

SIPS | SURABAYA
2017 | INTERNATIONAL
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SEMINAR

**PROCEEDINGS OF
THE SURABAYA
INTERNATIONAL PHYSIOLOGY
SEMINAR**

Surabaya, October 12-14, 2017

Editors:

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Gestrindo



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FOREWORD

Dean of Faculty of Medicine, Universitas Airlangga

Assalamu'alaikum Wr. Wb.

Distinguished Guests, all the Participants, Ladies and Gentlemen

On behalf of Faculty of Medicine, Universitas Airlangga, it is my great pleasure to welcome all the speakers, moderators, and participants on **Surabaya International Physiology Seminar 2017 (SIPS 2017)**, which will be held from today, October 12th until October 14th, 2017. I would like to express my hearty welcome to all the international speakers, **Prof. Cheng Hwee Ming**, from University of Malaya, Malaysia; **Prof. Daniel John Green**, from University of Western Australia; **Dr. Fadzil Hamzah**, from Sport Center of Changi General Hospital, Singapore and **Dr. Deanne Helena Skelly**, from Griffith University, Australia.

The aim of SIPS 2017 is to provide a platform for academicians, educators, researchers, practitioners, undergraduate and postgraduate students to share and discuss the knowledge of the recent issues, opinions, researchers about the development and innovation of physiology in medical science, dentistry, veterinary, plants and agriculture, sports and sciences.

I believe this event is a great purpose in order to develop knowledge, experiences and best practices that can be applied for the good, especially in the field of healthcare as a whole.

Finally, I would like to express my sincere acknowledgements to those who take part and especially for Department of Medical Physiology, Faculty of Medicine, Universitas Airlangga for their effort in holding this event and wishing all to have success.

Wassalamu'alaikum Wr. Wb.

Prof. Dr. Soetojo, MD.

Faculty of Medicine, Universitas Airlangga

Chair of Committee / Head of Physiology Department, Faculty of Medicine, Universitas Airlangga

Assalamu 'alaikum Wr. Wb

Greetings,

On behalf of SIPS committee and Physiology Department, Universitas Airlangga, we are welcoming to Surabaya, City of Heroes.

This year, the annual meeting of Indonesian Physiology Society (IAIFI) is hosted at Surabaya, entitled "**Surabaya International Physiology Seminar Workshop (SIPS)**". We present some update workshop and lectures in order to bring physiology research from basic to clinical application on humanities, animal welfare and good environment. All participants have opportunities to publish their research in presentation, poster and ISBN proceeding. Selected papers will be submitted to SCOPUS indexed proceeding/ journal and awarded as Best Poster and Best Oral Presentation.

We hope that all participants will get some interesting experiences for next 3 days, 12-14 October 2017. Enjoy our lectures and workshops, taste the culinary and take your time to sightseeing around Surabaya.

Wassalamu 'alaikum wr. wb.

Dr. Bambang Purwanto

Chairman of Committee / Head of Physiology Department
Faculty of Medicine, Universitas Airlangga

Welcome Address - Surabaya International Physiology Seminar Workshop (SIPS)

Dear fellow Physiologists and Participants,

On Behalf of the Indonesian Physiological Society (IAIFI) and the Physiology Department Faculty of Medicine Universitas Airlangga, I would like to welcome you all to Surabaya International Physiology Seminar (SIPS), held on 12-14 of October 2017.

Finally after long-awaited Surabaya gets a turn again to host and organize the International Physiology Seminar. Hence the Steering- and Organizing Committee consisting of young energetic physiologists are determined to make the Seminar a successful one. The theme of the seminar is:

"The Role of Physiology in Translation Research: From Basic to Application"

This annual meeting covers a wide range of topics of Physiology on Medicine, Dentistry, Veterinary, Plants and Agriculture, Sports and Sciences. We sincerely hope that SIPS 2017 enable to provide a platform for academicians, educators, researchers, practitioners and postgraduate students to present and discuss researches, development and innovations in wide range of topics as mentioned above. It will provide all participants to share knowledge, exchange new ideas and their experiences in many research topics, for then it will enhance future collaborations.

