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VISUAL STIMULUS DOES NOT ALTER FLUID REPLACEMENT IN WOMEN PRACTICING ZUMBA FITNESS

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ABSTRACT

Hydration is an important component of physical performance. The lack of adequate hydric replacement can lead to severe dehydration and early fatigue. The purpose of this study was to evaluate the effects of using visual stimulation on the hydration status of women Zumba fitness practitioners. Sixteen women practicing Zumba fitness (age = 42.3 ± 12.0 years, weight = 75.6 ± 16.8 Kg, height = 1.62 ± 0.58 m, BMI = 28.3 ± 4.6 Kg/m^2, WC = 89.4 ± 10.1 cm, %BF = 38.0 ± 6.0) participated in the study. Hydration status was assessed in three moments: 1) familiarization, 2) usual training (Control) and 3) training with visual stimulus for hydration (VS). Body mass before and after training and fluid intake during training were obtained. Sweating rate (SR), fluid intake rate (FIR), and dehydration percentage (D%) were calculated. Temperature and humidity were recorded during training. Hydration status in the recovery period was assessed using urine specific gravity (USG) and urine color (UC) which were measured on the mornings of the training days and the day after training. Although the workouts were performed under similar temperature and humidity conditions, SR was significantly higher in the VS ($p=0.002$). There was no difference in D%, FIR, USG, and UC between control and VS ($p>0.05$). Strong correlation was observed between USG and UC ($r = 0.76$; $p<0.001$). It was concluded that the students performed adequate fluid replacement which provided a low degree of dehydration during training sessions and that the use of visual stimulus in only one session was not enough to significantly increase fluid intake during training sessions and in the recovery period.

Key words: Organism Hydration Status. Dehydration. Dancing. Sweat, Exercise.

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RESUMO

Estímulo visual não altera reposição de líquidos de mulheres praticantes de Zumba fitness

A hidratação é um importante componente do desempenho físico. A falta de reposição hídrica adequada pode acarretar desidratação grave e fadiga precoce. O objetivo do estudo foi avaliar os efeitos do uso de estímulo visual sobre o estado de hidratação de mulheres praticantes de zumba fitness. Participaram do estudo 16 mulheres praticantes de zumba fitness (idade = 42,3 ± 12,0 anos, peso = 75,6±16,8 Kg, altura = 1,62 ± 0,58 m, IMC = 28,3 ± 4,6 Kg/m^2, CC = 89,4 ± 10,1 cm, %GC = 38,0 ± 6,0). O estado de hidratação foi avaliado em três momentos: 1) familiarização, 2) treino habitual (Controle) e 3) treino com estímulo visual para hidratação (EV). Foram obtidos a massa corporal antes e após os treinos e o consumo de líquidos durante o treino. Foram calculadas a taxa de sudorese (TS), taxa de ingestão de líquidos (TIL) e porcentagem de desidratação (D%). A temperatura e umidade foram registradas durante os treinos. O estado de hidratação no período de recuperação foi avaliado por meio da gravidade específica da urina (GEU) e coloração da urina (UC) que foram medidos nas manhãs dos dias de treino e do dia seguinte ao treino. Apesar dos treinos terem sido realizados em condições de temperatura e umidade semelhantes, a TS foi significativamente maior no grupo EV ($p=0,002$). Não houve diferença na D%, TIL, GEU e UC entre controle e EV ($p>0,05$). Foi observada forte correlação entre a GEU e UC ($r = 0,76$; $p<0,001$). Conclui-se que as alunas realizaram reposição hídrica adequada o que proporcionou baixo grau de desidratação nos treinos e que a utilização de estímulo visual em apenas um treino não foi suficiente para aumentar significativamente a ingestão hídrica durante os treinos e no período de recuperação.

Palavras-chave: Estado de Hidratação do Organismo. Desidratação. Dança. Suor. Atividade Física.

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INTRODUÇÃO

Knowledge about the benefits of physical activity for physical and mental health facilitates and encourages regular exercise, which is an important component of a healthy lifestyle (Campos and collaborators, 2019).

Several styles of dance have shown beneficial effects, such as reducing body fat, decreasing triglyceride levels, reducing symptoms of cardiovascular diseases, and improving joint movements and flexibility, among others (Mandic and collaborators, 2012; Marbá and collaborators, 2016; Yan and collaborators, 2017).

