EUROPEAN ACADEMIC RESEARCH
Vol. IV, Issue 6/ September 2016

Impact Factor: 3.4546 (UIF)
DRJI Value: 5.9 (B+)

ISSN 2286-4822
www.euacademic.org

Possible Alterations in Haematological Parameters in Asthmatic Female Students during Ovulation

MATHEW FOLARANMI OLANIYAN[1]
BUKOLA GRACE SOWUMI
Department of Medical Laboratory Science
Achievers University, Owo-Nigeria

Abstract:

Physiological and hormonal changes in ovulation could increase the severity of asthma as a result of increase in cellular immune response leading to excessive release and utilization of immune cells in response to the allergic reaction. This work aimed at determining possible alterations in haematological parameters in asthmatic female students during ovulation. Thirty (30) asthmatic female students aged 17 to 41 years observing regular menstrual cycle as test subjects and fifty (50) non asthmatic female students aged 18 to 36 years observing regular menstruation as control subjects. Total white blood cells (WBC), differential leucocyte and Packed Cell Volume were evaluated using standard techniques. The result obtained showed a significantly higher mean white blood cells count obtained in the asthmatic patients during ovulation than the non-asthmatic patients($p<0.05$). There was also a significantly lower mean platelet count in the asthmatic patients before, during and after ovulation than the non-asthmatic female students ($p<0.05$).There was a significantly lower platelet counts in the asthmatic female students during than before ovulation($p<0.05$).The result obtained showed a significantly higher difference in Packed cell volume obtained in the asthmatic female students before ovulation than during ovulation($p<0.05$). There was a significantly lower eosinophil count in the non-asthmatic female

[1] Corresponding author: olaniyanmat@yahoo.com

students than asthmatic female students before, during and after ovulation ($p<0.05$). The result of this work revealed significant increase WBC, Eosinophil and decreased platelet count. Ovulation has also been found to influence a decrease in platelet and PCV in asthmatic female students. Evaluation of Platelet, PCV, WBC and differential leucocyte count in asthmatic female students is recommended for effective management of the allergy.

Key words: haematological parameters, asthmatic female students, ovulation

INTRODUCTION

1.1 Background to the Study

Asthma is a condition in which your airways narrow and swell and produce extra mucus. A chronic condition that causes inflammation and narrowing of the bronchial tubes-the passageways that allow air to enter and leave the lungs[1].

The severity of asthma may be affected by a woman menstrual cycle. Respiratory symptoms become more severe around the time of ovulation with regular menstrual cycles lasting 28 days or less without hormonal contraceptives [2]. Large changes in symptom incidence through the cycle for all symptoms has been reported[3]. Asthma can be triggered by many different things, and this varies from person to person. People with asthma should be aware of things that trigger their symptoms so that they can take steps to control them[3].

If women with asthma notice that their symptoms are worsening at key times of the month then they can take preventive measures such as having inhalers that are within date, working and contain enough doses of medicine to see them through the times when they are most affected. Asthma is an incurable illness. However, with good treatment and management there is no reason why a person with asthma cannot live a normal and active life[3].

An asthma episode, or an asthma attack, is when symptoms are worse than usual. They can come on suddenly and can be mild, moderate or severe [1]. Shortness of breath was worse on days seven to 21, again with a slight fall around ovulation. Menstrual cycle is determined by complex hormonal processes over the course of her cycle. Throughout, levels of different hormones rise and fall - and body temperature rises around ovulation these fluctuations may have direct effects on airways. and indirect effects on inflammatory responses to infection[3].

1.2 Justification/Rationale of the Study

Hormonal changes are a feature of menstrual cycle including ovulation. This has been reported that; woman respiratory symptoms, including those of asthma, tend to worsen between day 10 to 22 of her menstrual cycle, wheezing symptom severity dipped during ovulation (days 14 to 16). Patients with asthma, regular smokers and those with a BMI (body mass index) of more than 23 tend to experience more coughs immediately after ovulation[3].

