

75 - THE IMPROVEMENT OF HIIT PRACTICING WOMEN IN THE DIFFERENT HORMONAL PHASES

CONSTANTINO. Caroline;
BRASILINO. Fabricio F.;
MORALES. Pedro J. C.;
ROSA. Luis F. da
Curso de Educação Física – UNIVILLE/SC - BR

doi:10.16887/89.a1.75

Introduction

It is known that the population is facing high levels of overweight, and according to the Ministry of Health in a survey conducted in 2016 (Government of Brazil, 2017) one in five people in the country is overweight. The prevalence of the disease increased from 11.8% in 2006 to 18.9% in 2016.

The big problem of the numbers shown, are the complications that the overweight population can suffer, such as chronic non-degenerative diseases, or in more severe cases, lead to death.

This is indicated by a recent survey published in the *New England Journal of Medicine*, where researchers claim that obesity kills more in the world than car accidents and Alzheimer's. They still mention that 4 million people in the world died in 2015 due to overweight - or 7% of all deaths (Epoch, 2017).

In another study conducted by the IBGE and referenced by the Brazilian Association for the Study of Obesity and Metabolic Syndrome in 2015, obesity affects one in five Brazilians aged 18 years or more in 2013 (20.8%), and the percentage is higher among women (24.4% vs. 16.8% of men - ABESO, 2015).

The same study done by the IBGE still indicates that 52.1% of the women had a waist circumference greater than or equal to 88 cm, which characterizes abdominal obesity and warns that excess abdominal fat is associated with the risk of cardiometabolic diseases, such as obesity, diabetes and hypertension (ABESO, 2015).

Leitão et al. (2000, p.215) add: In 1996, Blair and colleagues published a follow-up of 8.900 women for 10 years, demonstrating that the greatest weight factor in general mortality was the low physical fitness, overcoming all other major risk factors, including smoking.

For Mendonça et al. (2004, p.698) the reduction of the level of physical activity is related to the industrialization, where the work with physical effort was reduced, and the practice of leisure had changes as well, such as sports practices were exchanged for hours before the television or computer.

Meléndez et al. (2004, p. 309) presents pertinent information about a survey conducted in Belo Horizonte between 1975 and 1997, where there is an increase in obesity among women of lower socioeconomic status and a decrease in those with a higher socioeconomic level in the studied regions.

Obesity can also harm the female (and the male) reproductive system, which can make the risk of miscarriage high in pregnancy and changes in the menstrual cycle. This is what Clapauch (2012, p.125) says:

These abnormalities (overweight) interfere in the dynamics of the female reproductive system at the central (hypothalamic-pituitary) and peripheral (ovary and endometrial) levels, leading to changes in the menstrual cycle (oligoamenorrhea) and fertility, as well as increased risk of miscarriage.

The woman's body has several hormonal changes during the month, each phase is responsible for the release of specific hormones, which cause the woman to get from euphoric to discouraged quickly during the month.

According to Menke and Freitas (2001) apud Dias, Novaes and Simão (2005, p.289):

The normal cycle varies from 21 to 35 days, with an average of 28 days, and can be divided into three distinct phases: follicular, ovulatory and luteal. Each phase is characterized by alternating secretions of follicle stimulating hormone (FSH) and luteinizing hormone (LH) by the anterior pituitary and estrogen and progesterone by the ovaries.

Within the 28-day mean of the woman's complete hormonal cycle, specific phases occur that are responsible for each part of the month, the follicular phase, the ovulatory phase, and the last phase, the luteal phase.

These three stages range from the preparation of the woman's body to menstruation until the recovery of all the events that affect them in the process.

The follicular phase is the proliferative phase of the uterus. It lasts for the first 14 days of the menstrual cycle.

During the follicular phase, hormones stimulate the development of follicles. By day 5 or 6, a dominant follicle (which contains one egg to be released) emerges and the others return. During this time, the uterus, in its proliferative phase by stimulating estrogen, causes the endometrium to grow 1 to 3 mm after menstruation to 6 to 8 mm until ovulation (INTERNATIONALASHERMAN'S ASSOCIATION, 2017).

The ovulatory phase is the moment of the cycle in which the woman is fertile. It lasts between the 12th day of the cycle and the 16th day, according to the International Asherman's Association (2017). With ovulation, progesterone levels begin to rise. Estrogens decrease their concentration, as well as the levels of LH / FSH (luteinizing hormone / follicle-stimulating hormone) in the ovulatory phase (Guyton, 1976 p.1086-103 apud Arruda et al. 2008).

The luteal phase is the final phase, from the 14th day of the cycle to the 28th and last day of the menstrual cycle.

