SIPS 2017 | SURABAYA INTERNATIONAL PHYSIOLOGY SEMINAR

PROCEEDINGS OF THE SURABAYA INTERNATIONAL PHYSIOLOGY SEMINAR

Surabaya, October 12-14, 2017

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SIPS 2017

Proceedings of the
Surabaya International Physiology Seminar

Surabaya - Indonesia

October 12 - 14, 2017

Edited by Soetjipto, Muhammad Miftahussurrur, Ferry Efendi, Purwo Sri Rejeki and Bambang Purwanto

Printed in Portugal

ISSN: 2184-3678

ISBN: 978-989-758-340-7

Depósito Legal: 446682/18

http://sipsfk.conference.unair.ac.id

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BRIEF CONTENTS

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Malaysia

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Deanne Helena Skelly
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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

The Difference of *B-Endorfin* Level in Brain Tissue and Testicular Tissue on Wistar Rats Given Once a Week Aerobic and Anaerobic Exercise

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Keywords: Brain, Endorphin, Physical Exercise, Testes.

Abstract: Physical exercise could increase the levels of *β-endorphin. β-endorphin* was not only secreted in brain but also in testicular. However, it was still unidentified whether physical once a week exercise affected the secretion of *β-endorphin* in the brain tissue and testicular. This study aimed to analyze the different levels of *β-endorphin* in brain tissue and testicular tissue of Wistar rats given once a week aerobic and anaerobic exercises. This study was an experimental laboratory research with Post Test Control Group Design, using 27 male Wistar rats divided into a control group, once a week aerobic and anaerobic. Aerobic exercise performed once a week at a speed of 20m/min for 30 minutes, while the anaerobic exercise performed once a week in 35m/min for 20 minutes at 1 minute interval every 5 minutes, using a *treadmill* for 6 weeks. The endorphin levels of brain and testicular tissue were measured using ELISA kits *for Rat Endorphin ELABSIENCE*. an increase in the average level of brain tissue's *β-endorphin* in the treatment group occured compared to the control group (35,01±8,19 pg/ml), aerobic (47,45±6,98 pg/ml) and anaerobic (51,85±5,01 pg /ml). On the other hand, the average level of testicular tissue's *β-endorphin* decreased compared to the control group (77,33 ± 20,64 pg/ml), aerobic (38,93±3,52 pg/ml) and anaerobic (53,35±8,80 pg/ml). In ANOVA test result, p = 0.000 was obtained. there was a significant difference average level of *β-endorphin* in brain and testicular tissue in Wistar rats aften being given once a week aerobic and anaerobic exercise.

1 INTRODUCTION

During physical exercise, body releases *β-endorphin* providing a great influence on the brain and body. Cunha *et al.,* (2008) said that physical exercise is a major stimulus for endorphins secretion depending on its intensity.[1] The more physical exercise, the higher the levels of *β-endorphin* will be produced. *β-endorphin* that comes out will be captured by receptors in the hypothalamus and limbic system serving to regulate emotions.[2]

When doing physical exercise, the brain will recognize physical exercise as a stressor.[3] Acidosis is a major stimulus release of β-endorphins during exercise, since stress and physical exercise can increase the levels of *β-endorphin* 3 to 10 times higher.[5] The results Van Essen (2007) showed that *β-endorphin,*a substance that can improve mood, which was produced by the hypothalamus and the pituitary gland that plays a role in explaining the effects of exercise for brain.[6] The results of Schwarz & Kindermann(1992) research showed that during physical exercise opioid function could be noticed on *β-endorphin*'s concentration changes depending on the intensity and duration of physical exercise performed.[7]

β-endorphin is also generated in testicular tissue. *β-endorphin* produced in the testes would stimulate the interstitial cells in testes and seminiferous, which will result in Leydig cells to affect Sertoli cells size and will change paracrine into a proliferative response in Sertoli cells which will predispose FSH.[8] *β-endorphin* in the testicular tissue works in Sertoli cells, and is suspected to hamper the function of Sertoli cells.[9] The levels of *β-endorphin* will rise significantly during physical exercise, but