Zumba fitness is one of the most attractive, engaging, and popular dance forms in fitness centers, with almost total participation from the female audience, and is considered a suitable modality for youth, adults, and seniors (Cugusi and collaborators, 2018). It is composed of a mixture of various dance styles, such as merengue, salsa, samba, cumbia, reggeaton, hip-hop, belly dancing, Indian dance, African dance, etc. (Cugusi and collaborators, 2018). It is characterized as aerobic training that promotes high energy consumption, with a metabolic equivalent of approximately 8.8, favoring weight loss (Luettgen and collaborators, 2012).

In addition, Zumba fitness is considered a safe, feasible, and easy-to-perform exercise program that shows good results in fitness levels (Cugusi and collaborators, 2015), improving mental health, the cardiovascular system, and promoting enhanced muscle strength (Perez, Robinson, 2009; Domene and collaborators, 2015; Krishnan and collaborators, 2015, Ruiz, Viteri, Gonzalez, 2020).

Zumba fitness is estimated to be practiced by about 15 million people in 180 different countries with almost total female audience participation (Zumba, 2022).

Exercising at high intensities, such as Zumba fitness, significantly increases metabolic heat production, which needs to be dissipated to the environment.

During exercise, evaporation of sweat is the most efficient way to transfer heat to the environment. However, this mechanism occurs at the expense of water and electrolyte loss, which may lead to dehydration if an adequate fluid replacement is not performed (Edwards, Noakes, 2009).

Water replacement, when done properly, provides the body with plasma volume regulation and body temperature control.

On the other hand, dehydration limits body temperature regulation, determining inadequate physiological responses that favor the reduction of performance during exercise (Prado and collaborators, 2009).

For Hausen and collaborators (2013) a loss of 1% to 2% of body weight can result in a deterioration of the physiological function, contributing to a reduction in physical performance during exercise. Dehydration above 3% may lead to a more advanced impairment and cause more serious problems, such as diseases related to the increase in body temperature.

Voluntary fluid intake during exercise can be influenced by the drink's palatability and temperature, but also by propitious situations that may require fluid replacement (Naughton and collaborators, 2008).

However, it is not described in the literature whether the use of visual stimulation using posters with images and phrases that encourage fluid intake can affect total fluid replacement in a workout.

Given the above, the present study aimed to evaluate the effects of the use of visual stimulus (VS) on the hydration status of women practicing Zumba fitness.

MATERIALS AND METHODS

A cross-sectional study was carried out, in which aspects of hydration of 16 women aged between 18 and 66 years practicing Zumba fitness in a city in the south of the state of Minas Gerais were compared.

The participants took at least two Zumba fitness classes a week for 60 minutes. This research was approved by the Ethics and Research Committee of the Universidade Federal de Lavras (code: 68024517.0.0000.5148). Participation in the research was conditional on the signature of the Free and Informed Consent Form.

Body mass was determined using an EKS 8994 Triumph® digital scale, accurate to 0.1 Kg.

The participants were weighed without shoes, as little clothing as possible, and without objects in pockets, a belt, a watch, a cell phone, etc. Height was assessed using a Sanny® portable stadiometer with 0.1 cm precision

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according to the procedures described by Duarte (2007).

The classification of nutritional status was performed by adopting the cut-off points proposed by the World Health Organization (2000): BMI < 18.5 Kg/m^2 (Low weight); BMI between 18.5 and 24.9 Kg/m^2 (Eutrophic); BMI between 25 and 29.9 Kg/m^2 (Overweight); and BMI ≥ 30.0 Kg/m^2 (Obese).

To determine waist circumference (WC) an inelastic tape measure was used, positioning it at the midpoint between the last rib and the top of the iliac crest. The hip circumference was measured at the site of greatest prominence of the gluteal region. WC was classified according to the cutoff points proposed by WHO (2000): < 80 cm (appropriate), ≥ 80 cm (increased risk for metabolic complications), and ≥ 88 cm (very increased risk for metabolic complications).

Body composition was determined by the skinfold method. The triceps, biceps, subscapular, suprailiac, and abdominal skinfolds were collected in triplicate using the Cescorf® scientific adipometer with a constant pressure of 10 g/mm and precision of 0.2 mm. The fat percentage was estimated from the sum of skinfolds using the values proposed by Jackson, Pollock (1985).

Post-training hydration status was evaluated in three training sessions 15 days apart. The first training session was used to familiarize the participants with the procedures performed in the research. In the second training, the participants performed the training as it usually occurred (Control). In the third workout, the researchers put up posters emphasizing hydration in the place where the workout took place to encourage the hydric intake of the volunteers (VS).