LH (luteinizing hormone) induces the formation of the corpus luteum (which degenerates if a pregnancy occurs). The uterus still grows under the influence of estrogen and progesterone. The glands are enlarged and, if no implantation occurs, the endometrium begins to flake after day 28 of the cycle (International Asherman's Association, 2017).

Because the hormonal oscillations are very large during the month, it is difficult to carry out conclusive studies, as explained by Giamberardino et al. (1997) apud Barbosa et al. (2007) that the studies attempt to explain the physio behavioral reactions of women, however, the research does not present consistency in its results.

Faced with these hormonal issues, one important factor is the use of contraceptives in women's lives. Contraception has accompanied a good share of women around the world for a long time, whether it be the pill, condoms, injections, and so on. This is what the Earth Policy Institute (2012, web) says:

According to the United Nations, 63% of women of reproductive age worldwide, representing about 740 million couples practicing some form of contraception. Almost 90% of them employ modern methods, which include oral contraception (the pill), condoms, injections, intrauterine devices (IUDs) and sterilization.

In Brazil, according to Espejo (2001) apud. Alves et al. (2007, p.274) contraception is concentrated in tubal ligation (40%) and contraceptive pill (21%).

It is soon understood that all the hormonal phases of hormone and pregnancy highs and lows through which women spend their weight loss becomes more difficult and the probability of being overweight is much greater, and the number of tasks to be performed in the day it becomes increasingly difficult to put physical activity as a priority on the agenda.

In order to encourage a more active lifestyle of the population, the guidelines propose that the population should adhere to the practice of physical exercises for 30 to 60 minutes for most of the week (HASKELL et al. 2007; ACSM, 2011. SILVEIRA, 2017).

The search for a reduction in body fat is a trend that affects different populations and age groups and may be motivated by health-related issues such as aesthetic goals (Xavier et al. 2014). Cunha et al. (2008) complement that physical activity does not only modify body aesthetics, but a multitude of factors related to health:

The practice of regular physical activity reduces the risk of cardiovascular disease, some types of cancers, assists in blood pressure control and type II diabetes, promoting increased insulin turnover, increased liver uptake and improving the sensitivity of peripheral receptors, reducing complications related to comorbidities.

"A little more than two decades ago, several researchers have promoted aerobic exercise as the most effective strategy for reducing excess body fat" (HILL, 1992; WILMORE et al. 2001 apud GENTIL 2010, p.76).

Gentil (2010: 80) points out that the use of low-intensity and long-term exercises for fat loss has been advocated. He argues that this information led many practitioners to believe that intense activities would not lead to weight loss, so the idea that fat oxidation would start only after twenty minutes of activity.

Considering that people currently have high workloads and little time for physical activity, the idea that there is a need for at least twenty minutes of aerobic weight loss can lead people away from seeking a gym. This current need leads one to believe that HIIT may be a good option for the goal of weight loss to be achieved.

Gentil (2010, p.158) argues that although interval training has gained popularity in recent years, it has been used since the beginning of the century by coaches for athletes with the goal of improving their athletic performance.

Xavier et al. (2014 p.73) recall that HIIT does not only bring esthetic benefits, but also improves respiratory capacity: The improvement in cardiorespiratory capacity promoted by HIIT is very important considering that this is one of the components of physical fitness related and an important indicator of good health.

For Tjona et al. (2009) and Sartor et al. (2010) apud Xavier et al. (2014 p.76), it is possible to see that high intensity can promote metabolic adaptations promoting the increase of insulin sensitivity and, consequently, the regulation of glucose in overweight and obese individuals.

The HIIT modality practiced at FIT Academia has the main proposal of the modality, but it is applied in the open room, with the use of mats and body weight, being then of the body work model, not using bicycles or mats like conventional HIIT.

Recently some researchers have reintroduced the concept of body weight training using the HIIT method in their experiments characterizing the method as wholebody training, Whole body calisthenics or as it is known in professional practice as HIIT BODY WORK (MACHADO, 2017).

However, for Machado (2017) the literature is still lacking specific protocols for HIIT with body weight, limiting the use of this modality when we refer to its applicability. If there is no specific protocol, the HIIT practiced by the FIT Academy is an exercise prescription that considers the principles of HIIT for safety and results.

There is currently not enough literature to address the HIIT variables so, the source of LAURSEN et al. (2002) apud. VECCHIO et al. (2014 p.11 to 13):

Stimulus: Period in which the exercise is performed with intensity. The working interval lasts from 10 seconds to 5 minutes, with intensity above the anaerobic threshold; Recovery: Intervals between exercises. The type of recovery is related to the HIIT protocol performed. However, longer recoveries of the order of 4min and 30s can be respected; Intensity: As with time, intensity is applied as a form of effort control in the stimulus period; Duration: The total period spent in the training session, considering interval of work and recovery. The estimation is that the grouping of these activities requires a period between 20 and 25 minutes, of which, from 8 to 16 minutes are allocated to the exercise at high intensity; Series: The number of times the stimulus will be done. When the volume of work is low, the number of HIIT series is higher, with a duration varying from 1-4 minutes, depending on the specificity of the modality and the practitioner points out Vecchio et al. (2014, p. 12).

