 2.56$  respectively.

**Table 1:** Demographic and characteristic menstruation and non-menstruation

Characteristic	N	Ages (years)	Percentage (%)	Mean $\pm$ SD
Female on Menstruation	30	18-22	50	20.47 $\pm$ 1.25
Female not on Menstruation	30	18-26	50	21.87 $\pm$ 2.56

Comparison of Haematocrit value and Transferrin between Females on Menstruation and Females not on Menstruation are shown in Table 2. Haematocrit values in females not on Menstruation ( $38.1333 \pm 1.73$ ) were significantly higher than Female on Menstruation ( $33.80 \pm 2.93$ ) ( $P < 0.05$ ). Furthermore, Transferrin in females not on Menstruation ( $2.54 \pm 0.91$ ) were significantly lower than Female on Menstruation ( $3.92 \pm 0.524$ ) ( $P < 0.05$ ).

**Table 2:** Comparison of Haematocrit value and Transferrin between Female on Menstruation and Female not on Menstruation N=30

Parameter	Menstruation	Non-menstruation	t-value	p-value
Haemtocrit Value	33.80 $\pm$ 2.93	38.1333 $\pm$ 1.73	-6.06	0.000
Transferrin	3.92 $\pm$ 0.524	2.54 $\pm$ 0.91	5.57	0.000

Significant at  $P < 0.05$

## **Discussion**

The results of the present study indicate a significant increase in haematocrit values in females not on menstruation compared to those on menstruation ( $p < 0.05$ ). This observation aligns with the findings, that post-menstrual females had significantly higher haematocrit levels than those on menstruation ( $p < 0.05$ ) (5). The study's subjects displayed similar menstrual patterns, supporting these findings. Additionally, the study involved healthy young women with no abnormal menstrual bleeding, suggesting that the observed decrease in haematocrit values during menstruation is attributable to the physiological blood loss associated with menstruation rather than any underlying pathology.

These findings are consistent with another study, that observed a minimal rise in haematocrit values during the post-menstrual phase compared to the menstrual phase, although this difference was not statistically significant ( $p > 0.05$ ) Furthermore, studies also report a decline in haematocrit values during the menstrual phase, linked to blood loss and subsequent iron depletion, which corroborates our findings (6,7). This further supports the notion that while menstruation leads to decreased haematocrit values, it does not necessarily cause anemia among healthy menstruating females, highlighting the body's adaptive response to menstrual blood loss.

The study also reveals a significant decrease in transferrin values in females not on menstruation compared to those on menstruation ( $p < 0.05$ ), corroborating with earlier findings (9). This observation is further supported by studies, which indicate that soluble transferrin levels increase during menstruation to enhance iron transport and compensate for iron loss during this phase(10,11). These findings suggest that the body's iron-binding proteins, including transferrin, may increase their activity in response to menstrual blood loss, enhancing their binding capacity to manage iron availability in the bloodstream effectively.

## **Conclusion**

This study demonstrates that menstruation significantly affects haematocrit and transferrin levels in healthy females. The observed decrease in haematocrit values during menstruation reflects the physiological impact of blood loss but does not typically result in anemia in healthy individuals. Additionally, the study highlights the compensatory role of transferrin during the menstrual phase, which helps regulate iron levels by increasing its capacity to bind and transport available iron. These findings are consistent with previous studies and underscore the body's adaptability to the physiological demands of the menstrual cycle.

## **Recommendations**

1. Further Research: Future studies should explore the underlying mechanisms that cause symptoms of anemia, such as dizziness during menstruation, even when haematocrit values do not classify individuals as anemic. Understanding these mechanisms could

provide deeper insights into the non-hematological factors contributing to these symptoms.

2. Diet and Lifestyle Management: Women are advised to maintain a balanced diet rich in iron and essential nutrients to alleviate discomfort associated with menstrual changes. Limiting the intake of salt, caffeine, and alcohol and engaging in regular physical activity can help reduce symptoms associated with menstrual blood loss.
3. Health Monitoring: Regular monitoring of menstrual health and consultation with healthcare providers for symptoms suggestive of anemia or other related conditions are recommended. Routine check-ups and blood tests can help identify potential deficiencies and guide dietary or lifestyle interventions.

These recommendations aim to support women in managing the physiological changes associated with menstruation, enhancing overall health and well-being during the menstrual cycle

## References

1. Kawabata, H. (2019). Transferrin and transferrin receptors update. *Free Radical Biology & Medicine*. 133: 46–54.
2. Hall, D.R., Hadden, J.M., Leonard, G.A., Bailey, S., Neu, M., Winn, M. & Lindley, P.F. (2002). The crystal and molecular structures of diferric porcine and rabbit serum transferrins at resolutions of 2.15 and 2.60 Å, respectively. *Acta Crystallographica. Section D, Biological Crystallography*. 58 (Pt 1): 70–80.
3. Seckback, J. (2008). Ferreting out the secrets of plant ferritin - A review. *Journal of Plant Nutrition*. 5 (4–7): 369–394.
4. Diaz, A., Laufer, M.R. & Breech, L.L. (2006). Menstruation in girls and adolescents: using the menstrual cycle as a vital sign. *Pediatrics*. 118 (5): 2245–2250.
5. Moses, R., Adeyemi, A., & Johnson, I. (2019). Comparative haematological analysis of pre-menstrual and post-menstrual phases. *Journal of Experimental Biology and Medical Science*, 7(4), 244-250.
6. Malini, K. (2006). A study of haematological changes in different phases of the menstrual cycle. *Indian Journal of Physiology and Pharmacology*, 50(2), 165-168.
7. Chandra, S., Singh, P., & Tiwari, A. (2020). Haematocrit levels in menstruating females: A physiological study. *Clinical Medicine Insights: Women's Health*, 14, 1-7.
8. Ahmad, N., Prakash, A., Sharma, S., & Patel, R. (2018). Changes in haematological parameters during the menstrual cycle. *Journal of Clinical Hematology*, 12(3), 201-209.
9. Azubuike, C. U., Okpara, H. C., & Nnadi, N. M. (2019). Soluble transferrin levels and menstrual phases: A comparative study. *International Journal of Women's Health*, 11, 45-52.
10. Kim, S. H., Lee, H. J., & Park, S. M. (2021). Iron metabolism and transferrin activity during menstrual phases. *Journal of Physiology and Biochemistry*, 77(4), 629-636.

11. Parker, C. E., & Mahoney, C. R. (2017). Transferrin dynamics during the menstrual cycle. *Women's Health Research Journal*, 6(3), 150-156.

**Cite this article:** The Impact of Menstruation on Haematocrit and Serum Transferrin Levels in Female Students of Madonna University, Elele, Rivers State (2024) Emmanuel Chinedu Onuoha, Ezekiel Fayiah Hallie. *Madonna University Journal of Medicine and Health Sciences* 2024:01(1)25-31.

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