

Short communication

Exercise habits and cortisol level among women at a local Zumba clubDyah G. Rambu Kareri¹, Derri R. Tallo Manafe², I. Nyoman Sasputra³¹Department of Physical Medicine and Rehabilitation, ²Department of Physiology, ³Department of Anatomical Pathology, Faculty of Medicine and Veterinary Science, Universitas Nusa Cendana, Indonesia

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Corresponding author: **Dyah G. Rambu Kareri**. Email: rambu.kareri@staf.undana.ac.id**ABSTRACT**

Introduction and Aim: Cortisol has a vital role in helping the body deal with stress. It is known as the primary stress hormone. Cortisol modulates many changes in the body in response to stress, including blood sugar (glucose) metabolism, fat, protein, carbohydrate metabolism into energy (gluconeogenesis), immune and anti-inflammatory response. The aim of this study was to determine the impact of Zumba exercise on cortisol levels in Zumba club participants in Indonesia.

Materials and Methods: The design of the research is observational analytic using a cross-sectional analytic study method. The samples in this study were 25 women of productive age in the I'M Z crew Zumba club in Indonesia with a purposive amplification technique.

Results: The results showed that the subjects who routinely did Zumba exercise ($\geq 3x$ a week) or who did not exercise routinely (1-2x a week) to have cortisol levels within normal limits (3.09-16.66 ug/dL). The results of this study also showed that subjects who routinely did Zumba exercise ($\geq 3x$ a week) to have higher cortisol mean (7.82 ± 3.50) than subjects who did not regularly exercise (1-2x a week; 6.47 ± 3.46).

Conclusion: There was no significant relationship between exercise habits and cortisol levels in the research subjects ($p=0.346$).

Keywords: Cortisol; Zumba; exercise; stress.

INTRODUCTION

Glucocorticoids (GC) are endogenous hormones produced by the body. The adrenal fasciculate zone of the adrenal cortex is where steroid hormones are produced and secreted (1). Cortisol levels higher than circulating levels signal the anterior pituitary to decrease the adrenocorticotrophic hormone (ACTH) production. The hypothalamus can be signaled to secrete less corticotropin-releasing hormone (CRH) when it is exposed to higher cortisol or ACTH concentration. The hypothalamic-pituitary-adrenocortical (HPA) axis is responsible for this interconnected feedback loop (1,2). Studies have revealed that exercise has shown to affect the feedback from the HPA-axis towards the psychological stress factors. Various types of intense exercise (such as casual walks outside of the house, and cycling) may affect the HPA-axis sCort response in a similar way. Studies concluded that when participants faced an intermediate task that involved cognitive challenge, the production of cortisol increased when participants exercised vigorously for 30 minutes before the task than when they did not exercise at all. Another study found that participants who walked about 3 km outside for roughly 30 minutes showed fewer cortisol levels when they responded to minimum standard of speaking and math problems following their walk than those who sat (1-3).

Apart from improving functional abilities, exercise can also reduce stress levels since it releases endorphins, which are hormones of calmness that are naturally released during exercise. Exercise can be extremely relaxing for all individuals. As soon as a person begins practicing, he will notice that it reduces stress and makes him a happier person. A decrease in stress hormones during exercise is linked to the reduction of stress caused by exercise. The hormones cortisol and epinephrine can be reduced through regular exercise. These stress hormones are released when the body is under stress. As a result of exercise, the body produces beta-endorphins, which improve mood and lower cortisol levels. Exercise also stimulates the release of neurotransmitters such as serotonin and dopamine. A low level of this neurotransmitter is often associated with mood disorders and depression (4,5).

Dance fitness program, such as Zumba, blends Latin rhythms and aerobic moves, which incorporates the whole body, and depicts more flexible movements but are more effective than other types of exercises. According to research, women may improve their body image, quality of life, and functional capacity, and even reduce any pain experienced by doing belly dance. In addition, recent studies also revealed that Zumba may also influence decreased body mass, enhancing their emotional and social performances, as well as increasing muscular strength and flexibility.

Accordingly, we hypothesize that Zumba may be more stress-relieving than other forms of exercise. This study aimed to determine the impact of Zumba exercise on cortisol levels in Zumba club participants (6,7).