This author also stresses the importance of having more studies about HIIT: It is important to emphasize that there is no consensus in the literature regarding the intensity, duration and number of ideal intervals for HIIT execution, ideally that more studies are performed for which establishment of these issues (2014, p. 12).

Still for Xavier et al. (2014 P. 76), HIIT demonstrates potential for the promotion of adaptations related to the reduction of body fat, through protocol with volume and reduced frequencies allied to high intensity. The possible mechanisms responsible for the reduction in body fat induced by HIIT have not yet been determined; however, may be associated with increased fat oxidation during and especially after intermittent exercise (BOUTCHER, 2011 apud XAVIER et al. 2014 p.76).

In the light of the above, this study aims to compare the level of weight loss of HIIT women in the three different hormonal phases: follicular, ovulatory and luteal.

Materials and Methods

This is a bibliographical research, descriptive, semi-experimental design.

Given the nature of the research, it was decided to use the bio-impedance scale of the brand Serene Digi-Health Pro, using the data it provides: Weight, percentage of fat and percentage of muscle mass and will also be used the scale of subjective perception of effort of OMNI-RES (GEARHART et al., 2002).

Before the beginning of the research, the participants signed the informed consent form to start the research. All participants reported when their menstruation began during the two months of follow-up, and according to the literature the researcher calculated the menstrual phases in which the participants should be weighed, the follicular phase, the ovulatory phase and the luteal phase, and at the end of HIIT sessions on the days they were weighed, responded to the subjective perceived effort scale of OMNI-RES (GEARHART et al., 2002) according to their fatigue at the time of 0 for extremely easy and 10 for extremely difficult.

The sessions were based on calisthenics exercises such as polychromies, squats, burpees, jumps and sit ups timed between exercise and interval. The sample was started in 20 women, ending in 15. They are separated into two groups with 8 in group A: Menstruate and take contraceptive and 7 in group B: Menstruate and do not take contraceptive. Between 21 and 46

years old.

The physical activity intervention was done with HIIT three times a week. at FIT Academy. during the day and night periods.

This study was sent to the Human Research Ethics Committee of UNIVILLE, where it received a favorable opinion under No. 2,421,217.

The data then collected were made available in an Excel for Windows worksheet and later inserted into a statistical program where normality was analyzed. frequency. measures of central tendency and dispersion. as well as tested by the association of their variables with the Pearson correlation with p value <0.05.

Results

The data obtained were tested in the Kolmogorov-Smirnov normality test. suggesting a parametric test for the analysis of the results.

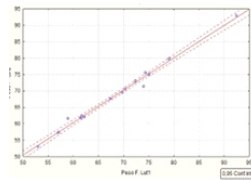
Table 1. Mean values and their derivatives for age. height and weight of the first and second weighing of the follicular. ovulatory and luteal phases

Variable	Mean	Variance	SD	VC
Age	30.50	46.40	6.81	20.64
Age	30.50	46.40	6.81	20.64
Height	1.6350	0.0036	0.0599	3.6346
Body Mass F 1	66.25	92.84	9.64	14.14
Body Mass O 1	65.90	91.83	9.58	14.22
Body Mass L 1	68.55	95.54	9.77	14.31
Body Mass F 2	68.50	91.33	9.56	13.91
Body Mass O 2	67.40	397.99	19.95	31.32
Body Mass L 2	69.40	99.63	9.98	14.50

Source: own research
SD: standard deviation VC: variation coefficient

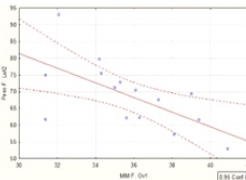
When analyzing Table 1, it can be observed that the mean age of the sample participants was 30.5 ± 6.81 years showing little variance between them, and the mean height was 1.635 ± 0.0599 meters. The mean weight at the beginning of the HIIT (follicular phase) sessions was 66.25 ± 9.64 kg and the mean weight of the last analyzed phase (luteal phase) was 69.4 ± 9.98 kg.

Graph 1: Comparison of the weight of the first weighing of the luteal phase with the weight of the second weighing of the luteal phase.



Source: own research
p-value<0.05

Graph 2: Comparison of the percentage of lean mass of the first weighing with the weight of the second weighing of the luteal phase.



Source: own research
p-value<0.05

In graph 1 it was possible to verify that the weight of the first weighing of the luteal phase is directly proportional to the weight of the second weighing of the luteal phase, which add up to a complete cycle between one and the other, suggesting a strong correlation (.99421).

