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Assessment of Salivary pH Changes During Various Phases of Menstrual Cycle

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Abstract

Aim: To assess salivary pH changes in females during various phases of menstrual cycle. **Methods:** The study comprised of 30 females belonging to 18-23 years with regular menstrual cycle. Saliva was collected on 1st, 7th and 14th day of the menstrual cycle and pH was evaluated. Descriptive statistics were calculated and rANOVA was used for comparison of the obtained data from pH readings. **Results:** The mean salivary pH on Day 1 was 7.47±0.51, Day 7th was 7.57±0.51 and Day 14th was 7.37±0.49. There was no statistically significant difference in salivary pH during the 3 time points of menstrual cycle that was considered. **Conclusion:** Within the limitations of our study, we conclude that among females with regular menstrual cycle changes in salivary pH was found to have no statistically significant difference. However, further long-term studies with considerations of menstrual disorders can be performed for better understanding.

Keywords: Saliva; pH; Dental Caries; Menstrual Cycle.

INTRODUCTION

Menstrual cycle is a physiological process occurring in females which usually occurs once in 28-35 days.^[1] Many bodily changes are associated with a female during all phases of the cycle. Oral cavity being the mirror of systemic health can also show few variations during the course of the cycle. Hormones have a great influence on this cycle in females majorly between the age of 13 to 45 years^[1].

The biochemical composition of saliva and overall salivary flow rate are profoundly influenced by hormonal fluctuations during various events in a female body namely puberty, menstruation and pregnancy making oral environment significantly more cariogenic for females^[2]. Lower flow rates and more variation in salivary pH has been noted in women than men which is attributed to hormonal fluctuations during events like puberty, menstruation, pregnancy and menopause^[3]. Buffering action of saliva tries to bring the pH back to the normal range as fast as possible^[4]. Few of the Studies in literature have indicated that salivary buffer capacity decreases toward late pregnancy^[5,6]. It has also been shown that buffering capacity does not show variation during menstrual cycle^[7].

Saliva is the most easily available body fluid which is rich in ions, possessing buffering capacity which maintains pH levels and helps in maintenance of tissues in the oral cavity and thus forms a diagnostic window to the body both in health and disease^[8]. Saliva can be considered as a better alternative over other diagnostic biofluids, not only for the presence of specific molecular constituents but also for its ease of use as a practical method of collection^[9].

It is reported that salivary changes are indicative of wellness of our health^[10]. Changes in salivary pH plays an important role to analyse and correlate with oral health. Decrease in salivary pH indicates greater risk to encounter caries. Thus, this study aims to assess salivary pH changes in females during various phases of menstrual cycle.

MATERIAL AND METHODS

The study was conducted after obtaining clearance from Institutional Ethical Committee. Thirty females between 18 to 23 years of age were considered for the study. Inclusion criteria were females between the age of 18 to 23 years with regular menstrual cycle. Exclusion Criteria were females with systemic disease,

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females with irregular menstrual cycle, females on medications influencing saliva, pregnant females, and females with deleterious habits.

After obtaining informed consent, the saliva samples were collected from the subjects corresponding to the menstrual phase (1st day), follicular phase (7th day), midcycle or ovulatory phase (14th day). The day for collection of saliva for ovulatory phase was determined for individuals based on their average menstrual cycle duration of last 3 months.

The saliva samples were collected between 10 AM and 11 AM, at least one hour after breakfast. The subjects were instructed not to eat after breakfast till the collection of saliva. During saliva collection, the subjects were seated in the dental chair. They were asked to rinse the mouth using distilled water. Saliva was allowed to accumulate in the mouth for five minutes. Using spit method, 2 ml of accumulated saliva was collected and stored at a temperature of +4 degree Celsius in sample bottle. The collected samples of saliva were later subjected to analysis using pH paper.

The results obtained was tabulated and subjected to statistical analysis. Descriptive statistics were calculated. rANOVA was used for comparison of the obtained data from pH readings. p value < 0.05 were considered as significant.

RESULTS

The study comprised of 30 females belonging to 18-23 years of age. Table 1 shows the descriptive statistics of salivary pH at Day 1, 7 and 14 of menstrual cycle. Table 2 shows the results of comparison salivary pH within the day and between the chosen days among the participants.

Table 1: Descriptive Statistics of Salivary pH at various stages of menstrual cycle

Timeline (Day)	Mean	Standard Deviation
1	7.47	0.51
7	7.53	0.51
14	7.37	0.49

Table 2: Results of One-Way Repeated Measures ANOVA

	Sum of squares	df	Mean Sqaure	F-value	p-value
Within the day	21.9	87	0.25	0.94	0.39
Between the days	0.42	2	0.21		

p<0.05 statistically significant

DISCUSSION

By virtue of the unique hormonal changes experienced women, they may be more susceptible for salivary changes. Oral health problems are common in five stages of woman's life; they are during puberty, at certain points in the menstrual cycle, when using birth control pills, during pregnancy and at menopause [11]. The present study assessed the salivary pH changes among females with regular menstrual cycle.

As per the current study there was no significant difference in salivary pH among females with regular menstrual cycle. The mean pH observed among non-pregnant women with regular menstrual cycle was 7.47 at

1st day (Beginning of menstrual phase), 7.53 at 7th day (Proliferative phase) and 7.37 at 14th day (Ovulation phase). This corroborates with a study which compared the salivary pH changes among pre- menopausal women with regular menstrual cycle as controls and post-menopausal women in test groups. It was noted that majority (75%) of the women with regular menstrual cycle had salivary pH >7 [12]. Rockenbach et al observed the mean salivary pH in non-pregnant women of Brazil was 7.5 [1]. However, the later studies didn't evaluate pH at different phases of menstrual cycle.

In the study by Saibaba et al, they categorized menstrual cycle as pre-ovulation phase (5 to 12 days), ovulation phase (13 or 14 days) and post-ovulation phase (15 to 25 days) and reported that significant difference in pH changes with average salivary pH being 7.1, 7.5 and 7.3 pre-ovulation phase, during ovulation and post-ovulation phases respectively [13]. A study done by Wadhvani et al [8]. showed significant salivary pH difference in value between ovulatory and luteal phase where the age group of the subjects ranged from 18-35 years in contrast to our study where the age group considered was 18-23 years and no significant salivary pH changes were observed. The variations may be attributed to the difference in method of assessing pH and timing of assessment.

The present study utilised a relatively simple method of pH assessment to derive an idea of influence of menstrual cycle on salivary pH. Thorough understanding of hormonal influence on salivary pH and oral health will be beneficial in prevention and treatment of dental diseases. The limitations of the study are smaller sample size and shorter duration of the study. There is further scope to assess the pH changes over a period of longer time and relation between menstrual disorders and salivary pH.

CONCLUSION

Within the limitations of our study, we conclude that among females with regular menstrual cycle changes in salivary pH was found to have no statistically significant difference. However, further long-term studies with considerations of menstrual disorders can be performed for better understanding.

Authors contribution

Siri – Conceptualisation, Execution of Study, Data collection and writing of manuscript; Roopashri – Monitoring of samples, data analysis, manuscript writing and editing.

Conflict of Interest

None declared.

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None declared.

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