With great interest and enthusiasm I look towards the success of this Seminar, and wish all of you every success and a pleasant stay in Surabaya.

May Allah Swt. bestow upon us His Blessings.

On Behalf of the Steering and Organizing Committee Senior Physiologist,
Prof. R. Soedarso Djojonegoro

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Three Weeks of High-Intensity Interval Training (HIIT) Decreases Visfatin Level on Overweight Men

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Keywords: High-Intensity Interval Training (HIIT), Intra-Abdominal Fat, Men, Overweight, Visfatin.

Abstract: Background: Overweight and obesity are common health conditions that continue to increase. Specifically, central obesity has a strong correlation with increasing risk of cardiovascular and metabolic diseases. The accumulation of visceral fat in this type of obesity is reported to play a key role in various pathogenesis of these diseases. Methods: 20 healthy overweight men (BMI=23–25) were enrolled for this study. Participants were divided into two groups: The HIIT group (n=12) and the control group (n=8). The intervention group performed high-intensity interval training (HIIT) three times per week for three weeks, 15–25 min per session; the control group was not allowed to perform any exercises during the study. Visceral fat masses were assessed using waist circumference and visfatin serum level. Results: the HIIT group demonstrated a significant reduction ($p=0.019$) in visfatin serum levels compared to the control group. However, there was no significant reduction ($p=0.991$) in waist circumference of either group after training. Conclusion: HIIT protocol reduces serum visfatin levels in overweight males. This effect may be achieved by increasing intra-abdominal fat oxidation, which is the specific site for visfatin synthesis.

1 INTRODUCTION

Overweight and obesity are conditions in which excess body fat has accumulated. In 2002, the World Health Organization estimated that more than one billion adults were overweight and over 300 million people are classified into obese (World Health Organization, 2002). The Indonesian Ministry of Health reported that the proportion of obesity in adult males has reached 26.4%, while in women the figure was 32.9% (Departemen Kesehatan, 2014). Visceral fat accumulation played a key role in the formation of cardiovascular risk factors. The adipose tissue is no longer only considered an energy reservoir, but also as an endocrine organ which can produce hormones, peptides, and other signaling molecules that affect other systems (DeClercq V et al., 2008).

Aerobic exercise has been widely used to burn excessive fat in the body. Recently, high intensity interval training (HIIT) has become an increasingly popular method of getting in shape. This protocol has been proven to increase fat burning over a shorter time while preventing excessive reduction of

muscle mass, making it preferred over aerobic exercise (Boutcher, 2011). HIIT has also had an effect on several cases, e.g. coronary heart disease and diabetes mellitus, for which obesity and overweight are risk factors (Francois and Little, 2015; Jung et al., 2015). Thus, the objective of this study is to define the effect of HIIT on visceral fat mass the risk population of overweight men.

2 MATERIALS AND METHODS

2.1 Participants

Twenty healthy overweight men (age = 19.59 ± 1.003 years) were enrolled for this study. Body weight and height were measured to meet the inclusion criteria. All participants were defined as overweight (BMI = 24.041 ± 0.507 kg / m²) before starting this study protocol. We did not recruit participants who have a history of severe heart disease, musculoskeletal disorders, and other conditions that could interfere with the protocol.

Participants were divided into two groups: HIIT (n = 10) and control (n = 10). Unfortunately, two people from the control group dropped out during this study, reducing the number of control group members to eight (n = 8). The intervention group underwent the HIIT protocol for three weeks, while the control group was not allowed to work out during this study. Serum samples and waist circumference measurements were taken on the same day. This study was approved by the medical ethics committees of Airlangga University. The participants also signed an informed consent document before recruitment.