MATERIALS AND METHODS

An analytic observational design research method was used for this study to find out the relationship between exercise habits and cortisol levels in women of reproductive age who attended Zumba classes. At the time of the study, each subject was measured only once. The Prodia Kupang Clinical Laboratory collects blood for cortisol testing. Blood samples were drawn before and after the intervention from 9.00 am to 12.00 noon. Blood was collected at the elbow crease from the median ulnar vein. The blood from the syringe was placed in a sterile test tube, and cortisol is measured using the impolite cortisol technique (solid-phase two-site chemiluminescent enzyme immunoassay).

The immulite cortisol assay procedure consists of solid-phase beads, a polystyrene ball coated with a rabbit monoclonal antibody specific for cortisol, mounted on the immulite test unit. The Ethics Commission of the Faculty of Medicine, Universitas Nusa Cendana Kupang, approved the project. Informed consent was obtained from patients or their families to participate in the study. Patients' identities were kept confidential.

RESULTS

Characteristics of research subject

This study involved 25 research subjects. Study subjects were members of the I'M Z crew Zumbas club. A week before the research was conducted, research subjects were socialized with research activities. Study subjects were examined for cortisol levels and asked whether they exercise regularly. The Prodia Kupang Clinical Laboratory tested cortisol levels.

Table 1: Characteristics of research subjects

Variable	F (%)	Mean \pm SD	Median (min-max)
Zumba			
Routine	14 (56.0)		
Non-Routine	11 (44.0)		
BMI		24.43 \pm 2.98	24.14 (18.22-30.47)
Systolic BP		131.16 \pm 16.38	128 (108 – 178)
Diastolic BP		84.64 \pm 12.81	83 (60 – 113)
Cortisol		7.23 \pm 3.47	6.2 (2 – 16.1)

Table 1 shows that the mean BMI of the study subjects was 24.43 \pm 2.98, the mean systolic blood pressure was 131.16 \pm 16.38, and the mean diastolic blood pressure was 84.64 \pm 12.81.

Table 2: The relationship between exercise habits and cortisol levels

Variable	Zumba		P value
	Routine	Non-Routine	
BMI	24.38 \pm 2.52	24.49 \pm 3.60	0.926 [§]
Systolic BP	133.29 \pm 20.02	128.45 \pm 10.43	0.476 [§]
Diastolic BP	85.93 \pm 13.65	83.00 \pm 12.11	0.978 [‡]
Cortisol	7.82 \pm 3.50	6.47 \pm 3.46	0.346 [§]

*Significance ($p < 0,05$); [§] Independent t; [‡] Mann Whitney

Exercise habits and cortisol levels do not appear to be related ($p=0.346$) in Table 2. Cortisol levels are not significantly related to BMI, systolic and diastolic blood pressure, as shown in Table 2.

DISCUSSION

In the research subjects, there was no significant relationship between exercise habits and cortisol levels ($p=0.346$). In subjects who worked out regularly (* 3 times a week) or who did not exercise regularly (1-2 times a week), cortisol levels were within normal ranges (3.09-16.66 ug/dL). Exercise at least once a week has a beneficial effect on maintaining normal cortisol levels. Exercise produces beta-endorphins, which improve mood and lower cortisol levels in the body. Exercise also releases neurotransmitters like serotonin and dopamine. Depression and mood disorders are often associated with low levels of this neurotransmitter (8).

In this study, Zumba exercisers (*3 times a week) also had higher cortisol mean (7.82 \pm 3.52) than non-exercisers (1-2 times a week) (6.47 \pm 3.46). Zumba is an exercise with moderate to high intensity. Exercise with moderate to high intensity increases cortisol levels in the bloodstream, according to a study by Hill *et al.*, (9). The increase was the result of hemoconcentration and HPA axis stimulation (ACTH). Heavy-intensity training for eight weeks significantly increased cortisol levels. Increased HPA axis activity is also associated with stimulation of the parasympathetic nervous system, increased body temperature, increased blood pH, hypoxia, and lactate accumulation. A study also found that on samples aged 15-25 years undergoing moderate-intensity aerobic exercise for four weeks, the hormone cortisol increased significantly with a $p=0.001$ (10).

CONCLUSION

There was no significant relationship between exercise habits and cortisol levels in the research subjects ($p=0.346$).

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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