Flora, R., Ferta Sari, L., Zulkarnain, M. and Sukirno, .
The Difference of B-Endorfin Level in Brain Tissue and Testicular Tissue on Wistar Rats Given Once a Week Aerobic and Anaerobic Exercise.
In *Proceedings of Surabaya International Physiology Seminar (SIPS 2017)*, pages 256-260
ISBN: 978-989-758-340-7

testosterone levels will decrease.[10-11] This may occur due to differences in hormonal response that can be caused by the distinctive reactivity of *neuro psikoendokrine* in the body during physical exercise. According to a research conducted by Johnson (1999), the desire for sexual intercourse was increased when we physical exercise regularly. Physical exercise will affect testosterone levels, by affecting the circulation to cause libido.[12]

Several researches on physical exercise and endophine secretion and the impact of physical exercise to sexual intercourse ability have been conducted. However, researches discussing the release of endorphine during acute physical exercises and its relation to endophine in testicular tissue are still limited. This research intended to analyze the *β-endorphin* level differences in brain and testicular tissues on Wistar rats given aerobic and anaerobic once a week.

2 METHODS

This study was an experimental laboratory research with Post Test Control Group Design, using 27 male Wistar rats divided into a control group, aerobic and anaerobic. Aerobic exercise performed once a week at a speed of 20m/min for 30 minutes, while the anaerobic exercise performed once a week in 35m / min for 20 minutes at 1 minute interval every 5 minutes, using a *treadmill* for 6 weeks. The rats were acquired from Bio Sains Riset (bioscience research) Palembang animal house. The research were conducted on April to June 2016. This research obtained ethical approval from *komisi etik* (ethical commission) of Medical Faculty Universitas Sriwijaya No.56/kepkrsmhfkunsri/2017, 13 April 2017.

2.1 Brain and Testicular Homogenates Production

Brain and testicular homogenates production was adopted from Flora et al (2016) research.[13]

2.2 Endorphin Level Parameter Measurement

Brain and testicular endorphin levels were measured with ELISA kit *for Rat Endorphin* from *ELABSIENCE*.

2.3 Data Analysis

Data were analyzed using 16th version of SPSS for windows with significant level ($p<0,05$). In order to find the distinction in average level of endorphin between control group and treatment group, unpaired t-tes was performed. Furthermore, to find out the difference endorphin level among control group, aerobic group, and anaerobic group, *one way* ANOVA test was conducted observing the average difference among them.

3 RESULTS

3.1 Brain Tissue β- endorphin Level

To discove the comparison of Wistar rats' brain tissues' *β-endorfin* average level between aerobic and anaerobic exercise group, unpaired T-test was conducted. There was significant difference ($p<0,05$) in their *β-endorfin* average level.

Table 1: The comparison of wistar rats' brain tissues' *β-endorfin* average level between once a week aerobic and anaerobic exercise group.

Group	N	Mean± SD (pg/ml)	p*
Aerobic	9	47,45±6,98	
Group			0,00
Anaerobic	9	51,85±5,01	
Group			

p t-test p<0,05*

To discover whether there was a difference of endorphin level among control group, aerobic group, and anaerobic group, ANOVA test was conducted. The result showed that there was an increase of brain *β-endorfin* average level in treatment group. The average level of beta-endorphin was higher in anaerobic exercise group than was it in aerobic exercise and control group.

Table 2: The comparison of wistar rats' brain tissues' *β-endorfin* average level among control group, aerobic exercise group and anaerobic exercise group.

Group	n	Mean± SD (pg/ml)	p*
Control Group	9	35,01±8,19	
One-time Aerobic Group	9	47,45±6,98	0,00
One-time Anaerobic Group	9	53,35±8,80	

p* Anovatest p< 0,05

3.2 β- endorfin in Testicular Tissue

To determine the average levels of *β-endorphin* in Wistar rats' testicular tissue between control group and anaerobic exercise group, the unpaired t-test was conducted. There was a significant difference (p <0.05) in the average levels of *β-endorphin* in Wistar rats' testicular tissue between the aerobic and anaerobic exercise group.

Table 3: The comparison of wistar rats' testicular tissues' *β-endorfin* average level between once a week aerobic and anaerobic exercise group.

