SIPS 2017

SURABAYA INTERNATIONAL PHYSIOLOGY SEMINAR

PROCEEDINGS OF THE SURABAYA INTERNATIONAL PHYSIOLOGY SEMINAR

Surabaya, October 12-14, 2017

Editors:

Soetjipto
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Purwo Sri Rejeki
Bambang Purwanto

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Proceedings of the
Surabaya International Physiology Seminar

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Malaysia

Daniel John Green
University of Western Australia
Australia

Fadzil Hamzah
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Singapore

Deanne Helena Skelly
Griffith University
Australia

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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 energic 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

CONTENTS

PAPERS

FULL PAPERS

Characteristics of Glucose Tolerance, Energy Expenditure, Lactic Acid Level, and Oxygen Saturation in Indonesian Diabetes Dance Version 6

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Keywords: Diabetes Dance, Energy Expenditure, Glucose Tolerance, Lactate, Oxygen Saturation.

Abstract: Objective: One approach of the Indonesian Diabetes Association (PERSADIA) to prevent glucose intolerance, which is the first sign of the course of diabetes mellitus progression, is through increased programmed and measurable physical activity, such as dance. This study aims to determine the effect of diabetes dance version 6 on oxygen saturation, energy expenditure, lactic acid levels and glucose tolerance. Methodology: A total of 32 subjects were measured for fasting and 2 hours post prandial (2hPP) blood glucose, then they performed a diabetes dance version 6 and we measured heart rate, oxygen saturation, energy expenditure and lactic acid blood levels. A day later, at the same time, we measured the same parameters. Output: There was no difference in glucose tolerance, both before (33.91±24.14) and after (34.37±22.31) the diabetes dance version 6 (p: 0.918). Total energy expenditure still did not reach the recommended value: 83.77±22.96 (>135 kcal). Diabetes dance version 6 is accordance with American Diabetes Association (ADA) recommendations in terms of percentage of heart rate maksimum 67.12±8.46 (standard: 50-70%), lactic acid 1.79±0.82 (standard: <4mmol/L and SpO_2 97.94±0.72) Conclusion: diabetes dance version 6 did not produce a significant difference in glucose tolerance, and did not achieve the recommended energy expenditure, but this version of the exercise of diabetes dance did match the training zone requirement.

1 INTRODUCTION

Diabetes mellitus (DM) is a syndrome characterized by elevated blood glucose levels (hyperglycemia) above the normal average. Increased blood glucose levels are caused by the failure of cells to transport glucose from the blood into the cells. Disturbance of glucose transport is caused by low insulin stimulation and/or low response to insulin stimulation. Both glucose transport impairments were observed through fasting blood glucose loading tests. Increased blood glucose levels after the loading of glucose per oral is called glucose intolerance (WHO, 1999; ADA, 2004).

Glucose intolerance is an early sign of DM progression. Pancreatic beta cells are unable to release adequate insulin, or tissue cells are unable to respond to insulin stimulation properly. Intolerance develops into sedentary hyperglycemia that triggers further DM complications. Prevention of glucose intolerance is an important first step in the control of DM disease (Sato, 2000; IDF, 2006).

Nutritional needs, especially glucose as the main ingredient of energy metabolism, can not be ignored in the daily diet. Daily glucose intake, in the form of polysaccharide, disaccharides, and monosaccharides, becomes the main menu. High glucose intake burdens pancreatic beta cells to synthesize insulin. Glucose restriction as an effort to prevent glucose intolerance often fails (Sato, 2000).

The Indonesian Diabetes Association (PERSADIA) recognizes the difficulty of preventing glucose intolerance through the restriction of glucose in the diet. Prevention of glucose intolerance is further developed through increased programmed and measurable physical activity, such as gymnastics/dance (Fox, 1998; Brown et al., 2009; Yendi, 2014). PERSADIA has developed a series of Diabetes dance, from series 1 to series 6. This study aims to determine the effect of diabetes dance

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version 6 on oxygen saturation, energy expenditure, lactic acid levels and glucose tolerance.

2 METHODS

This study was a field experiment study. The population of this study was educational staff of Medical Faculty of UniversitasAirlangga which has characteristics according to the criteria of women aged 21-60 years and with a random blood glucose concentration of 120-200 mg/dL. The subjects of the study underwent a health examination, were given information for consent and signed informed consent forms for approval following research procedures. Selected candidates who met the exclusion criteria and/or were unwilling to sign informed consent forms are excluded from the sample and replaced by another candidate. Subjects were asked to fast for 8 hours, and then their fasting blood glucose levels were taken. Subsequently subjects received carbohydrate for consumption, then 2 hours post prandial (2hPP) blood glucose levels were measured. Research subjects were then guided to do the movement of diabetes dance version 6 for 30 minutes with a tool installed to measure energy expenditure, that is, an Actiheart monitor. During diabetes dance, we measured heart rate, and oxygen saturation. And after diabetes dance, we determined the lactic acid level in the blood. A day later, at the same time, we measured the same parameters.

3 RESULTS

The research results show, that there were 35 research subjects that were able to follow the whole process, and we obtained the basic data characteristics as shown in Table 1.