These posters featured phrases and images emphasizing the benefits of hydration. During each workout, including the familiarization session, the volunteers were instructed to drink water ad libitum during the workout. Chilled water was provided in glasses with a capacity of 200 mL.

If the participant did not consume the entire volume of the cup, the remaining liquid was measured in a graduated cylinder and recorded by the researchers. At the end of the training session, the researchers counted the total volume ingested.

To determine water loss or gain, the participants were weighed before and after the workout. This evaluation was performed before and after each workout.

Sweating rate, fluid intake rate, and dehydration were calculated according to the following equations (Godois and collaborators, 2014):

Sweating rate (SR) = ΔBM + fluid intake during training (L)/exercise time (hours).

Fluid intake rate (FIR) = Total fluid intake (L)/exercise time (h)

Dehydration (D%) = ΔBM (Kg)/pre exrcise BM (Kg) x 100

In which: ΔBM = body mass difference; BM: body mass.

The ambient temperature and relative humidity were also monitored during training and were recorded using an Incoterm model 7666.02 Digital Thermohygrometer with accuracy ± 1ºC/ºF at three moments, in the beginning, middle, and end of each training session.

Overall hydration status was assessed by urine specific gravity (USG) and urine color (UC). The USG was determined using the Megabrix® Portable Manual Refractometer. UC was classified according to Armstrong and collaborators (1994).

To perform this evaluation, a sample was collected, in a sterile and transparent container, from the middle stream of the first urine on the day of training and the day after training.

The researchers picked up the containers containing the urine at the participants' homes right after the collection.

All the workouts were given in a gym in the city of Ribeirão Vermelho-MG, by a professional with a bachelor's degree in Physical Education.

The training sessions lasted 60 minutes, and in the first ten minutes stretching and warm-up movements were performed, and after 40 minutes the dance was performed, which involved a mixture of several rhythms. In the last ten minutes, abdominal exercises and relaxation were performed. During the training, there was a short break so that the practitioners could hydrate themselves, but even so, they were allowed to hydrate at any time.

Data were analyzed using the program SigmaPlot version 2012. The normality of the data was assessed by the Shapiro-Wilk test.

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Student's t-test for independent samples was used to compare sweating rate, fluid intake, and dehydration between the Control and VS groups. Paired t-test was applied to compare the USG and UC collected on the training days with the post-training day. Pearson's correlation test was applied to determine the correlation between USG and UC. The significance level was 5%.

RESULTS

Sixteen women with a mean age of 42.3 ± 12.0 years, practicing Zumba fitness, participated in the study. Most of them (93.7%) were over 30 years old, 31.2% were overweight and 37.5% were obese. Table 1 shows the anthropometric data of the study participants.

Table 1 - Anthropometric characterization of Zumba Fitness practitioners.

Anthropometric variables	Mean	Standard Deviation
Weight (Kg)	75.64	16.76
Height (m)	1.62	5.83
BMI (Kg/m^2)	28.26	4.59
WC (cm)	89.46	10.06
BF (%)	37.99	5.96

BMI = body mas index; WC = waist circunference; BF = body fat.

Sweating, fluid intake, and dehydration rates were compared in two workouts: control and VS. The temperature and relative humidity did not vary significantly between the workouts (control: 27.6 ± 1.1ºC, 43.3 ± 7.4%; VS: 27.0 ± 1.7ºC, 36.8 ± 6.8%, p>0.05).

Figure 1 shows the data on sweating rate, fluid intake, and dehydration. Sweating rate was significantly higher in the VS group (SR = 0.53 ± 022 L.h^{-1}) compared to control (SR = 0.30 ± 0.13 L.h^{-1}) (p=0.002). No significant difference was observed between training sessions in the rate of fluid intake and dehydration (control: FIR = 0.42 ± 027 L.h^{-1}, D = +0.1 ± 0.32%; VS: FIR = 0.47 ± 025 L.h^{-1}, D= -0.08 ± 0.31%) (p>0.05). A relevant percentage of participants had body mass gain at the end of training sessions, indicating excessive water consumption (control = 56.2% vs VS= 37.5%).