1.3 Aim and Objective

Aim

This study seeks to determine hematological alterations in asthmatic females during ovulation

Broad Objective

This study was designed to evaluate possible hematological alterations in asthmatic female patients during ovulation

Specific Objectives

1. To determine possible hematological alterations in asthmatic female patients after ovulation

2. To determine possible hematological alterations in asthmatic female patients before ovulation
3. To determine possible hematological alterations in asthmatic female patients during ovulation
4. To compare the value of PCV, Platelet count and White blood cell count in the patients with non-asthmatic and non-ovulating females.
5. To compare the value of PCV, Platelet count and White blood cell count in the patients with non-asthmatic and ovulating females.

1.4 Hypothesis

1. That there will be no significant difference in the value of PCV, Platelet count and White blood cell count in the patients compared with non-asthmatic and non-ovulating females.
2. That there will be no significant difference in the value of PCV, Platelet count and White blood cell count in the patients compared with non-asthmatic and ovulating females.
3. That there will be no significant difference in the value of PCV, Platelet count and White blood cell count in the patients during and after ovulation
4. That there will be no significant difference in the value of PCV, Platelet count and White blood cell count in the patients during and before ovulation
5. That there will be no significant difference in the value of PCV, Platelet count and White blood cell count in the patients before and after ovulation

1.5 Significance of Study

This study was used to provide useful information for the management of Asthma in adult females. It will also contribute to the original knowledge in the area of hematology.

1.6 Scope of Study

This study was carried out among females students within the reproductive age at the Achievers University, Owo-Nigeria.

1.7 Limitation of the Study

Inability of the students to be truthful about the reproductive status as it may affect menstruation including ovulation.

1.8 Delimitation

Only female students were used and males were excluded from the work. Female students within reproductive age will be recruited. Females who are not menstruating regularly will be excluded. Only Students of Achievers University, Owo were studied other students were excluded.

METHODOLOGY

2.1 MATERIALS

2.1.1 Study area

This work was carried out at the Achievers University, Owo – Nigeria. Owo is located in Ondo state in South-Western Nigeria equidistant between Abuja (Federal Capital Territory) and Lagos.

2.1.2 Study Population

The study population consist of thirty(30) asthmatic female students aged 17 to 41 years observing regular menstrual cycle as test subjects and fifty(50) non asthmatic female students aged 18 to 36 years observing regular menstruation as control subjects.

2.1.3 Inclusion criteria

1. Asthmatic female students observing regular menstrual cycle as test subjects who are not on any contraceptive

2. Non-asthmatic female students observing regular menstruation and are not on any contraceptive as control subjects.

2.1.4 Exclusion criteria

1. Female students at their menopausal age were not included
2. Female students taking contraceptive at the time of the study were not included
3. Female students who have not attain puberty were not included

2.1.5 Biological specimen

Early morning urine and five (5ml) milliliters of venous blood were obtained from each of the subjects before, during and after ovulation for the determination of ovulation and evaluation of Packed Cell Volume, White Blood Cell (total and differentials) and platelet.

METHODS

3.1 Determination of Ovulation

This was carried out using immunochromatographic method.

3.2 Evaluation of Packed Cell Volume, White Blood Cell (total and differentials) and platelet was carried out using the method described by Cheesbrough, (2002)[4].

3.3 Data Analysis

The result was subjected to statistical analysis using SPSS 18.0 to determine probability and level of significance at 0.05 by student't' test.

3.4 Ethical Approval

This proposal was presented to the Ethical Committee of the Department of Medical Laboratory Science, Achievers University, Owo-Nigeria.

RESULTS

Table1: The mean and standard deviation obtained in Asthmatic patients before and after ovulation

	WBC/× 10^9/L	Platelet / × 10^9/L	PCV/%	Neutrophil/%	Eosinophil/%	Basophil/%	Lymphocyte/%	Monocyte/%
A	11.1 ±3.0	130±10.1	35±5.2	61±5.0	10±1.0	0	25±2.0	3±0.5
B	15±2.5	106±7.0	36±3.0	66±3.1	16±4.0	0	26±3.0	4±1.0
C	13.6±2.0	116±5.0	37±2.0	64±1.5	11±2.0	0	27±2.0	3±1.0
D	8±1.0	200±10.1	37±3.0	60±2.0	2±0.5	0	35±1.0	3±0.5

