# 60 - HEMATOLOGIC MODIFICATIONS IN UNIVERSITY WOMEN DURING MENSTRUAL FLOW AND INFLUENCE IN PERFORMANCE

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**Introduction**

A great number of women suffer, or at least already it suffered some related riot to the MC, mainly in the period that precedes the MF(PPM) and during the same. The individual tolerance for these factors are very considerable[23], then practical the regular one of physical exercises can or not be interrupted in function of the organic behavior of each woman. Another question is to know if the physical exercises could intervene of beneficial form with this so bothering period for a great number of individuals.

The hormonal regulation of the menstrual cycle is well established by literature, however it is not known very well occurs any other significant modification in sanguineous level during the phase of the MF, especially if the woman to practise exercises. Theoretically the level of the sanguineous elements would not be modified until the moment of beginning of the MF. Factors as duration and volume could intervene directly with the modification of the level of the sanguineous elements.

Alterations in the diverse organic systems had been studied and proven in previous studies[23]. We do not know if during the follicular phase(FP) of the MC the organic modifications compromise the concentration of the sanguineous elements, and if they occur, How they can intervene with the physical performance? Sampaio, citing Kim et al., tells to values of seric hemoglobin and ferritin and lower saturation of transferrin in women who if found in higher periods of bleed in the luteal phase (LP).

Amongst the resources that can be used to reduce the organic effect undesirable of the pre-menstrual Syndrome (PMS), it is considered sufficiently efficient physical activity in some cases. Authors as Coleman, 2001 and Rosemblum, 2001 recommend practical of physical activity for therapy of PMS[24]. The objective of the study was to analyze the hematologic profile of the sample during the FP and to verify if it occurred, in this phase, some significant alteration that can intervene with the physical performance.

**Materials and methods**

A group of university students (n=6), with average age of 22,4 years was monitored by five months through specific questionnaires of the MC. None of the evaluated ones made contraceptive use of or some another type of medicine. Beyond the questionnaire, all the women had carried through a training program during 12(twelve) weeks, preceded and succeeded of tests to measure its physical conditioning ($VO2_{máx}$ and 40" test - anaerobic resistance). The integrant of the group had been students of the first period of Physical Education of the Agricultural Federal University of Rio De Janeiro in the second period of 2004. In the end of 12(twelve) weeks of training a sanguineous sample was collected in first hours of menstrual flow(MF) and one second sample was collected no day average of MF. The average day of the flow was esteem through the average of duration of the MF in the 4 months that had preceded the sanguineous collection. Thus that the blood was collected the sample was led to the laboratory to be analyzed.

**Results**

The first analysis was based on the information contained in the questionnaire, on the practical one of alimentary exercises, habits and information on sensitivity alteration that can occur in the daily pay-menstrual period. Four of the six women presented swell in the PPM, what it can be explained by the biggest aldosterone level in the LP average. Another factor in common was the increase of candy ingestion in the PPM. It was not possible to detect with precision the number of meals to the long one of the twelve weeks of training, however through the questionnaire we can admit the number of 3 the 4 evaluated meals for at least four of the six. During the LP some women present sensitivity alterations, however she was not possible to detect an event in common standard, also in that she concerns to the perspiration exacerbated in the extremities or another part of the body. A study already it had shown a reduction in the resistance of heat transference that occurs during the LP and the peak of superficial temperature of tórax[19]. The intensity of each activity carried through during the training sessions was evaluated through the scale of subjective quantification of the effort, Borg's Scale. The average of intensity of the exercises is in the graph below.

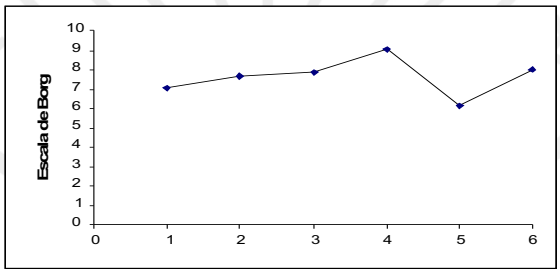


**Figure 1.** Picture with the average of the values of intensity of effort carried through in each session of training.

In the physical tests it did not have significant modification of the anaerobic power, the improvement was lesser of that 5%. The main measure where it expected to find increase was the $VO2_{máx}$, even so some sessions has had anaerobic peaks. The carried through tests had shown a significant improvement in the $VO2_{máx}$ in a ratio of 5/6. The average of increase of the $VO2_{máx}$ was of 30,22ml for 35,77ml, what it corresponds to an average improvement of 18,3%.