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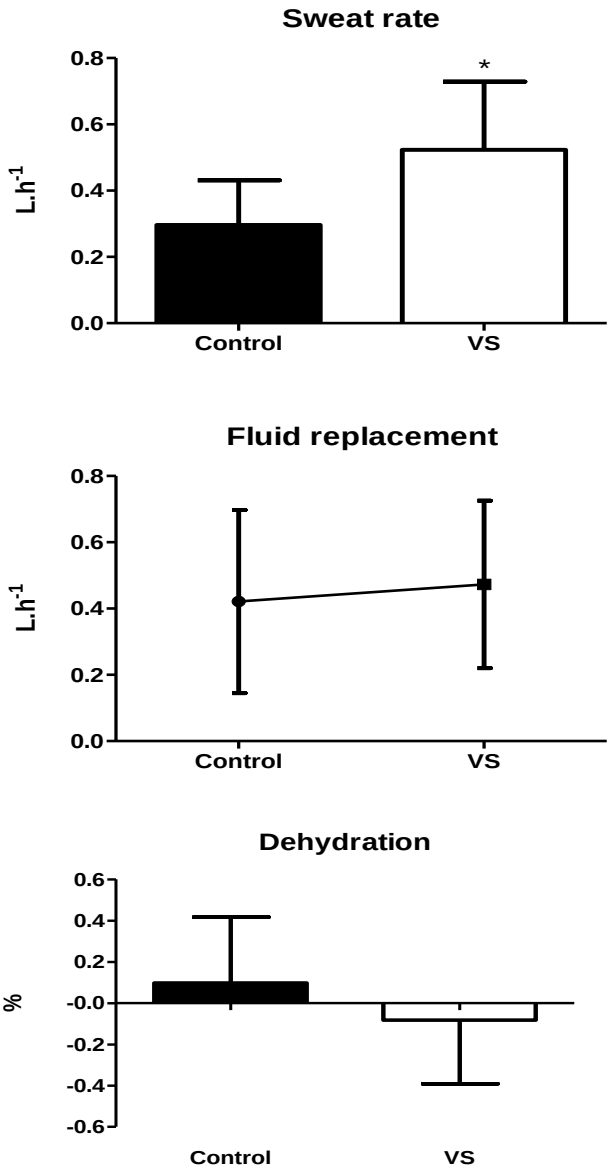

Figure 1 - Sweating Rate, Fluid Replacement, and Dehydration of women Zumba fitness practitioners. Data are presented as mean ± SD. Control: training without visual stimulus to hydration, VS: training with visual stimulus. *p<0,05.

Hydration status in the recovery period was assessed using USG (Figure 2A) and UC (Figure 2B) collected in the mornings on two consecutive days (training day and day after training).

There was no significant variation in USG (control: training day = 1.018 ± 0.006 g/mL vs post training day = 1.020 ± 0.007 g/mL; VS: training day = 1.021 ± 0.006 g/mL vs post training day = 1.018 ± 0.009 g/mL) and UC (control: training day = 3.1 ± 0.7 vs post training day = 3.3 ± 0.9; VS: training day = 2.9 ± 1.0 vs post training day = 2.5 ± 1.2) between training and post training days. Strong correlation was observed between USG and UC (r = 0.76; p<0.001).

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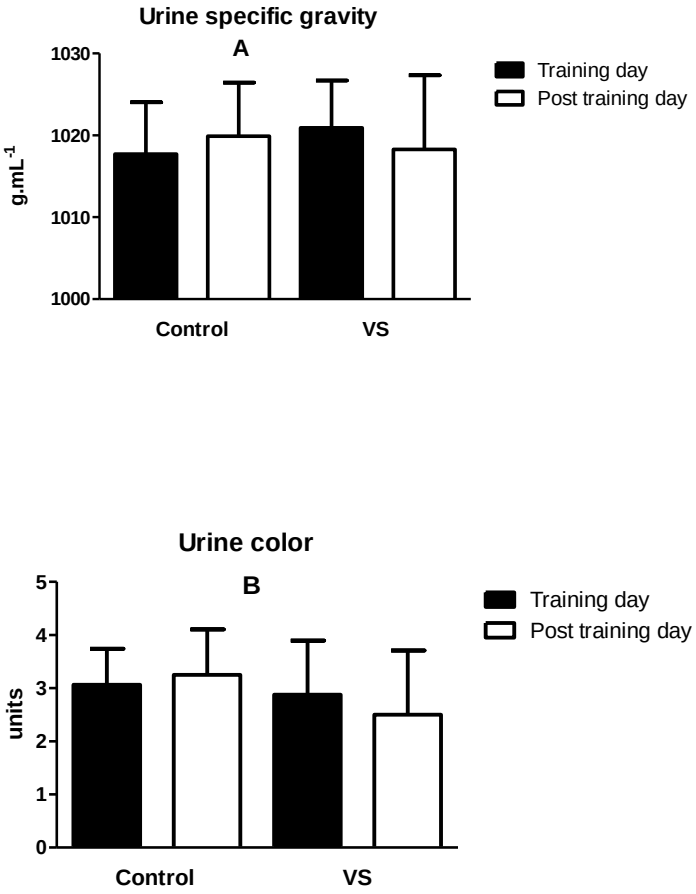

Figure 2 - Urine Specific Gravity and Urine Color of women Zumba fitness practitioners on the training day and post-training. Data are presented as mean ± SD. Control: training without visual stimulus to hydration, VS: training with visual stimulus.