Group	n	Mean±SD(pg/ml)	p*
Aerobic	9	38,93±3,52	
Group			0,00
Anaerobic	9	53,35±8,80	
Group			

p t-test p< 0,05*

To determine whether there was a significant distinction of *β-endorphin* average levels on Wistar rats in testicular tissue among the control group, aerobic exercise group and anaerobic exercise group, ANOVA test was conducted. It was found that there was a decline in the average levels of *β-endorphin* in the testicular of the treatment group. There was a significant difference (p <0.05) on the average levels of *β-endorphin* in testicular tissue among the control group, aerobic exercise group and anaerobic exercise group.

Table 4: The comparison of wistar rats' testicular tissues' *β-endorfin* average level among control group, aerobic exercise group and anaerobic exercise group.

Group	n	Mean±SD (pg/ml)	p*
Control Group	9	74,70±20,85	
One-time Aerobic Group	9	38,93±3,52	0,00
One-time Anaerobic Group	9	53,35±8,80	

p* Anova test p< 0,05

4 DISCUSSION

According to this reasearch, increase in the average levels of *β-endorphin* in the brain tissue was found. This happened because physical exercise was one important factor in enhancing *β-endorphin* and the impact of physical exercise for the body was not only as a stressor, but also as stimulator; a secreted endorphins simulator.

During physical exercise, the brain would recognize physical exercise as a stressor. Physical exercise then stimulated hypoxia due to the low oxygen content in brain so that the brain sensed that we were in the process to deal with or avoid the stressor.[3] Given a stimulus such as a stressor would activate the HPA axis which would boost the hypothalamus and *Locus Coerulus* (LC). The hypothalamus would decrease the secretion of *Corticotropin Re-leasing hormone* (CRH) *Adrenocorticotropic Hormone* so that ACTH decreased and *Pro-opimelanocortin* (POMC) thrilled, which also reduced the production of ACTH and provoked the production of endorphins resulting pleasant feeling, fresh mind, and better emotion.[14]

This study was in line with research conducted by Viru and Tendzegolskis (1995) discussing the relationship between the level of training and *β-endorphin* concentrations observed in 12 trained individuals and untrained 11 individuals. Moderate-intensity physical exercise did not cause an increase in *β-endorphin* in the untrained group, while the high-intensity exercise increased levels of *β-endorphin* in the trained group.[15] Anaerobic exercise had a greater impact on the release of *β-endorphin* compared to aerobic exercise because the release of endorphins was stimulated by relatively high physical exercise.[16]

The results showed a significant relationship (p <0,05) on the increased levels of *β-endorphin* in the anaerobic group compared to the aerobic group and controls. This happened because the anaerobic exercise increased levels of *β-endorphin* related to lactate serum concentration, whereas aerobic exercise only had a smaller effect on the level of *β-endorphin.* Age and gender also influenced the lower levels of *β-endorphin.*[16] This result were cohesive with the Goldfarb & Jamurtas (1997) which demonstrated that aerobic and anaerobic exercise could increase levels of *β-endorphin.* However, The increase was more significant in anaerobic exercise depending on the level of metabolic demand.[17]

The results also showed a decline in the average levels of *β-endorphin* in testicular tissue. This decrease was due to the reproductive system which was very sensitive to the effects of stressors associated with physical exercise, resulting in hormonal disorders, which were influenced by the type, intensity, duration and frequency of exercise performed. Endorphins could cause an impaired function of the reproductive system and lower the secretion of LH and FSH.[18] During physical exercise, endorphins were known to have a strong

inhibitor properties on the secretion of GnRH. GnRH would directly inhibit the release of LH and prevent the synthesis testosterone to Leydig cells, inducing lower testosterone in plasma.