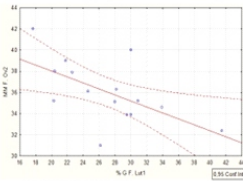
In this case, the weight of the second weighing of the luteal phase remained like the weight of the first weighing. Observing graph 2 it was possible to note the correlation that the percentage of lean mass of the first weighing of the ovulatory phase with the weight of the second weighing of the luteal phase, they are inversely proportional, that is, as the weight decreases, and the lean mass increases it is understood that what decreases is body fat.

No studies were found that analyzed the weight loss before the hormonal phases using HIIT sessions, in this case were selected works that compared other physical valences with the female hormonal cycle.

In the study conducted by Rezende et al. (2009) with five women accustomed to resistance training may be like the results of this study. The women were followed by two menstrual cycles, 3 times a week. As a result, it was observed an increase in body weight, but the percentage of body fat decreased.

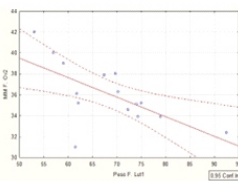
In a study conducted by Simão et al. (2007) apud. Costa (2014 p.24) with 19 women who did not use regular contraceptives, used the 45° leg press and the triceps pulley test, it was noted in this study that there was an increase in performance in leg-press exercise, in the tests performed in the follicular and ovulatory phases. On the other hand, in the luteal phase, there was a decrease in the load / strength of the women tested.

Graph 3: Comparison of the first fat percentage of the luteal phase with the percentage of lean mass of the second weighing of the ovulatory



Source: own research
p-value<0.05

Graph 4: Comparison of the weight of the first weighing of the luteal phase with the percentage of lean mass of the ovulatory phase.



Source: own research
p-value<0.05

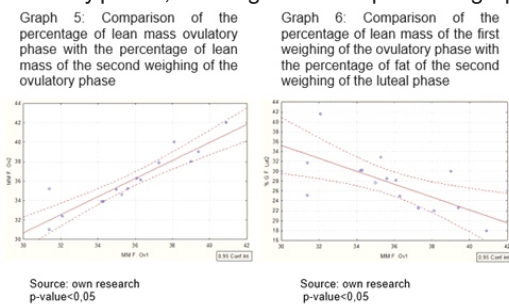
In graph 3 it is verified that the fat percentage of the first weighing of the luteal phase with the percentage of lean mass of the second weighing of the ovulatory phase are inversely proportional, that is, the percentage of fat decreased in relation to the gain of lean mass, suggesting again gains lean mass.

Observing graph 4, it is possible to observe the negative correlation that has the weight of the first weighing of the luteal phase with the percentage of lean mass of the second weighing of the ovulatory phase. They are inversely proportional, demonstrating again that what has come to decline was the percentage of body fat.

In the study conducted by Oliveira (2016, p.32) with 20 women using contraceptives, the exercises tested were bench press, 45° leg press and low row with triangle. There were no significant changes in maximal strength levels when compared to the three different phases of the menstrual cycle in any of the three exercises evaluated.

However, there was a considerable increase in the amount of load supported in the leg press exercise 45°, from the

premenstrual phase (208kg [95% CI: 192.77; 223.22]) to the postmenstrual phase (233kg [95% CI: 209.37, 256.62]). In this case, the post-menstrual phase refers to the ovulatory phase, showing relationship with the graphs presented in this work.

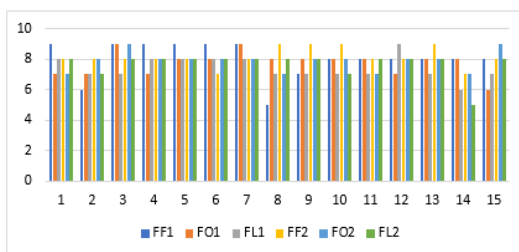


In analyzing graph 5, it is possible to verify the positive correlation between the percentage of lean mass of the first ovulatory phase and that of the second ovulatory phase, having a strong correlation among them (.91135). In this analysis that completes a complete cycle, it is possible to perceive the increase of lean mass in the ovulatory phase.

Graph 6 shows the comparison of the percentage of lean mass of the first weighing with the percentage of fat of the second weighing, including a strong negative correlation (-.6300), explaining that the fat percentage of the second weighing of the luteal phase is inversely proportional to the percentage of lean mass of the first weighing of the ovulatory phase.

When analyzing the groups that used contraceptive and those who did not use, it was proved that although there are significant differences between the averages obtained, this difference is not proved by the statistic.

Table 2. Subjective effort perception from the OMNI-RES scale (GEARHART, 2002).



