The Effect of Menstrual Cycle on Electric Flicker

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As is well known, the menstrual cycle is accompanied by cyclic changes of various functions of the body such as physical and chemical properties of the blood,1,2) the basal metabolism,3,5) the body temperature,6,8) the antibacterial agency,9) the potential difference of the skin,10) etc. In general, women in the menstrual phase are more liable to fatigue than usual; the efficiency of labor is said to decrease during menstruation in 60–80 per cent of female workers.11,15) In view of the fact that fatigue of a slight degree can be detected by Motokawa’s method of electric flicker,16,19) we attempted in the present investigation to find any cyclic change in values of electric flicker which might be correlated with the menstrual cycle.

EXPERIMENTAL

Method

Subjects were 6 healthy students of our training-school for nurses, aged 16 years and having a regular menstrual cycle. As all of them were boarding students of the school dormitory, their conditions of life and business were all alike.

The apparatus used for measuring electric flicker values was the same as in the previous report by Motokawa and Suzuki.17) The stimulating electrodes were placed at the outer corners of the eyes of a subject, and the eyes were stimulated with rectangular pulses of 20 cycles per second. The stimulating voltage was increased from zero at a constant rate of 80 mV per second to determine the threshold for the appearance of flicker, $S_1$, and then the threshold for the disappearance of flicker, $S_2$, was determined by lowering the voltage from a sufficiently high level at the same rate as above. The value of electric flicker (EFV) is represented by the difference of both sorts of threshold, $S_1 - S_2$. In one series such values were determined 5 times in succession, and averaged. For each subject
measurements extended over two and a half months with one series a day except for a Sunday or a holiday.

**Results**

During the observation period two or three phases of menstruation were encountered in each subject. The duration of the menstrual phase was 4 days in 9 cases, 3 days in 2 cases and 5 days in one case.

The protocols of the data for 6 subjects are represented in Table I.

**Table I**

<table>
<thead>
<tr>
<th>Changes of EFV in mV in Menstrual Cycle</th>
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<tbody>
<tr>
<td>Subject and Age</td>
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<tr>
<td>------------------</td>
</tr>
<tr>
<td>A.T., 16</td>
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<tr>
<td>K.A., 16</td>
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<tr>
<td>A.T., 16</td>
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<tr>
<td>A.H., 16</td>
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<tr>
<td>C.G., 16</td>
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<td>T.G., 16</td>
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</table>

As can be seen in this table, EFV in the pre-menstrual phase ranged from 40 to 300 mV and the average was 124.4 mV. In the menstrual phase EFV was generally higher, ranging from 120 to 540 mV, and the average was 286.8 mV. After the menstruation, EFV decreased to the same level as in the pre-menstrual phase; the values ranged from 20 to 300 mV, and the average was 124 mV. The difference between EFV obtained in
the menstrual phase and that obtained in the pre- or post-menstrual phase was shown to be statistically significant. The data illustrated in Fig. 1, in which EFV obtained from 6 subjects are plotted against the days of the menstrual cycle. It is to be noted that the fluctuation of EFV is more remarkable during the menstrual phase than in the other phases. Despite the greater standard deviation of EFV during the menstrual phase, the increase of EFV in this phase was always so marked that the increase has proved to be statistically significant. In some cases EFV increased gradually as the menstrual phase was approached, while in the other cases an abrupt increase set in on the 1st day of menstruation. In the same way, the decrease of EFV to the normal level was found either abrupt or gradual as the case might be. In one and the same subject EFV was found different from day to day, as can be seen in Table I, but such daily variations never exceeded the variation based on the menstrual cycle.

**DISCUSSION**

From the above-mentioned experiment there is no doubt that EFV increases in the menstrual phase. On the other hand it is known that an increase of EFV occurs under various unfavorable conditions such as
insufficient oxygen supply, fatigue after physical and mental exercises, etc. Therefore it may be said that the increase of EFV obtained above is an indication of a sub-normal state of the subjects in the menstrual phase. The present experiment has thus provided further evidence that the method of electric flicker represents one of the most sensitive methods for finding out sub-normal states and therefore serves as a convenient tool for survey of general conditions of subjects.

SUMMARY

The value of electric flicker (EFV) of 6 healthy female subjects aged 16 years were measured, extending over 2 and a half months to examine the effect of the menstrual cycle on EFV.

EFV increased in the menstrual phase above the values obtained in the pre- and the post-menstrual phases; the average of EFV during menstruation was 286.8 mV, while those in the pre- and the postmenstrual phases were 124.4 and 124 mV respectively. The difference between the values for the menstrual and the non-menstrual phases was found statistically significant. This fact provides further evidence that the method of electric flicker is a sensitive method to find subnormal states of subjects.

We are greatly indebted to Prof. K. Motokawa for his many valuable discussions and kind guidance.

References

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