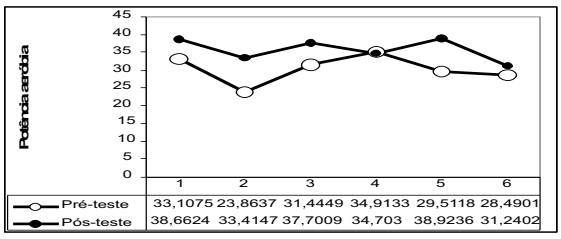


**Figure 2.** $VO2_{máx}$ comparative daily pay-test to the $VO2_{máx}$ after-test. It had a 18,3% improvement.

The analysis of the sanguineous elements did not show relative significant modifications to the MF, nor modifications that can suggest the influence of the exercise in this period. The elements of the red series had kept standard in the first one the same and in the second counting, the modifications had been minimum. The hypothesis of loss of elements of the red series, mainly hematocrite (HCT) and

hemoglobin (HGB) in function of the MF was annulled. Figure 3 shows the comparison between the values initial and final of HCT and HGB.

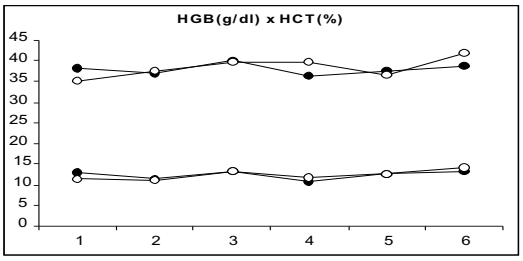


**Figure 3.** Comparison between the hematocrite and the concentration of hemoglobin in the first one and the second collection.

The analysis of the elements serial white showed distinct values between the samples. It had reduction in the white globule counting (WBC) in the ratio of 4/6. The values of one of the women and kept in 8,6K/ul and to another one it suffered increase. These modifications are not enough to conclude that it has reduction of the immunity.

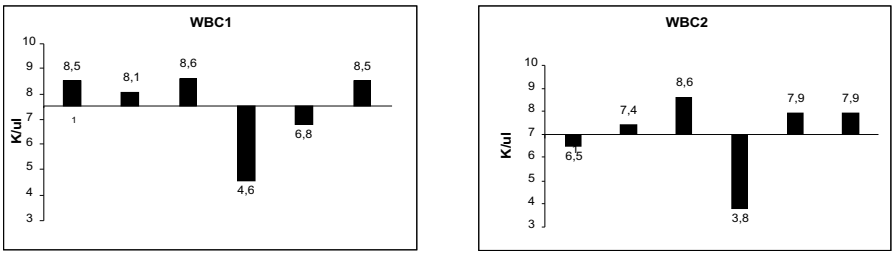


**Figure 4.** The comparison enters the WBC of the first comparative sample the second sample does not represent reduction in the immunity due to the FM.

The study of the number of plaquelets it showed increase of this variable in 3 of 6 evaluated and reduction of this same variable in 3/6. One expected to find values raised for all the evaluated ones, however the decrease of this variable in the average day of the evaluated MF in 3 of 6 can represent a temporary state of debility.

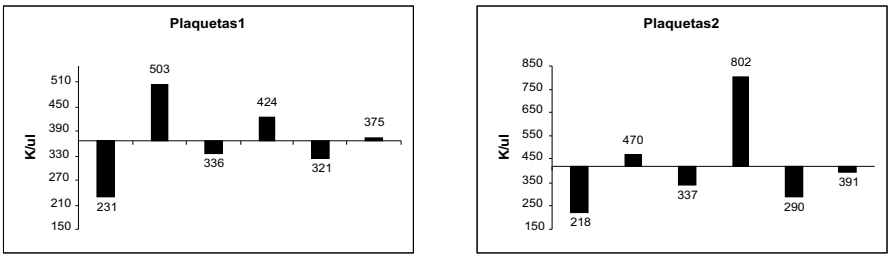


**Figure 5.** Comparison enters the number of plaquelets in the first one and the second sample.

**Discussion**

Dusse et al., citing Junqueira & Carneiro, characterizes the menstruation as a physiological process that consists of the disintegration of the superficial layer of the endometrium. In this process, numerous responsible sanguineous vases for the irrigation of this uterine region are breached, taking to the bleed menstrual[9]. The modifications that occur in this period are necessary for the interpretation of the effect on the organism.

Beyond physiological riots that normally occur during the cm, some women present extra complications. Women with dysfunction in the MF commonly report fatigue as a symptom following the contractions uterinas[1]. Related to the exercise, the events of the MF can harm the performance. Women with dysfunction in the MF have a lesser efficiency in sono[1], what she makes it difficult the organic recovery of any carried through effort, however exercises related with menstrual irregularities are not a contraindication for activity[23].