Source: own research

Analyzing the subjective perception of the OMNI-RES effort (GEARHART et al., 2002) of the participants during all the phases, it is observed that in the first weighing of the follicular phase and in the second weighing of the same phase the average was greater than the other phases, with the first weighing 8 and the follicular phase of the second weighing 8.133333, the other phases remaining at a mean of 7.

The results show that even in the phases where the perception of effort was lower, it remained in a zone suitable for the desired intensity, 7 being a little difficult and 8 difficult on the scale.

The subjective perception of effort (PSE) is based on the perception of effort and fatigue of the subject during the exercise and is used with the objective of measuring or regulating the intensity of the same, through numerical value that represents the state of fatigue during exercise (BORG, 1970, GOMES et al., 2014, p.14).

The subjective perception in the absence of some means of heart rate measurement or the like, becomes very relevant to achieve the expected results with the HIIT sessions. As the subjects can define the effort through the PSE, they can improve the ability to self-regulate the workload more precisely (CÉLINE et al., 2011 apud GOMES et al., 2014 p.16).

A study by Melegario et. al. (2006) investigated the influence of the menstrual cycle on flexibility in women between the ages of 18 and 35 years of gymnastics who did not use contraception.

The flexibility was measured through goniometry, using eight movements, in three phases of the menstrual cycle, showed that there was no significant difference in the degree of flexibility of the women in the menstrual phases.

Another study by Celestino et. al. (2012), which aimed to compare the muscular strength of women in the age group of 18 to 30 years, in the three hormonal phases through 10 RM tests in the extensor chair and flexor chair also concluded that there were no important differences, but in the post phase Both groups presented a slight variation in maximal strength performance relative to the other two menstrual phases.

Ramos et. al. (2018) verified the muscular strength of the lower limbs in the phases of the menstrual cycle.

Strength was measured by the Welday (1988) submaximal test in the 45° leg press apparatus during all hormonal phases and as a result it was possible to observe an increase in strength in menstrual and post menstrual, menstrual and post ovulatory, ovulatory and ovulatory, menstrual and post-ovulatory.

Fleck and Kraemer (2006) add that the effect of the menstrual cycle on performance is still confusing and probably very specific to individuals.

According to Leitão et al. (2000) apud. Celestino et al. (2012) the different phases of the menstrual cycle do not interfere with physical performance, and some women who exercise regularly present relief from premenstrual symptoms.

Fleck and Kraemer (2006) apud. Celestino et al. (2012) cite that world records were established at all stages of the menstrual cycle.

On the other hand, Weineck (2005) contrasts with the fact that the optimal physical performance is achieved in the postmenstrual phase, due to the increasing rate of estrogen; in the postoperative phase is considered a phase of reduced performance capacity and during menstruation, about 70% of women achieve a performance equal to or better than at other times of the cycle and 30%, there is a decrease although not significant.

Finals Considerations

When observing the data obtained with this research it is possible to conclude that between the group that took contraceptive and the one that did not take although there are expressive differences between the means, statistically this difference is not proven. The weight between the beginning and the end of the weighing was directly proportional, maintaining

itself.

The percentage of lean mass was inversely proportional to the weight, showing a significant increase of lean mass, leading to the belief that there was also a decrease in fat percentage.

It is also important to mention the benefits that the HIIT sessions have brought, because although there are not many studies yet, they are proving to be increasingly effective, not only decreasing body fat but also increasing lean mass, the latter being extremely important for healthy aging women. Since it is a research with a small number of samples, it is suggested that new research be done with a larger number of participants, control of variables such as food for example, and with more time to follow the results to prove more.

Referências

ABESO, Associação Brasileira para Estudo da Obesidade e da Síndrome Metabólica. Quase 60% dos brasileiros estão acima do peso, revela IBGE. Disponível em: <<http://www.abeso.org.br/noticia/quase-60-dos-brasileiros-estao-acima-do-peso-revela-pesquisa-do-ibge>>. Acesso em: 19 set. 2017.

ALVES, Aline Salheb et al. Locus de Controle e escolha do método anticoncepcional. Revista brasileira de Enfermagem, Brasília, 2007, p. 274. Disponível em: <<http://www.redalyc.org/pdf/2670/267019611005.pdf>>. Acesso em: 15 abr. 2018.

ARRUDA, Priscila Oliveira; SILVA, Isabella Monteiro de. Estudo das emissões otoacústicas durante o ciclo hormonal feminino. Revista Brasileira de Otorringolaringologia. 2008, p. 107. Disponível em: <<http://www.redalyc.org/html/3924/392437836017/>>. Acesso em: 13 ago. 2018.

BARBOSA, MB et al. Determinação dos limiares de percepção sensorial e de resposta motora nas diferentes fases do ciclo menstrual. Revista Brasileira de Fisioterapia. Vol.11 no.6, p. 444, 2007. Disponível em: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S14133552007000600005>. Acesso em: 02 nov. 2018.

