

# Serum Glucose Level According to Menstrual Cycle Phases in Young Students at the College of Science for Women

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## Abstract

**Objective:** This study was carried out to present data on serum fasting glucose level in healthy young women with regular menstrual cycle who have moderate active state across their three different stages of the menstrual cycle (menstruation, proliferation and secretory) phases.

**Subjects and Method:** A total of 50 non-diabetes women with normal regular menstrual cycle were involved in this study, the subjects ages ranged from 20-24 years, fasting venous blood (3ml) was collected at early morning during menstruation phase (days 1-5), proliferation phase (6-14 days) and the secretory phase (15-28days) for each subject, serum glucose measurement were conducted by colorimetric technique.

**Results:** The present study shows non-significant ( $p < 0.05$ ) increase in the mean of glucose level during menstruation and proliferative phase ( $92.8 \pm 12.7$ ,  $92.6 \pm 10.2$  mg/dl) respectively in the same subject comparison with secretory phase ( $90.48 \pm 8.3$  mg/dl) in the same subject.

**Conclusion:** This study revealed that serum glucose level does not change along stages of normal and regular menstrual at rest or moderate active young women.

**Keywords:** Menstrual cycle phases, Serum glucose, level, young students.

## Introduction

Determining how the menstrual cycle phase affect varies aspects of metabolism is necessary to provide a comprehensive understanding of normal physiology in women<sup>1</sup>, many women notice blood glucose fluctuation at certain times in their monthly cycle, these occur to change in hormones (estrogen and progesterone), at the same time, these hormones affect another important hormone, insulin which may in turn cause variation in blood glucose level<sup>2</sup>, previous study showed relation between fluctuation of hormone and level of glucose during menstrual cycle, as well, that variation in insulin sensitivity during menstrual cycle was found by other researchers<sup>3,4</sup> menstruation describe the female period<sup>5</sup>. Women begin menstruation at an average age of 13 years till age 51, this period involves highly complex hormonal interactions estrogen and progesterone the key hormones were involved<sup>6</sup>.

## Material and Method

This study was conducted at college of science for women/university of Babylon. A total of 50 non-diabetes women with normal regular menstrual cycle were involved in this study, the subjects ages ranged from 20-24 years with BMI mean ( $23.67 \pm 4.37$  Kg/m<sup>2</sup>). Fasting venous blood (3ml) was collected at early morning during menstruation phase (days 1-5), proliferation phase (6-14 days) and the secretory phase (15-28days) for each subject<sup>7</sup>, no subject was excessively sedentary or participate in heavy physical activity. Colorimetric technique was used for glucose measurement by use the Bio Merieux (France) Company kit.

**Statistical Analysis:** Repeated measures a nova-pair-wise comparisons test was used in studying the glucose level differences across the three menstrual phases using (spss) system. P value less or equal to 0.05 was taken as significant.

## Results and Discussion

Our data revealed that rise in the mean serum glucose level in healthy women during their menstruation (92.68±12.68mg/dl) and proliferative stages (92.64±10.22mg/dl) were non-significant compared

to secretory phase (90.08±8.49mg/dl), as well its non-significant difference found in glucose level between the menstruation and proliferative stage as showed in table 1.

Stage of menstrual cycle	Glucose level (mg/dl)			P value
	Number of samples	Mean	SD	
Menstruation(G1)	50	92.68	12.68	NS (G1vs.G2)
Proliferation (G2)	50	92.64	10.22	NS (G1vs.G3)
Secretory(G3)	50	90.84	8.49	NS (G2vs.G3)

NS: P value >0.05

Concerning with the result of glucose during menstruation phase it is agreement with studies which suggested that possible change in eating pattern in few days before and during menstrual cycle may affect glucose level, where many women experience craving for high -carbohydrate food during the days leading up to menstruation<sup>8,9</sup> other study suggested that possibility of pre-menstrual hyperinsulinism to account for their findings of a lower premenstrual blood sugar compared to the midcycle values this association with premenstrual tension syndrome<sup>10,11</sup>, while other study suggested that glycolysis peak rate just occurs prior to ovulation<sup>12</sup> that may reason to that glucose level increase in proliferative stage in our population study.