NB: A - Asthmatic patients before ovulation**; B-** Asthmatic patients during ovulation**; C-** Asthmatic patients after ovulation; **D-** Non-Asthmatic patients

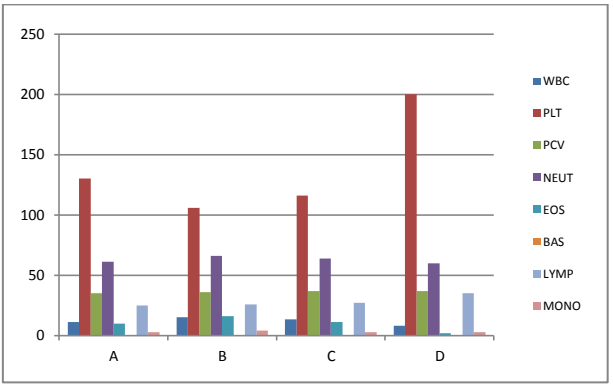

Table 1: The mean and standard deviation obtained in Asthmatic patients before and after ovulation

Table 2: Comparative evaluation of the results obtained in non-Astmathic and asthmatic female students before and after ovulation

		WBC/× 10^9/L	Platelet / × 10^9/L	PCV/%	Neutrophil/%	Eosinophil/%	Basophil/%	Lymphocyte/%	Monocyte/%
A Vs B	**'t'**	**-1.11**	**3.61**	**-7.51**	**-0.86**	**-1.46**	**0**	**-0.28**	**-0.96**
	'p'	**0.19**	**0.04**	**0.01**	**0 .241**	**0.14**	**0**	**0.40**	**0.22**
	comment	**p>0.05***	**p<0.05****	**p<0.05****	**p>0.05***	**p>0.05***	**0**	**p>0.05***	**p>0.05***
A Vs C	**'t'**	**-0.56**	**1.07**	**-0.37**	**-0.59**	**-1.34**	**0**	**-0.71**	**-0.046 .**
	'p'	**0.32**	**0 .20**	**0.37**	**0.31**	**0.16**	**0**	**0 .28**	**0 .48**
	comment	**p>0.05***	**p>0.05***	**p>0.05***	**p>0.05***	**p>0.05***	**0**	**p>0.05***	**p>0.05***
A Vs D	**'t'**	**0.95**	**-6.71**	**-0.45**	**-0.80**	**7.15542**	**0**	**-4.47**	**-0.07**
	'p'	**0.22**	**0.01**	**0.35**	**0.25**	**0.010**	**0**	**0.023**	**0.47**

	comment	p>0.05*	P<0.05**	p>0.05*	p>0.05*	p<0.05**	0	p<0.05**	p>0.05*
B Vs C	't'	0.71	-1.02	-0.28	0.63246	0.67	0	-0.28	0.71
	'p'	0.28	0.21	0 .41	0.30	0.29	0	0.404	0 .28
	Comment	p>0.05*	p>0.05*	p>0.05*	p>0.05*	p>0.05*	0	p>0.05*	p>0.05*
B Vs D	't'	3.13	-5.55	-0.38	1.66	3.47	0	-2.85	0.89
	'p'	0.04	0 .02	0 .37	0.12	0.037	0	0 .052	0 .23
	comment	P<0.05**	P<0.05**	p>0.05*	p>0.05*	P<0.05**	0	p>0.05*	p>0.05*
C Vs D	't'	2.24	-7.51	-0.16	1.79	5.34	0	-3.58	
	'p'	0 .06	0.01	0.45	0.11	0.017	0	0 .035	0.5
	comment	p>0.05*	P<0.05**	p>0.05*	p>0.05*	P<0.05**	0	P<0.05**	p>0.05*

A - Asthmatic patients before ovulation**; B-** Asthmatic patients during ovulation**; C-** Asthmatic patients after ovulation; **D-** Non-Asthmatic patients