The results were parallel to a research conducted by Kostic et al (1997) which revealed that CRH and *β-endorphins* affected the hypothalamic-pituitary-gonad (HPG) by inhibiting the release of GnRH from the hypothalamus. CRH acted directly as an anti-reproductive peptide and *β-endorphin* served indirectly as an anti-reproduction peptide in the testes, where the two peptides to function as negative regulators of gonadotropin. GnRH would inhibit the release of LH and interupted the synthesis of testosterone directly to Leydig cells which therefore lowered testosterone in the plasma.[19] According Safanirejad, et.*all* (2009) when doing physical exercise, ACTH and secretion would intesify and LH LH levels decreased.[21] After doing physical exercises, corticotropin releasing hormone (CHR) induced the release of ACTH and *β-endorphin.* The increase of *β-endorphin* could impede the release of gonadotropin (LH secretion). The reduction of LH secretion might lead to an abatement in testosterone produced by the Leydig cells (Colon, 2007).[22]

The results also indicated that the drop in the average levels of *β-endorphin* in aerobic and anaerobic exercise group. There was a significant relationship (p <0,05) on the reduction of *β-endorphin* in aerobic and anaerobic exercise group. This took place since physical exercise

could effect hormones in the reproduction system that might be increased or decreased after an acute or chronic physical exercise.[10] In addition, *β-endorphin* had regulator effect on reproductive fuction at the level of the hypothalamus-pituitary axis.[8] From the results of this study it was concluded that aerobic and anaerobic exercise could result in changes to the levels of *β-endorphin* in the brain and the testes. There were significant differences in the brain (p <0.005) and testes (p <0.005) in terms of average levels of endorphin among wistar rats in aerobic exercise group and anaerobic exercise group.

5 CONCLUSION

There was significant distinction on the average level of β-endorphin on wistar rats' brain and testicular tissues after given aerobic and anaerobic treatments once a week for 6 weeks long.

ACKNOWLEDGEMENT

Researches would like to express their highest gratitude for the endowment of this study to Hibah Pascasarjana Kemenristekdikti 2017.

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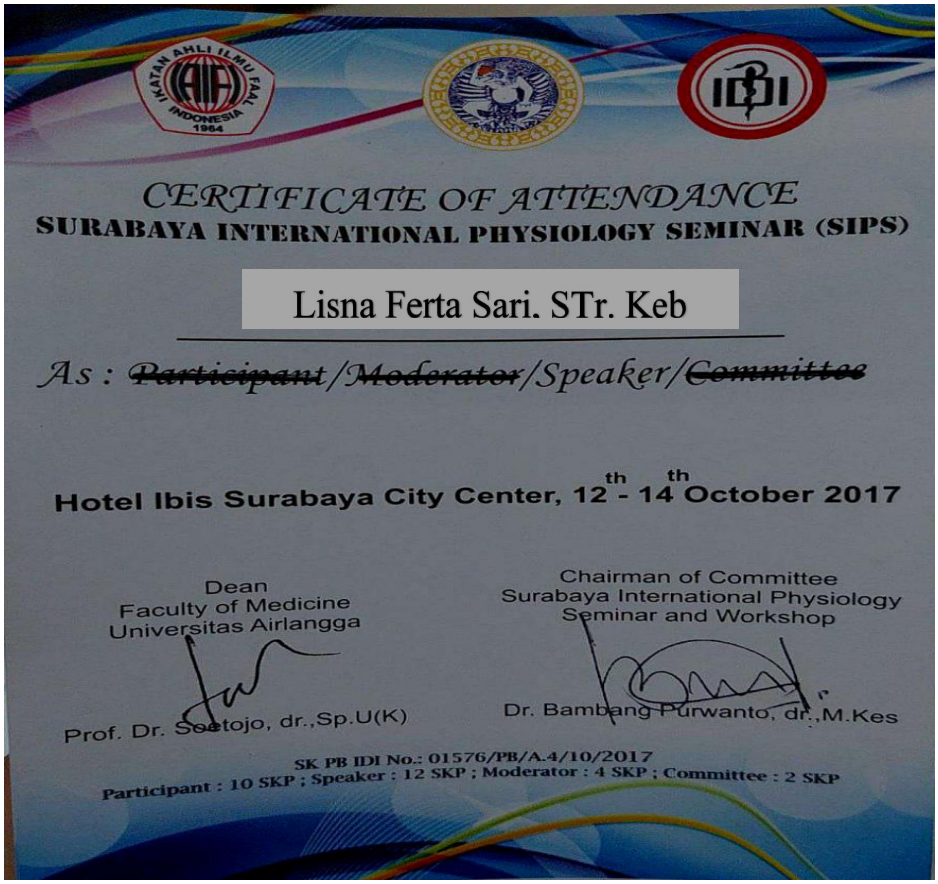