Other studies performed on glucose utilization and carbohydrate metabolism have shown no significant difference in moderate active or at rest women across the menstrual cycle<sup>1</sup>, moreover, change in estrogen and progesterone across the normal menstrual cycle do not appear to be of sufficient magnitude to significantly affect resting glucose flux<sup>13,14</sup>, this may be the same responses in our study population was observed.

Additionally, the effect of menstrual cycle on fuel metabolism may be more apparent during exercise<sup>1</sup> however contrary to what was originally hypothesized<sup>2,3</sup> however, variables such as age, body weight and parity<sup>15</sup> may be contributed in the result of the present study.

## Conclusion

This study revealed that serum glucose level does not change along three stages of normal and regular menstrual cycle at rest or moderate active young women.

**Financial Disclosure:** There is no financial disclosure.

**Conflict of Interest:** None to declare.

**Ethical Clearance:** All experimental protocols were approved under the Department of biology and all experiments were carried out in accordance with approved guidelines.

## References

- Horton T, Miller E, Glueck D. No effect of menstrual cycle phase on glucose kinetics and fuel oxidation during moderate-intensity exercise. *American journal of physiology. Endocrinology and metabolism.* 2002; 282(4): E752.
- Usha R, Manjunath P, Desai R. Comparative Study of Variations in Blood Glucose Concentration in Different Phases of Menstrual Cycle in Young Healthy Women Aged 18-22 Years. *Journal of Dental and Medical Sciences.* 2013; 9(2): 09-11.
- Majeed, M. Variation of Glucose Concentration During Different Phases of Menstrual Cycle. *Iraqi Academic Scientific Journal,* 10(1), pp.73-77.
- Stallings J. Why are my blood sugars affected by my period? *Diabetes sister.* 2009.
- Collier J, Collier J, Longmore M, Longmore J, Amarakone K. *Oxford handbook of clinical specialties.* Oxford University Press. 2013.
- Hacker N, Gambone J, Hobel C. *Hacker & Moore's essentials of obstetrics and gynecology.* Elsevier Health Sciences. 2015.

7. Reed B, Carr B. The normal menstrual cycle and the control of ovulation. In Endotext [Internet]. MDText. com, Inc. 2015.
8. Barfield R, Glaser J, Rubin B, Etgen A. Behavioral effects of progestin in the brain. *Psychoneuroendocrinology*. 1984; 9(3): 217-231.
9. Pugeat M, Moulin P, Cousin P. Interrelations between sex hormone-binding globulin (SHBG), plasma lipoproteins and cardiovascular risk. *The Journal of steroid biochemistry and molecular biology*. 1995; 53(1-6): 567-572.
10. Billig H, Spaulding C. Hyperinsulinism of menses. *Industrial medicine & surgery*. 1947; 16(7): 336.
11. Spellacy W, Carlson K, Schade, S. Menstrual cycle carbohydrate metabolism: Studies on plasma insulin and blood glucose levels during an intravenous glucose tolerance test. *American Journal of Obstetrics & Gynecology*. 1967; 99(3): 382-386.
12. Wynn, Ralph., 1977. Cellular biology of the uterus in :Biology of the uterus. Book. PLENUM PRESS. NEWYORK. 751 pages.
13. Braun B, Mawson J, Muza S. Women at altitude: carbohydrate utilization during exercise at 4,300 m. *Journal of Applied Physiology*. 2000; 88(1): 246-256.
14. Zderic T, Coggan, A, Ruby B. Glucose kinetics and substrate oxidation during exercise in the follicular and luteal phases. *Journal of applied physiology*. 2001; 90(2): 447-453.
15. Cudworth A, Veevers A. Carbohydrate metabolism in the menstrual cycle. *BJOG: An International Journal of Obstetrics & Gynecology*. 1975; 82(2): 162-169.