The results obtained showed no significant difference in white blood cell count in the asthmatic female students before ovulation compared with patients during ovulation, after ovulation and also during ovulation compared with after ovulation and non-asthmatic patients($p>0.05$). However a significantly higher mean white blood cells count was obtained in the asthmatic patients during ovulation than the non-asthmatic patients($p<0.05$). There was no significant difference in the platelet count obtained in asthmatic patients during ovulation compared with after ovulation and before ovulation compared with after ovulation ($p>0.05$). There was a significantly lower mean platelet count in the asthmatic patients before, during and after ovulation than the non-asthmatic female students ($p<0.05$). There was also a significantly lowee platelet counts in the asthmatic female students during than before ovulation ($p<0.05$). The result obtained showed a significantly higher difference in Packed cell volume obtained in the asthmatic female students before ovulation than during ovulation with $p<0.05$. There was no significant difference in the Packed Cell Volume obtained in the asthmatic female students before and after ovulation, during and after ovulation and also in asthmatic female students compared with non-asthmatic female students ($p>0.05$). No significant difference was obtained in the comparative analysis of the value of neutrophil, lymphocytes, basophils and monocytes in the asthmatic patients before

ovulation, during ovulation, after ovulation and in non-asthmatic female students ($p>0.05$). There was no significant difference in the value of eosinophils in the asthmatic female students before ovulation compared with during and after ovulation and during ovulation compared with after ovulation($p>0.05$). There was a significantly lower eosinophil count in the non-asthmatic female students than asthmatic female students before, during and after ovulation ($p<0.05$).

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

A significantly higher mean white blood cell count was obtained in the asthmatic patients during ovulation than the non-asthmatic patients. This is consistent with the report of Ava and Wasima, (2013)[4]that there was a significant increase in the Total Leucocyte Count, Absolute Eosinophil Count, Erythrocyte Sedimentation Rate and the differential counts of neutrophil and eosinophil, and a significant decrease in the lymphocyte count among the cases as compared to the controls. Wheezing symptom severity dipped during ovulation (days 14 to 16) in asthmatic patients which could be associated with the finding of this work with respect to the severity of the allergic reaction increased by ovulation[5].

The above finding in this work is also agrees with the report of Judyta *et al.*,(2016)[6] that compared to menstruation, WBC ($P = 0.002$) and neutrophils ($P < 0.001$) increased around ovulation and remained stable in the mid-luteal phase, whereas lymphocyte and mixed cell counts did not change throughout the menstrual cycle. There were some correlations of sex hormone variation with leukocyte changes between menstruation and ovulation (positive for E and WBC, negative for P and WBC and for P and neutrophil count, but not between ovulation and mid-luteal phase.

There was a significantly lower eosinophil count in the non-asthmatic female students than asthmatic female students before, during and after ovulation. This could be associated with the typical changes in the airways which include an increase in eosinophils and thickening of the lamina reticularis. Antigen-presenting cells (ie, macrophages, dendritic cells) in the airway capture, process, and present antigen to helper T cells, which, in turn, become activated and secrete cytokines. Helper T cells can be induced by cytokines to develop into TH 1 (ie, by interferon-gamma, interleukin [IL]–2) or TH 2 (ie, by IL-4, IL-5, IL-9, IL-13) cells. Regulatory T cells (Treg) appear to play an important role in TH 2-cell response to allergens. Allergens drive the cytokine pattern toward TH 2, which promotes B-cell IgE production and eosinophil recruitment [5].

There was a significantly lower mean platelet count in the asthmatic patients before , during and after ovulation than the non-asthmatic female students. Also the result obtained showed a significantly higher difference in Packed cell volume obtained in the asthmatic female students before ovulation than during ovulation These could be related to the degree of severity of asthma influenced by ovulation as reported by Murray (2010). that found significant rhythmic variations over the menstrual cycle were found in each symptom for all subjects and subgroups. Wheezing was higher on cycle Days 10–22, with a midcycle dip near the time of putative ovulation (approximately Days 14–16) in most subgroups. Shortness of breath was higher on days 7–21, with a dip just before midcycle in many subgroups. Cough was higher just after putative ovulation for subjects with asthma.

Respiratory symptoms varied significantly during the menstrual cycle and were most frequent from the midluteal to midfollicular stages, often with a dip near the time of ovulation.These relations link respiratory symptoms with hormonal changes through the menstrual cycle[5].

There was a significantly lower platelet counts in the asthmatic female students during than before ovulation.