2.2 HIIT Protocols

This study used the HIIT protocol designed by Trapp et al. for overweight adults with a modification in exercise duration. Five minutes of low-intensity cycling was carried out in the beginning as a warm-up and at the end as a recovery period. The HIIT group performed a repeated cycle sprint for 8 seconds followed by 12 seconds of minimal cycling. Exercise intensity was maintained at 80–90% of the maximum heart rate (HR_{max}) using a polar heart rate monitor (Trapp et al., 2008). Each session lasted for 15 minutes in the first week, 20 minutes in the second week, and 25 minutes in the third week. The total training program was carried out for 3 weeks, 3 times/week. All training sessions were supervised by Airlangga sports medicine laboratory staff.

2.3 Visceral Fat Mass

Alterations in total visceral fat mass were measured using waist circumference and circulating visfatin levels in the blood serum. Waist circumference is an anthropometric measurement that has been widely used to estimate visceral fat mass in the abdomen. These parameters were assessed using a tape measure on the uppermost border of the iliac crest. Visfatin is a hormone produced by visceral adipose tissues, and that has a strong correlation to a standard measurement using a single sliced CT scan at L4-L5 intervertebral level (Trapp et al., 2007). The circulating levels of this hormone in blood serum were measured using a visfatin ELISA kit specifically for humans (Elabscience, China). Blood serums were taken one day after the last session with 8–9 hours of fasting prior to sampling.

2.4 Statistical Analysis

Descriptive data are presented in mean \pm standard deviation. Pretest and posttest results were analyzed with a paired T test, while the differences between the HIIT and control groups were analyzed with an independent T test. Statistical significance was set at $p < 0.05$. The entire statistical analysis of this study used SPSS 20.0 (SPSS Inc., Chicago, IL, USA).

3 RESULTS

The general characteristics of all participants, including age, body weight, body height, and BMI, are showed in Table 1. Visfatin serum reduction after the 3-week protocols were observed in the HIIT group (7.49 ± 5.89 ng/mL; $p=0.05$). Meanwhile, the control group did not show a significant decrease on this parameter (1.22 ± 3.76 ng/mL; $p=0.182$). Waist circumference in the HIIT group also demonstrated a significant reduction (1.42 ± 1.3 cm; $p = 0.018$), whereas the control group showed no significant difference (0.25 ± 1.04 cm; $p = 0.516$).

Table 1: General characteristic.

Variable	Control (n=8)	HIIT group (n=10)
Age (years)	19.71 \pm 1.12	19.50 \pm 0.97
Body Weight (kg)	69.43 \pm 3.31	68.71 \pm 2.16
Body Height (m)	1.69 \pm 0.03	1.69 \pm 0.02
BMI (kg/m ²)	24.04 \pm 0.47	24.04 \pm 0.55

Table 2: Pre-test and post-test values (control group).

	pre	post	<i>p</i>
Visfatin (ng/mL)	10.554 \pm 5.1	9.335 \pm 6.99	0.393
Waist circumference (cm)	99.750 \pm 9.95	99.500 \pm 10.0	0.516

Data are presented as mean \pm standard deviation.

*significant change from pre-test to post-test ($p < 0.05$)

A significant group-time interaction was observed for visfatin serum ($p=0.019$). The visfatin serum decrease was greater in the HIIT group than in the control group. However, there was no significant group-time interaction in waist circumference ($p=0.991$). (Tables 2 and 3)

Table 3: Pre-test and post-test values (HIIT group).

	Pre	Post	<i>p</i>	<i>p(GxT)</i>
Visfatin (ng/mL)	14.728 ± 5.0	7.234 ± 5.4	0.003*	0.019**
Waist circumference (cm)	94.600 ± 3.5	93.3 ± 2.98	0.018*	0.991

Data are presented as mean ± standard deviation.