CERTIFICATE OF ATTENDANCE

SURABAYA INTERNATIONAL PHYSIOLOGY SEMINAR (SIPS)

Lisna Ferta Sari. STr. Keb

As : ~~Participant~~/~~Moderator~~/Speaker/~~Committee~~

Hotel Ibis Surabaya City Center, 12th - 14th October 2017

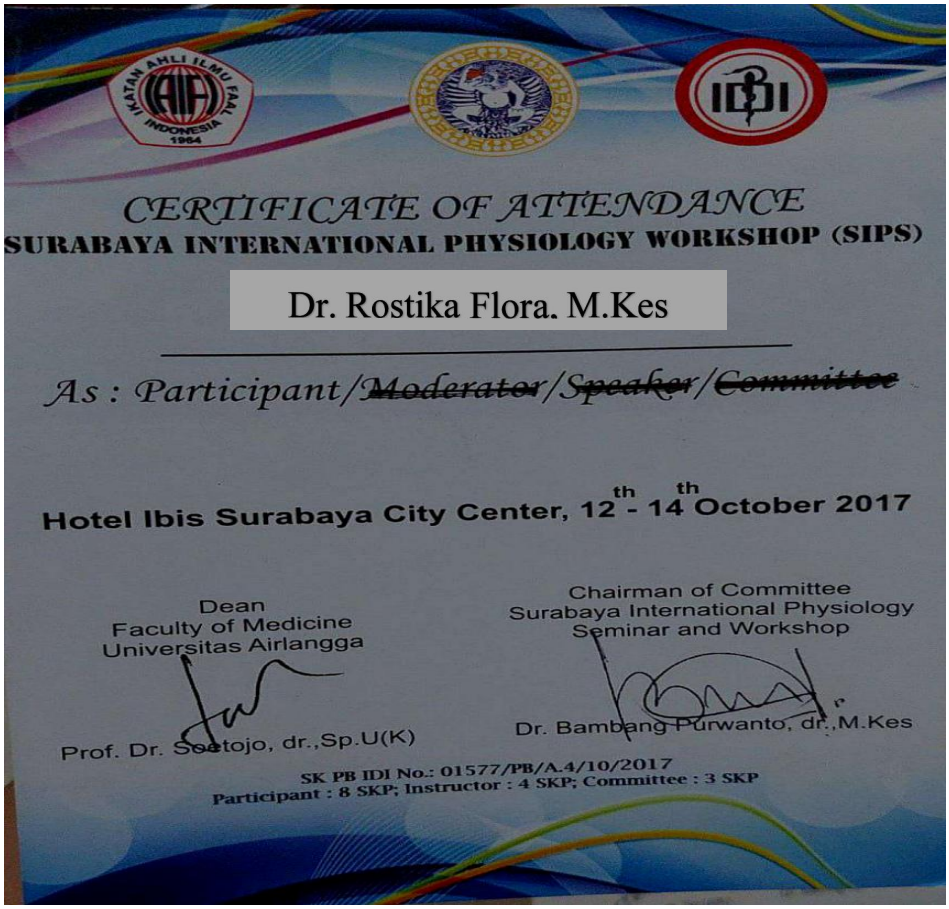
Dean
Faculty of Medicine
Universitas Airlangga

Prof. Dr. Soetojo, dr.,Sp.U(K)

Chairman of Committee
Surabaya International Physiology
Seminar and Workshop

Dr. Bambang Purwanto, dr.,M.Kes

SK PB IDI No.: 01576/PB/A.4/10/2017
Participant : 10 SKP ; Speaker : 12 SKP ; Moderator : 4 SKP ; Committee : 2 SKP



CERTIFICATE OF ATTENDANCE

SURABAYA INTERNATIONAL PHYSIOLOGY WORKSHOP (SIPS)

Dr. Rostika Flora. M.Kes

As : Participant/~~Moderator~~/~~Speaker~~/~~Committee~~

Hotel Ibis Surabaya City Center, 12th - 14th October 2017

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Seminar and Workshop

Dr. Bambang Purwanto, dr.,M.Kes

SK PB IDI No.: 01577/PB/A.4/10/2017
Participant : 8 SKP; Instructor : 4 SKP; Committee : 3 SKP