CELESTINO, Keila dos Santos Domingos; SANTOS, Igor Freitas; SANTOS, Ana Luisa Batista; LOUREIRO, Adriano Carneiro. Comparação da força muscular de mulheres durante as fases do ciclo menstrual. Caderno de Cultura e Ciência. 2012, p. 42. Disponível em: <<http://periodicos.urca.br/ojs/index.php/cadernos/article/view/478>>. Acesso em: 22 set. 2018.

CLAPAUCH, Ruth. Endocrinologia Feminina e Andrologia. Ac Farmacêutica – Grupo GEN (Grupo Editorial Nacional), 1ª Edição. 2012, p.125.

COSTA, Henrique Machado da. A influência das fases do ciclo menstrual no treinamento de força em mulheres que não utilizam anticoncepcionais. Repositório digital institucional da UFPR. 2014, p. 24. Disponível em: <<https://acervodigital.ufpr.br/handle/1884/46706>>. Acesso em: 20 out. 2018.

CUNHA, Iara Cândido et al. Fatores associados à prática de atividade física na população adulta de Goiânia: monitoramento por meio de entrevistas telefônicas. Revista brasileira de epidemiologia. 2008. Disponível em: <<http://www.scielo.br/pdf/rbepid/v11n3/15.pdf>>. Acesso em: 06 nov. 2018.

DIAS, Ingrid. NOVAES, Jeferson da Silva. SIMÃO, Roberto. Ciclo Menstrual e Força: Efeitos das diferentes fases do ciclo menstrual em um teste de 10 RM. Fitness & Performance Journal, Rio de Janeiro, v. 4, n. 5, 2005, p. 288-292.

EARTH POLICY INSTITUTE. Growth in World Contraceptive Use Stallin 215 Million Women's Needs Still Unmet. Disponível em: <http://www.earth-policy.org/data_highlights/2012/highlights26>. Acesso em: 09 abr. 2018.

ÉPOCA NEGÓCIOS. Obesidade mata mais do que acidente de carro, terrorismo e Alzheimer. Disponível em: <<http://epocanegocios.globo.com/Vida/noticia/2017/06/obesidade-mata-mais-do-que-acidente-de-carro-terrorismo-e-alzheimer.html>>. Acesso em: 28 set. 2017.

FLECK, S.; KRAEMER, W. Fundamentos do treinamento de força muscular. Porto Alegre: Artmed, 2006.

GEARHART, Randall J. et al. Ratings of perceived exertion during high and low intensity resistance exercise. Revista de Pesquisa em Força e Condicionamento. v. 16, n. 1, p. 87–91, Feb. 2002.

GENTIL, Paulo. Emagrecimento: Quebrando mitos e mudando paradigmas. Rio de Janeiro. Sprint, 2010, p.76-158.

GOMES, Bruno Prestes; COSWIG, Victor Silveira; VECCHIO, Fabricio Boscolo Del; Percepção subjetiva de esforço aplicada ao treinamento intermitente de alta intensidade. OMP Editora, p. 14-16. Edição do Kindle, 2014

GOVERNO DO BRASIL. Obesidade cresce 60% em dez anos no Brasil. Disponível em: <<http://www.brasil.gov.br/noticias/saude/2017/04/obesidade-cresce-60-em-dez-anos-no-brasil>>. Acesso em: 02 nov. 2018.

INTERNATIONAL ASHERMAN'S ASSOCIATION. Fases do ciclo menstrual. Disponível em: <<http://www.ashermans.org/informacoes/phases-of-the-menstrual-cycle/?L=8>>. Acesso em: 08 set. 2017.

LEITÃO, Marcelo Bichels et al. Posicionamento Oficial da Sociedade Brasileira de Medicina do Esporte: Atividade Física e Saúde na Mulher. Revista brasileira de medicina do esporte. Vol. 6, Nº 6 – Nov/Dez, 2000. Disponível em: <http://www.scielo.br/scielo.php?pid=S1517-8692200000600001&script=sci_arttext>. Acesso em: 06 nov. 2018.

MACHADO, Alexandre F. HIIT Body Work. Editora Vo2Pro. 1ª edição, São Paulo, 2017, p.8 – p.11.

MELEGARIO, Solange Mattos et al. A influência do ciclo menstrual na flexibilidade em praticantes de ginástica de academia. Revista Brasileira de Medicina do Esporte. 2006, p. 125. Disponível em: <<http://www.scielo.br/pdf/rbme/v12n3/v12n3a03.pdf>>. Acesso em: 22 set. 2018.