*significant change from pre-test to post-test ($p < 0.05$)

**significant group and time interaction ($p < 0.05$)

(G x T) = group and time interaction

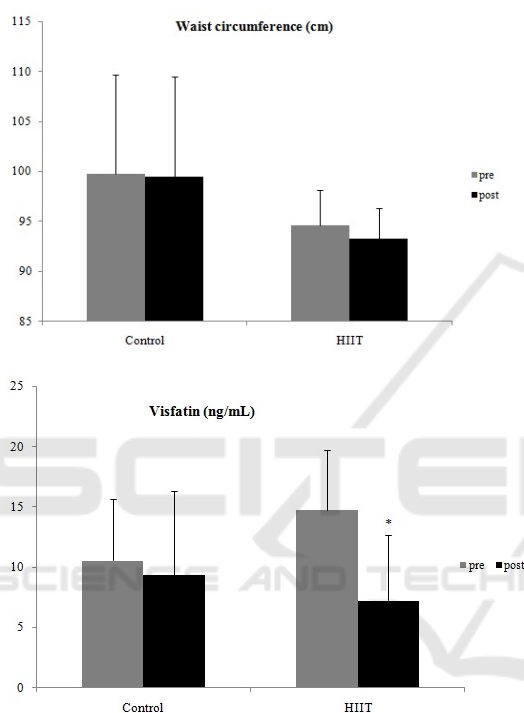


Figure 1: Waist circumference and visfatin serum level before and after treatment. Pre= before treatment; post= after treatment. (*sig. Difference compare to pre ($p < 0.05$)).

4 DISCUSSION

Waist circumference also showed a reduction, but not significant in the group-time interaction. Direct burning of intra-abdominal fat may be responsible for these decreases. Some studies have shown a significant reduction in body fat mass along with reduction in plasma visfatin level (Haider et al., 2006; Manco et al., 2007). In addition, visfatin is a more specific biomarker of visceral adipose tissue. The insignificant difference of waist circumference in the group-time interaction was probably due to

the measurements characteristics being not specific for three weeks of exercise.

Males have a tendency to accumulate more visceral fat than females (Enzi G, Gasparo M, Biondetti PR, Fiore D, Semisa M, 1986). When someone is defined as overweight or obese, he will have a different metabolism due to the adipose tissue, which itself could act as an endocrine organ that produces many hormones (Kershaw and Flier, 2004). One of suggested mechanisms underlying the effects of HIIT is fat oxidation enhancement during exercise and post-exercise. Transport of fatty acid also increased significantly in this protocol. In addition, HIIT inhibits glycogenolysis and prefers recycling of ATP using triacylglycerol stores (Cassidy et al., 2017; Trapp et al., 2007). Increasing the corticotropin releasing factor (CRF) contributes to HIIT-induced suppression of appetite. HIIT also had been demonstrated to induce redistribution of splanchnic blood flow. Splanchnic blood flow can reduce by 80% when the body is working at maximum intensity (Clausen, 1977).

The small number of participants is the major limitation of this study. Although it did not interfere with the clear differences in variables within or between groups due to intervention, the results cannot be generalized to other groups. We recommend further studies using a larger sample.

Even though obesity is a major independent prognostic of cardiovascular risk, aerobic capacity turned out to indicate a stronger correlation. A study conducted by Myers et. al. reported that low aerobic capacity is the greatest risk factor for death by cardiovascular disease. In fact, HIIT could increase VO_{2max} (aerobic capacity) more than other protocols (Myers et al., 2002). Moreover, HIIT enhanced stroke volume of the heart, Ca^{2+} cycle, and mitochondrial capacity of skeletal muscle. High aerobic capacity would also improve central and peripheral O_2 transport (Wisloff et al., 2007).

5 CONCLUSIONS

Eventually, this study concludes that HIIT over three weeks reduces the level of visfatin serum in overweight males. This effect may be achieved by increasing intra-abdominal fat oxidation, which is the specific site for visfatin synthesis. However, this significant reduction was not observed in waist circumference. It may be due to the measurements characteristic being not specific for three weeks of exercise.

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