Alterations in number of platelets, total white blood cells and eosinophils as found in this work and as stated above could also be linked with the pathophysiology that asthma is the result of chronic inflammation of the conducting zone of the airways (most especially the bronchi and bronchioles), which subsequently results in increased contractability of the surrounding smooth muscles. This among other factors leads to bouts of narrowing of the airway and the classic symptoms of wheezing. The narrowing is typically reversible with or without treatment. Occasionally the airways themselves change[5]. Typical changes in the airways include an increase in eosinophils and thickening of the lamina reticularis. Chronically the airways' smooth muscle may increase in size along with an increase in the numbers of mucous glands. Other cell types involved include: T lymphocytes, macrophages, and neutrophils. There may also be involvement of other components of the immune system including: cytokines, chemokines, histamine, and leukotrienes among others[5].

Furthermore, considering peripheral leukocyte fluctuation before, during and after ovulation in asthmatic female students as one of the adaptive mechanisms intended to create an optimal condition for implantation, it should be remembered that not only systemic immune modulations, but local morphological and functional changes in the endometrium seem to be important for successful pregnancy [8][11]. It is well known that the number and proportion of endometrial immune cells also differ between the phases of a menstrual cycle [7]. This dynamic cellular composition and expression of immune molecules in the endometrium are accompanied by hormonal fluctuations across the menstrual cycle [8]. Some authors suggest that observed fluctuation in the numbers of immune cells in the endometrium is a con- sequence of their migration

from the blood, and peripheral blood cells seem to be a major source of endometrial leukocytes [9].

5.2 Conclusion

The result of this work revealed significant increase WBC, Eosinophil and decreased platelet count. Ovulation has also been found to influence a decrease in platelet and PCV in asthmatic female students.

5.3 Recommendation

Evaluation of Platelet, PCV, WBC and differential leucocyte count in asthmatic female students is recommended for effective management of the allergy.

LIST OF REFERENCES

1. Maddox L, Schwartz DA (2002). "The pathophysiology of asthma". Annu. Rev. Med. 53: 477–98. doi:10.1146/annurev.med.53.082901.103921. PMID 11818486.
2. Jindal, SK (2011). Textbook of pulmonary and critical care medicine. New Delhi: Jaypee Brothers Medical Publishers. p. 242. ISBN 978-93-5025-073-0.
3. Samar Farha, Kewal Asosingh, Daniel Laskowski, Jeffrey Hammel, Raed A. Dweik, Herbert P. Wiedemann,and Serpi C. Erzurum (2009) Effects of the Menstrual Cycle on Lung Function Variables in Women with Asthma. Am J
4. Ava Dihingia, Wasima Jahan(2013) A Study Of The Hematological Profile In Relation To Some Allergic Diseases International Journal of Basic and Applied Physiology Vol. 2 Issue 1 ;35-40 (A Hospital Based Study)

5. Murray, John F. (2010). "Ch. 38 Asthma". In Mason, Robert J.; Murray, John F.; Broaddus, V. Courtney; Nadel, Jay A.; Martin, Thomas R.; King, Jr., Talmadge E.; Schraufnagel, Dean E. Murray and Nadel's textbook of respiratory medicine (5th ed.). Elsevier. ISBN 1-4160-4710-7.
6. Judyta Nowak, Barbara Borkowska, and Boguslaw Pawlowski (2016)Leukocyte Changes Across Menstruation, Ovulation, and Mid-Luteal Phase and Association with Sex Hormone Variation American Journal of Human Biology • April 2016 online in Wiley Online Library wileyonlinelibrary.com
7. Laird SM, Tuckerman EM, Cork BA, Linjawi S, Blakemore AI, Li TC.(2003). A review of immune cells and molecules in women with recur rent miscarriage. Hum Reprod Update 9:163–174.
8. Dey SK, Lim H, Das SK, Reese J, Paria BC, Daikoku T, Wang H. (2004). Molecu lar cues to implantation. Endocr Rev 25:341–373
9. Lee JY, Lee M, Lee SK. (2011). Roe of endometrial immune cells in implantation. Clin Exp Reprod Med 38:119–125.
10. Hill JA, Melling GC, Johnson PM. 1995. Immunohistochemical studies of human uteroplacental tissues from first-trimester spontaneous abortion. Am J Obstet Gynecol 173:90–96.