The exercise induces changes in subtracts (glucose, lactate, free acid greasy, glicerol) and in the hormonal standard Luteinizing hormone , folliculate stimulant hormone, insulin, progesterone(P), hormone of the growth, cortisol3. The MC possess two distinct phases, follicular phase (FF) and LP. Some authors consider three phases, adding an ovulatory phase, however this concept will not be excellent in this study. The hormone changes to the long one of the MC can intervene with the practical one of exercises. The reproductive hormones as estradiol(E) and P have influence of the regulation cardiovascular[28], beyond the P reducing the fatigue in reply the eccentric contraction and this effect are diminished when and also he is present[24].

Certainly the hormone effect as well as the interrelation between nutrition, intensity and volume of the exercise, index of corporal mass, and psychological factors contribute for a normal menstrual function[14]. Any athlete with menstrual dysfunction must be evaluated by eat clutters[22]. The physical exercise can be beneficial in that respect to the secondary effect of the MF. A lesser degree of physical training did not cause a significant increase in the aptness, but they oppose the trend of deteriorization observed in groups that had not made physical training[25].

The aldosterone level is higher during the half of the LP of that in the recent FP, and amenorréicas[8] is higher in runners, that they do not show signal of damage in the independent function and the orthostatic answers compared with eumenorrheics athletes and eumenorrheics athletes with oral contraceptive use[28]. The runners of long distance are considered very susceptible the secondary amenorrhea and reduction in the mineral bond, and recent studies suggest that this riot can have nutritional or metabolic relation, however do not have evidences of conservation of energy in women amenorréicas[29].

The physical exercise does not intervene with the pharmacokinetic of the caffeine with or without termic stress[16]. The effect of the physical Exercise associates to the MC seem not to intervene with the interaction of medicines in the organism, this information are very generic however it can assist in the come back nutritional orientation to the exercise.

A study it showed that after eight weeks of training in ergometric bicycle, sixty minutes per day, only beta-endorphin + beta-lipotrophin and cortisol had presented an increase in the peak of reply with the progress of trainning[5]. High levels of P in the LP[2,4] associated with a hemoglobin decrease, possibly reflect an increase in the plasmatic volume and a effect of hemodilution[4], beyond a ventilatory stimulation[26] and greater sensitivity to $CO_2$ in the comparative LP the FP[10]. Not accepted Beidleman et al this ventilatory stimulation for the increase of the P, either to the level of the sea or great altitude. Considering Beidleman et al can occur loss in the aerobic capacity. The reinfusion of erythrocytes can improve the capacity of oxygen transport apparently regulate the circulatory answers[20].

Dusse et al showed in its study has a significant reduction in the number of plaquelets circulating in the first day of the MF, comparing itself it the average day of the MC[9]. However the results had shown that during the FM this still does not happen, also having reduction in the counting of plaquelets.

The FP does not have significant difference in the consumption of oxygen nor in the income in any level of work comparing and LP in submaximum exercises, while in the maximum exercise it has a fast increase in the income during the LP, but none another parameter was different between fases[4,13]. Also it does not seem to have difference in the cardiac frequency, ventilation, or $CO_2$ expiration in the two phases during the light exercise and weighed, and no difference in the cardiac frequency until exaustion[13].

A significant increase in the maximum voluntary force occurs (about 10%) during the FP of the MC when the estrogen level is in ascension, in the trained groups and untrained[19]. In this case the accomplishment of exercises where the main physical valence is the force would be contraindicated. It does not have effect of the phase of the MC, in rest or reply to the acute exercise, the protein synthesis myofibril and the synthesis of collagen in woman[17].

The aerobic performance and the cardiorespiratory adaptations to the exercise are not influenced by the phase of the MC, the performance in exercise of high intensity is improved, and the lactate production seems to decrease in the LP when the P and level are elevated[11,13].

**Conclusion**

The found sanguineous modifications in the study do not represent a damage to the exercise, however the individual tolerance to these modifications can affect the performance. In general the organism supports well these modifications without compromising its physiology in the exercise. The bibliographical revision did not show significant differences between the performance during the MF or is of it. If the MF will be enough to modify the sanguineous elements of the red series, then in this study, the exercise can have been beneficial through its erithropoietics effect, or either, in this in case that, the loss of elements of the red series better would be tolerated by its bigger production. However this better would be clarified with a comparative study between a group has tested and a group has controlled. The increase in the level of maximum voluntary force suggested by literature can be considered the biggest modification in performance level, being able to affect sports results in specific activities. In last analysis we can admit an improvement in some effect provoked for the MF as: bigger tolerance pains provoked for the uterine cramps, lesser retention of liquids and control of the sanguineous glucose.