MELÉNDEZ, Gustavo Velásquez- et al. Epidemiologia do sobrepeso e da obesidade e seus fatores determinantes em Belo Horizonte (MG), Brasil: estudo transversal de base populacional. Revista pan-americana de saúde pública. 2004, p. 309. Disponível em: <<https://www.scielosp.org/pdf/rpsp/2004.v16n5/308-314/pt>>. Acesso em: 07 nov. 2018.

MENDONÇA, Cristina Pinheiro et al. Aspectos das práticas alimentares e da atividade física como determinantes do crescimento do sobrepeso/obesidade no Brasil. Cadernos de saúde pública. Rio de Janeiro, 2004, p. 698. Disponível em: <<https://www.scielosp.org/pdf/csp/2004.v20n3/698-709/pt>>. Acesso em: 07 nov. 2018.

OLIVEIRA, Igor Luan Velho de. Variabilidade da força máxima e da resistência muscular conforme as fases do ciclo menstrual em mulheres adultas praticantes de treinamento resistido. Repositório Institucional UFSC. 2016, p. 32. Disponível em: <<https://repositorio.ufsc.br/xmlui/handle/123456789/171570>>. Acesso em: 21 out. 2018.

RAMOS, Hévelyn C.; MORALES, Pedro J.; SOUZA, William C.; BRASILINO, Monica F.; BRASILINO, Fabricio F. Análise da força muscular dos membros inferiores em mulheres praticantes de musculação nas diferentes fases do ciclo menstrual. Revista Brasileira de Prescrição e Fisiologia do Exercício. 2018, p. 29. Disponível em: <<http://periodicos.urca.br/ojs/index.php/cadernos/article/view/478>>. Acesso em: 22 set. 2018.

REZENDE, Fernanda Martins Alves et al. Efeitos de um treinamento resistido periodizado, conforme as fases do ciclo menstrual, na composição corporal e força muscular. Revista Científica da América Latina, Caribe, Espanha e Portugal. 2009. Disponível em: <<http://www.redalyc.org/html/930/93012686008/>>. Acesso em: 06 nov. 2018.

SILVEIRA, Nathan. Efeitos do treinamento intervalado de alta intensidade em cardiopatas. Unisul, 2017. Disponível em :

<https://www.runi.unisul.br/bitstream/handle/12345/3904/Efeitos%20do%20treinamento%20intervalado%20de%20alta%20intensidade%20em%20cardiopatias.pdf?sequence=8&isAllowed=y>. Acesso em: 06 nov. 2018.

VECCHIO, Fabricio Boscolo Del et al. Exercício Intermitente: Estado da arte e aplicações práticas. OMP Editora. Edição do Kindle, 2014.

XAVIER, Gabriela Brisola et al. Exercício Intermitente: Estado da arte e aplicações práticas. OMP Editora, p. 66-76. Edição do Kindle, 2014. Acesso em: 06 nov. 2018.

WEINECK, J. Biologia do esporte. 7ª edição. São Paulo: Manole. 2005.

THE IMPROVEMENT OF HIIT PRACTICING WOMEN IN THE DIFFERENT HORMONAL PHASES

This study had as objective compares the level of practicing women's of HIIT weigh loss in the three different hormonal phases: follicular, ovulatory and luteal, through weightings in a bioimpedance scale. It is a research bibliographical, descriptive, quantitative of semi-experimental stamp. The sample was composed by 15 women, with age group between 21 and 47 years, divided in two groups: 8 made contraceptive use and 7 didn't do. The participants practiced sessions of HIIT frequently of at least three times the week during two hormonal cycles. The weightings took place for two months always in the beginning of the training sessions, the first, Monday and third weighting happened in the phases follicular, ovulatory and luteal respectively. To the end of the sessions of HIIT they answered the scale of subjective perception of effort of OMNI-RES (GEARHART et al. 2009). The collected data were made available in a spreadsheet of Excel for Windows and inserted in a statistical program where was analyzed the normality, frequency, measures of central tendency and dispersion, also tested by the association of the variables with the correlation of Pearson with $p < 0.05$. It was noticed that the weight in the beginning of the weightings and in the end of the weightings it was directly proportional, in other words, he/she stayed. Already the percentile of thin mass was shown inversely proportional to the weight, having expressive increase of thin mass with the practice of sessions of HIIT.

Keywords: Weight loss; Woman; HIIT; Phases hormonal; Gym.