KEMENTERIAN RISET, TEKNOLOGI DAN PENDIDIKAN TINGGI
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Rumah Sakit Umum Pusat Mohammad Hoesin dan Fakultas Kedokteran Universitas Sriwijaya
Mohammad Hoesin Central General Hospital and Faculty of Medicine Sriwijaya University

Komisi Etik Penelitian Kesehatan
Health Research Review Committee

SERTIFIKAT PERSETUJUAN ETIK
ETHICAL APPROVAL CERTIFICATE

No. 56/kepkrsmhfkunsri/2017

Komisi Etik Penelitian Kesehatan Rumah Sakit Umum Pusat Mohammad Hoesin Hospital dan
Health Research Review Committee of Mohammad Hoesin Central Hospital and

Fakultas Kedokteran Universitas Sriwijaya, Palembang, Indonesia,
Faculty of Medicine, Sriwijaya University, Palembang Indonesia

berdasarkan penilaian terhadap proposal penelitian, dengan judul:
based on the review on research proposal, entitled:

Adaptasi Molekuler yang Terjadi di Jaringan Otak Tikus Wistar sebagai Respon terhadap Latihan Fisik Aerobik dan Anaerobik

Molecular Adaptation in the Wistar Rat Brain as a Response of the Physic Aerobic and Anaerobic Exercise

atas usulan peneliti:
proposed by the researcher:

Rostika Flora, Moh. Zulkarnain, Sukirno

dari Bagian Biomedik
from the Department of Biomedic

dengan mengacu pada Pedoman Nasional Etik Penelitian Kesehatan beserta suplemennya
referring to National Ethical Guidelines on Health Research and its Supplements

dengan ini menyatakan bahwa penelitian kesehatan tersebut
hereby declares that the proposed health research is

layak etik;dan disetujui untuk dilaksanakan di lingkungan
ethically liable;and is approved to be carried out within

Rumah Sakit Mohammad Hoesin dan Fakultas Kedokteran Universitas Sriwijaya
Mohammad Hoesin General Hospital and Faculty of Medicine Sriwijaya University

Palembang, 13 April 2017

dr. Kemas Ya'kub Rahadiyanto, SpPk, M. Kes
Ketua Tim Penilai
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The Difference of B-Endorfin Level in Brain Tissue and Testicular Tissue on Wistar Rats Given Once a Week Aerobic and Anaerobic Exercise

by Rostika Flora

Submission date: 07-Dec-2020 03:27PM (UTC+0700)
Submission ID: 1467284423
File name: Wistar_Rats_Given_Once_a_Week_Aerobic_and_Anaerobic_Exercise.pdf (241.04K)
Word count: 2905
Character count: 15823

The Difference of *B-Endorfin* Level in Brain Tissue and Testicular Tissue on Wistar Rats Given Once a Week Aerobic and Anaerobic Exercise

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Keywords: Brain, Endorphin, Physical Exercise, Testes.

Abstract: Physical exercise could increase the levels of *β-endorphin*. *β-endorphin* was not only secreted in brain but also in testicular. However, it was still unidentified whether physical once a week exercise affected the secretion of *β-endorphin* in the brain tissue and testicular. This study aimed to analyze the different levels of *β-endorphin* in brain tissue and testicular tissue of Wistar rats given once a week aerobic and anaerobic exercises. This study was an experimental laboratory research with Post Test Control Group Design, using 27 male Wistar rats divided into a control group, once a week aerobic and anaerobic. Aerobic exercise performed once a week at a speed of 20m/min for 30 minutes, while the anaerobic exercise performed once a week in 35m/min for 20 minutes at 1 minute interval every 5 minutes, using a *treadmill* for 6 weeks. The endorphin levels of brain and testicular tissue were measured using ELISA kits *for Rat Endorphin ELABSIENCE*. an increase in the average level of brain tissue's *β-endorphin* in the treatment group occured compared to the control group (35,01±8,19 pg/ml), aerobic (47,45±6,98 pg/ml) and anaerobic (51,85±5,01 pg /ml). On the other hand, the average level of testicular tissue's *β-endorphin* decreased compared to the control group (77,33 ± 20,64 pg/ml), aerobic (38,93±3,52 pg/ml) and anaerobic (53,35±8,80 pg/ml). In ANOVA test result, p = 0.000 was obtained. there was a significant difference average level of *β-endorphin* in brain and testicular tissue in Wistar rats aften being given once a week aerobic and anaerobic exercise.