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**HEMATOLOGIC MODIFICATIONS IN UNIVERSITY WOMEN DURING MENSTRUAL FLOW AND INFLUENCE IN PERFORMANCE**

**Abstract**

Abnormalities in the menstruation cycle (MC) are commons in adolescents and young women are physical practicing or not. The effect caused for the phases of the MC in the performance in exercises have been studied and many information are Known. However, we know just a little about the effect of exercises related to menstrual flow (MF) in that says respect to the blood elements and the consequences related to exercises. The objective of the present study is to verify modifications in blood composition in function of the MF in universities women in physically activity. A group (n=6) composed for universities women, was monitored by five months by a specific questionnaire and had carried through a training for 12 weeks of physical exercises. The blood collection occurred in first day and the mid-day of the MF. Occurred diminishes in number of white blood cells in a proportion of 4/6 and in number of plaquelets of 3/3. Didn't a pattern blood modification in variables analyzed. The performance in exercises not be related with blood modifications provoked by the FM or with the phase of the MF.

**MODIFICATIONS HÉMATOLOGIQUES DANS DES FEMMES D'UNIVERSITÉ PENDANT L'ÉCOULEMENT MENSTRUEL ET INFLUENCE DANS L'EXÉCUTION**

**Resumé**

Les anomalies dans le cycle de menstruation (MC) sont des terrains communaux dans les adolescents et les jeunes femmes soient pratiquant d'exercices physiques ou pas. L'effet causé pour les phases de MC dans l'exécution des exercices ont été étudiés et beaucoup de l'information sont connues. Cependant, nous savons que juste au sujet de l'effet des exercices liés à l'écoulement menstruel (MF) dans cela dit le respect aux éléments de sang et aux conséquences liés aux exercices. L'objectif de la présente étude est de vérifier des modifications en composition en sang en fonction du MF dans des femmes d'universités dans l'activité physique. Un groupe (n=6) composé pour des femmes d'universités, a été surveillé par cinq mois par un questionnaire spécifique et avait réalisé une formation pendant 12 semaines d'exercices physiques. La collecte du sang s'est produite dans le premier jour et le midi du MF. Le résultat des examens a été présenté une diminution pour le nombre des cellules de sang blanches dans une proportion de 4/6 et en nombre des plaquettes de 3/3. Pas de modification de sang modèle dans les variables analysées. La performance des exercices ne peut pas être relié avec des modifications de sang provoquées par le FM ou avec la phase du MF.

**MODIFICACIONES HEMATOLOGICAS EN MUJERES UNIVERSITARIAS DURANTE EL FLUJO MENSTRUAL Y INFLUENCIA EN EL DESEMPEñO**

**Resumen**

Anormalidades en el ciclo mestrual (CM) son comúnes em adolescentes e jovenes adultas, practicantes de actividades físicas o no. Los efectos causados por las fases del CM en el desempeño en ejercicios fueron estudiados y muchas informaciones son conocidas. Sin embargo, poco se conoce sobre el ejercicio físico relacionado con el flujo menstrual (FM) em lo que se refiere a los elementos de la sangre y las consecuencias em posibles modificaciones orgânicas relacionadas al ejercicio. El actual estudio tiene el objectivo de verificar modificaciones em la composición de la sangre em la función del FM em mujeres universitárias fisicamente activas. Un grupo (n=6) compuesto por mujeres universitárias, fue observado por cinco meses, por medio de cuestionario y realizaron un entrenamiento de 12 semanas de ejercicios físicos. La colecta de la sangre ocurrio en el primero y em la mitad del FM. Ocurrio uma disminución en el número de glóbulos blancos en una proporción de 4/6 e en el número de plaquetas de 3/3. No se constato una modificación de la sangre estándar en las variables analizadas. El desempeño en la relización de ejercicios no parece estar relacionado con modificaciones de la sangre provocadas por el FM o con la fase del CM.

**MODIFICAÇÕES HEMATOLÓGICAS EM MULHERES UNIVERSITÁRIAS DURANTE O FLUXO MENSTRUAL E INFLUÊNCIA NO DESEMPENHO**

**Resumo**

Anormalidades no ciclo menstrual(CM) são comuns em adolescentes e jovens adultas, sejam praticantes de atividades físicas ou não. Os efeitos causados pelas fases do CM no desempenho em exercícios já foram estudados e muitas informações são conhecidas. Porém, pouco se sabe sobre os efeitos do exercício físico relacionado ao fluxo menstrual (FM) no que diz respeito aos elementos sanguíneos e as conseqüências de possíveis modificações orgânicas relacionadas ao exercício. O presente estudo tem o objetivo de verificar modificações na composição sanguínea em função do FM em mulheres universitárias fisicamente ativas. Um grupo (n=6) composto por mulheres universitárias, foi monitorado por cinco meses através de questionário e realizaram um treinamento de 12 semanas de exercícios físicos. A coleta sanguínea ocorreu no primeiro e no dia médio do FM. Ocorreu uma diminuição no número de glóbulos brancos em uma proporção de 4/6 e no número de plaquetas de 3/3. Não houve uma modificação sanguínea padrão nas variáveis analisadas. O desempenho na realização de exercícios não parece estar relacionado com modificações sanguíneas provocadas pelo FM ou com a fase do CM.