L'AMÉLIORATION DE LA PRATIQUE DES FEMMES HIIT DANS LES DIFFÉRENTES PHASES HORMONALES

L'objectif de cette étude était de comparer le niveau de perte de poids chez les femmes HIIT dans les trois différentes phases hormonales: folliculaire, ovulatoire et lutéale, en pesant dans une échelle de bioimpédance. Il s'agit d'une recherche bibliographique, descriptive, quantitative de nature semi-expérimentale. L'échantillon était composé de 15 femmes âgées de 21 à 47 ans, divisées en deux groupes: 8 utilisaient des contraceptifs et 7 non. Les participants ont pratiqué des séances HIIT au moins trois fois par semaine pendant deux cycles hormonaux. Des poids ont été réalisés pendant deux mois au début des séances d'entraînement, les première, deuxième et troisième pesées ayant eu lieu respectivement dans les phases folliculaire, ovulatoire et lutéale. À la fin des sessions HIIT, ils ont répondu à l'échelle de perception subjective de l'effort d'OMNI-RES (GEARHART et al., 2002). Les données recueillies ont été mises à disposition dans une feuille de calcul Excel pour Windows et insérées dans un programme statistique analysant la normalité, la fréquence, les mesures de la tendance centrale et la dispersion, également testées par l'association des variables à la corrélation de Pearson avec $p < 0,05$. Il a été observé que le poids au début et à la fin de la pesée était directement proportionnel, c'est-à-dire qu'il était maintenu. Le pourcentage de masse maigre était inversement proportionnel au poids et il y avait une augmentation de la masse maigre expressive avec la pratique des séances de HIIT.

Mots clés: Perte de poids; Les femmes; HIIT; Phases hormonales; Académie.

EL EMAGRECIMIENTO DE MUJERES PRACTICANTES DE HIIT EN LAS DIFERENTES FASES HORMONALES

Este estudio tuvo como objetivo comparar el nivel de adelgazamiento de mujeres practicantes de HIIT en las tres diferentes fases hormonales: folicular, ovulatoria y lútea, a través de pesajes en una balanza de bioimpedancia. Se trata de una investigación bibliográfica, descriptiva, cuantitativa de cuño semi experimental. La muestra fue compuesta por 15 mujeres, con rango de edad entre 21 y 47 años, dividido en dos grupos: 8 hacían uso de anticonceptivo y 7 no lo hacían. Las participantes practicaron sesiones de HIIT con frecuencia de al menos tres veces la semana durante dos ciclos hormonales. Los pesajes se realizaron durante dos meses siempre al inicio de las sesiones de entrenamiento, la primera, segunda y tercera pesaje ocurrieron en las fases folicular, ovulatoria y lútea respectivamente. Al final de las sesiones de HIIT respondieron la escala de percepción subjetiva de esfuerzo de OMNI-RES (GEARHART et al 2002). Los datos recolectados fueron disponibles en una hoja de Excel de Windows e insertados en un programa estadístico donde se analizaron la normalidad, frecuencia, medidas de tendencia central y dispersión, también probadas por la asociación de las variables con la correlación de Pearson con $p < 0,05$. Se notó que el peso al inicio de los pesajes y al final de los pesajes fue directamente proporcional, o sea, se mantuvo. El porcentaje de masa magra se mostró inversamente proporcional al peso, habiendo un aumento de masa magra expresiva con la práctica de sesiones de HIIT.

Palabras claves: Adelgazamiento; Las mujeres; HIIT; Fases hormonas; Academia.

O EMAGRECIMENTO DE MULHERES PRATICANTES DE HIIT NAS DIFERENTES FASES HORMONAIS

Este estudo teve como objetivo comparar o nível de emagrecimento de mulheres praticantes de HIIT nas três diferentes fases hormonais: folicular, ovulatória e lútea, através de pesagens em uma balança de bioimpedância. Trata-se de uma pesquisa bibliográfica, descritiva, quantitativa de cuño semi experimental. A amostra foi composta por 15 mulheres, com faixa etária entre 21 e 47 anos, dividido em dois grupos: 8 faziam uso de anticoncepcional e 7 não faziam. As participantes praticaram sessões de HIIT com frequência de no mínimo três vezes na semana durante dois ciclos hormonais. As pesagens realizaram-se durante dois meses sempre no início das sessões de treino, a primeira, segunda e terceira pesagem aconteceram nas fases folicular, ovulatória e lútea respectivamente. Ao fim das sessões de HIIT responderam a escala de percepção subjetiva de esforço de OMNI-RES (GEARHART et al. 2002). Os dados coletados foram disponibilizados em uma planilha do Excel for Windows e inseridos em um programa estatístico onde foram analisados a normalidade, frequência, medidas de tendência central e dispersão, também testados pela associação das variáveis com a correlação de Pearson com $p < 0,05$. Notou-se que o peso no início das pesagens e no final das pesagens foi diretamente proporcional, ou seja, manteve-se. Já o percentual de massa magra mostrou-se inversamente proporcional ao peso, havendo aumento de massa magra expressivo com a prática de sessões de HIIT.

Palavras chaves: Emagrecimento; Mulheres; HIIT; Fases hormonais; Academia.