1 INTRODUCTION

During physical exercise, body releases *β-endorphin* providing a great influence on the brain and body. Cunha *et al.,* (2008) said that physical exercise is a major stimulus for endorphins secretion depending on its intensity.[1] The more physical exercise, the higher the levels of *β-endorphin* will be produced. *β-endorphin* that comes out will be captured by receptors in the hypothalamus and limbic system serving to regulate emotions.[2]

When doing physical exercise, the brain will recognize physical exercise as a stressor.[3] Acidosis is a major stimulus release of β-endorphins during exercise, since stress and physical exercise can increase the levels of *β-endorphin* 3 to 10 times higher.[5] The results Van Essen (2007) showed that *β-endorphin,*a substance that can improve mood, which was produced by the hypothalamus and the pituitary gland that plays a role in explaining the effects of exercise for brain.[6] The results of Schwarz & Kindermann(1992) research showed that during physical exercise opioid function could be noticed on *β-endorphin*'s concentration changes depending on the intensity and duration of physical exercise performed.[7]

β-endorphin is also generated in testicular tissue. *β-endorphin* produced in the testes would stimulate the interstitial cells in testes and seminiferous, which will result in Leydig cells to affect Sertoli cells size and will change paracrine into a proliferative response in Sertoli cells which will predispose FSH.[8] *β-endorphin* in the testicular tissue works in Sertoli cells, and is suspected to hamper the function of Sertoli cells.[9] The levels of *β-endorphin* will rise significantly during physical exercise, but

Flora, R., Ferta Sari, L., Zulkarnain, M. and Sukirno, .
Difference of B-Endorfin Level in Brain Tissue and Testicular Tissue on Wistar Rats Given Once a Week Aerobic and Anaerobic Exercise.
In *Proceedings of Surabaya International Physiology Seminar (SIPS 2017)*, pages 256-260
ISBN: 978-989-758-340-7

testosterone levels will decrease.[10-11] This may occur due to differences in hormonal response that can be caused by the distinctive reactivity of *neuro psikoendokrine* in the body during physical exercise. According to a research conducted by Johnson (1999), the desire for sexual intercourse was increased when we physical exercise regularly. Physical exercise will affect testosterone levels, by affecting the circulation to cause libido.[12]

Several researches on physical exercise and endophine secretion and the impact of physical exercise to sexual intercourse ability have been conducted. However, researches discussing the release of endorphine during acute physical exercises and its relation to endophine in testicular tissue are still limited. This research intended to analyze the *β-endorphin* level differences in brain and testicular tissues on Wistar rats given aerobic and anaerobic once a week.

2 METHODS

This study was an experimental laboratory research with Post Test Control Group Design, using 27 male Wistar rats divided into a control group, aerobic and anaerobic. Aerobic exercise performed once a week at a speed of 20m/min for 30 minutes, while the anaerobic exercise performed once a week in 35m / min for 20 minutes at 1 minute interval every 5 minutes, using a *treadmill* for 6 weeks. The rats were acquired from Bio Sains Riset (bioscience research) Palembang animal house. The research were conducted on April to June 2016. This research obtained ethical approval from *komisi etik* (ethical commission) of Medical Faculty Universitas Sriwijaya No.56/kepkrsmhfkunsri/2017, 13 April 2017.

2.1 Brain and Testicular Homogenates Production

Brain and testicular homogenates production was adopted from Flora et al (2016) research.[13]

2.2 Endorphin Level Parameter Measurement

Brain and testicular endorphin levels were measured with ELISA kit *for Rat Endorphin* from *ELABSIENCE*.

2.3 Data Analysis

Data were analyzed using 16th version of SPSS for windows with significant level (p<0,05). In order to find the distinction in average level of endorphin between control group and treatment group, unpaired t-tes was performed. Furthermore, to find out the difference endorphin level among control group, aerobic group, and anaerobic group, *one way* ANOVA test was conducted observing the average difference among them.