DISCUSSION

The present study evaluated the effects of using visual stimuli on the hydration status of women practicing Zumba fitness. We hypothesized that the exposure of the participants to posters with pictures and texts about the benefits of adequate hydration would promote an increase in fluid replacement, and consequently an improvement in hydration status. In the training with a visual hydration stimulus (VS), it was observed an average increase of 50 mL in fluid replacement, which corresponds to 11.9%.

However, this increase was not significant ($p>0.05$), and therefore cannot be attributed to the intervention. A reduction in USG and UC was also observed on the day after training with visual stimulus. Similarly as observed in fluid intake, this reduction was not significant ($p>0.08$). Extensive individual variability was observed in all hydration-related variables.

Thus, we believe that to obtain possible benefits from this strategy it will be necessary to apply it in several training sessions. Therefore, although the results of this study refute the hypothesis that the use of visual stimulus can improve fluid replacement, it is necessary to test it in several workouts.

Zumba fitness is a high-intensity workout that can improve various fitness parameters, highlighting the increase in intrinsic motivation to exercise, and is an effective method for and reduction of body weight and fat percentage (Krishnan and collaborators, 2015).

Therefore, the audience that is most interested in practicing Zumba fitness in gyms are individuals who have weight gain and want to lose weight (Cugusi and collaborators, 2015).

The anthropometric data of the women who participated in the study corroborate this

information, because most participants (68.7%) were overweight and had a high body fat percentage.

In the present study, the SR was significantly higher in VS compared to control, even though the workouts were performed under similar temperature and humidity conditions. It was observed, extensive variation in SR (Minimum = 0.10 L/h and Maximum = 0.87 L/h) in both workouts. Another relevant factor is intra-individual variability. For example, the same participant who had the highest sweating rate (0.87 $L.h^{-1}$), observed in the VS, had a much lower water loss in the control training (0.26 $L.h^{-1}$).

Thus, it is likely that the volunteers did not maintain the same intensities in all workouts. Other studies that investigated hydration in gym classes in gyms also found low values of sweat rate (Teixeira, Liberali, Navarro, 2010; Castro, 2012; Silva, Silva, Martins, 2017).

Lack of adequate replacement or hyperhydration can impair physical performance and cause damage to health (McDermott and collaborators, 2017).

Fluid intake during exercise should be performed according to the sweat rate to avoid excessive dehydration (>2% of body mass) or hyperhydration (Moreira and collaborators, 2006; Nuccio and collaborators, 2017).

In the present study, the percentage of body mass loss and gain ranged from -0.68% to +0.63%. Therefore, this result indicates that women practicing Zumba fitness presented a low risk of dehydration (moderate or severe) or of sufficient hyperhydration that could cause hyponatremia since the activity time is restricted to 1 hour and the hydric replacement tends to be equal to or greater than the loss.

Similar results were observed by Silva, Silva, Martins, (2017), who found percentages of dehydration below 0.5% in women practicing Kangoo Jump who performed replacement with sports drinks or flavored water.

To start training well hydrated, the athlete or sportsperson must make adequate fluid replacement throughout the recovery period (Chagas and collaborators, 2016).

In the present study, the mean value of USG and UC were slightly higher in the control group. On the contrary, in VS these values tended to reduce, especially for UC (p=0.08).

Perhaps visual stimulation can contribute to improving fluid replacement in the recovery period if used over several workouts.

Adequate hydration is essential during physical activity, and the nutritionist is the professional responsible for guiding about the best forms of hydration, as well as, the indication of drinks to be ingested and the adverse effects that inadequate hydration can cause (Rodrigues, Fanaro, 2019).

CONCLUSION

We concluded that the women practicing Zumba Fitness performed adequate fluid replacement, which provided a low degree of dehydration during the workouts, and that the use of visual stimulus in only one workout was not enough to significantly increase fluid intake during workouts and in the recovery period.

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