Table 1: Distribution of the participants.

Characteristic	Mean	Std. Deviation
Age (year)	32.40	10.310
Body weight (kg)	61.23	12.074
Body height (cm)	153.86	4.380
Body mass index	25.49	4.937

We measured the fasting blood glucose and 2 hours PP blood glucose before and after the diabetes dance version 6, and the results can be seen in Table 2.

Table 2: Fasting blood glucose and 2 hours PP blood glucose.

	Mean	Std. Deviation	Normal Distribution
Fasting Blood Glucose Pre exercise (mg/dL)	83.829	11.2184	.200
2 hoursPP Pre exercise (mg/dL)	117.743	24.2443	.200
Fasting Blood Glucose Post exercise (mg/dL)	79.486	11.3484	0.126
2hPP Blood Glucose Post exercise (mg/dL)	113.857	20.9005	0.179

Table 3: Glucose tolerance comparison.

	Mean	Std. Deviation	Normal Distribution	Wilcoxon
Glucose tolerance Pre exercise (mg/dL)	33.9143	24.13975	0.14	0.918
Glucose tolerance Post exercise (mg/dL)	34.3714	22.31734	0.12	

From Table 3, blood glucose levels were increased after glucose loading (glucose tolerance) both for on pre and post-diabetes dance version 6. That is 33.91±24.13 before diabetes dance version 6, and 34.37±22.31 on one day after diabetes dance version 6. Based on statistics analysis, there was no significant difference in glucose tolerance between before and after the treatment of diabetes dance version 6.

Table 4: Percentage of HR Max (%HR_{max}), lactic acid levels, total energy expenditure, and oxygen saturation.

	Mean	Std. Deviation	Recommendation
%HR_{max} (%)	67.1254	8.45762	50-70
Lactic acid levels (mmol/L)	1.7857	0.82217	<4
Total energy expenditure (Kcal)	83.7714	22.96684	>135
S_PO_2 (%)	97.94	.725	95-100

Other parameters measured in this study were Percentage of Heart Rate maximum (%HR_{max}), lactic acid levels, total energy expenditure, and oxygen saturation. This was done to see if the diabetes dance version 6 performed is in accordance with the recommendations issued by the ADA. In

Table 4 it can be seen that the diabetes dance version 6 was in accordance with the ADA recommendation in terms of $\%HR_{max}$ is 67.12 ± 8.46 (standard: 50-70%), lactic acid 1.79 ± 0.82 (standard: <4mmol/L) and SpO_2 97.94 ± 0.72 From the data it can be seen that diabetes dance version 6 is done in the aerobic zone, but in the total energy expenditure results it still has not reached the recommended value of> 135 kcal.

4 DISCUSSION

Diabetes dance is a sequence of physical activities that was developed to prevent diabetes. Subjects with a high risk of diabetes were recommended to perform diabetes dance. Impaired fasting glucose and obesity were two diabetes risks commonly found among Indonesian subjects. Mean of fasting blood glucose level of subjects was 83.83mg/dl, higher than the ADA recommendation (≤ 70 mg/ dl). Mean of body mass index of subjects was 25.49kg/m^2, higher than the ADA recommendation (20 -24 kg/m^2) (WHO, 1999; ADA, 2004; Chambers et al., 2009)

There were six versions developed of diabetes dance. This research evaluated the latest version compared with the ADA physical activity recommendation for diabetes prevention. Diabetes dance version 6 fulfilled the ADA recommendation for the exercise intensity (67.25% HR_{max}) and lactate level (1.78 mmol/L). Unfortunately, the total energy expenditure was only 83.77 kcal, significantly below the ADA recommendation. (WHO, 1999; ADA, 2004; Seo et al., 2009).

A low level of energy expenditure was found almost all subjects after a single bout of diabetes dance. Consistent with this, the fasting blood glucose levels were also not significantly lower (p= 0.92), even though the mean level of fasting blood glucose was lower after single bout diabetes dance version 6 performance. Higher energy expenditure might result in a lower fasting blood glucose level after performing diabetes dance. Repeated bouts of diabetes dance would increase total energy expenditure to the ADA recommendation. (ADA, 2004; Heled et al., 2005; Seo et al., 2009).

It was impossible to increase the intensity of the exercise in order to reach minimum energy expenditure. The exercise intensity of diabetes dance had reached an optimum level at aerobic zone of moderate intensity. Higher exercise intensity stimulated a higher level of lactate. It is necessary to find an alternative method to increase higher energy expenditure without any changes in repetition, exercise intensity and lactate level.

5 CONCLUSIONS

In this study, diabetes dance version 6 did not produce significant differences in glucose tolerance, and also did not reach the energy expenditure recommended by the ADA. However, diabetes dance version 6 has met the aerobic exercise zone, as can be seen from $\%HR_{max}$ of 67%, and it is still below the anaerobic threshold value, judging by the lactate level measured post-exercise (1.78mmol / L). We suggest further improvements should be made to the movements of the diabetes dance, in accordance with the progress of existing science and technology.

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