3 RESULTS

3.1 Brain Tissue β- endorphin Level

To discove the comparison of Wistar rats' brain tissues' *β-endorfin* average level betwe aerobic and anaerobic exercise group, unpaired T-test was conducted. There was significant difference (p<0,05) in their *β-endorfin* average level.

Table 1: The comparison of wistar rats' brain tissues' *β-endorfin* average level between once a week aerobic and anaerobic exercise group.

Group	N	Mean± SD (pg/ml)	p*
Aerobic	9	47,45±6,98	
Group			0,00
Anaerobic	9	51,85±5,01	
Group			

p t-test p<0,05*

To discover whether there was a difference of endorphin level among control group, aerobic group, and anaerobic group, ANOVA test was conducted. The result showed that there was an increase of brain *β-endorfin* average level in treatment group. The average level of beta-endorphin was higher in anaerobic exercise group than was it in aerobic exercise and control group.

Table 2: The comparison of wistar rats' brain tissues' *β-endorfin* average level among control group, aerobic exercise group and anaerobic exercise group.

Group	n	Mean± SD (pg/ml)	p*
Control Group	9	35,01±8,19	
One-time Aerobic Group	9	47,45±6,98	0,00
One-time Anaerobic Group	9	53,35±8,80	

p* Anovatest p< 0,05

3.2 β- endorfin in Testicular Tissue

To determine the average levels of *β-endorphin* in Wistar rats' testicular tissue between control group and anaerobic exercise group, the unpaired t-test was conducted. There was a significant difference ($p < 0.05$) in the average levels of *β-endorphin* in Wistar rats' testicular tissue between the aerobic and anaerobic exercise group.

Table 3: The comparison of wistar rats' testicular tissues' *β-endorfin* average level between once a week aerobic and anaerobic exercise group.

Group	n	Mean±SD(pg/ml)	p*
Aerobic	9	38,93±3,52	
Group			0,00
Anaerobic	9	53,35±8,80	
Group			

p t-test p< 0,05*

To determine whether there was a significant distinction of *β-endorphin* average levels on Wistar rats in testicular tissue among the control group, aerobic exercise group and anaerobic exercise group, ANOVA test was conducted. It was found that there was a decline in the average levels of *β-endorphin* in the testicular of the treatment group. There was a significant difference ($p < 0.05$) on the average levels of *β-endorphin* in testicular tissue among the control group, aerobic exercise group and anaerobic exercise group.

Table 4: The comparison of wistar rats' testicular tissues' *β-endorfin* average level among control group, aerobic exercise group and anaerobic exercise group.

Group	n	Mean±SD (pg/ml)	p*
Control Group	9	74,70±20,85	
One-time Aerobic Group	9	38,93±3,52	0,00
One-time Anaerobic Group	9	53,35±8,80	

p* Anova test p< 0,05

4 DISCUSSION

According to this reasearch, increase in the average levels of *β-endorphin* in the brain tissue was found. This happened because physical exercise was one important factor in enhancing *β-endorphin* and the impact of physical exercise for the body was not only as a stressor, but also as stimulator; a secreted endorphins simulator.

During physical exercise, the brain would recognize physical exercise as a stressor. Physical exercise then stimulated hypoxia due to the low oxygen content in brain so that the brain sensed that we were in the process to deal with or avoid the stressor.[3] Given a stimulus such as a stressor would activate the HPA axis which would boost the hypothalamus and *Locus Coerulus* (LC). The hypothalamus would decrease the secretion of *Corticotropin Re-leasing hormone* (CRH) *Adrenocorticotropic Hormone* so that ACTH decreased and *Pro-opimelanocortin* (POMC) thrilled, which also reduced the production of ACTH and provoked the production of endorphins resulting pleasant feeling, fresh mind, and better emotion.[14]

This study was in line with research conducted by Viru and Tendzegolskis (1995) discussing the relationship between the level of training and *β-endorphin* concentrations observed in 12 trained individuals and untrained 11 individuals. Moderate-intensity physical exercise did not cause an increase in *β-endorphin* in the untrained group, while the high-intensity exercise increased levels of *β-endorphin* in the trained group.[15] Anaerobic exercise had a greater impact on the release of *β-endorphin* compared to aerobic exercise because the release of endorphins was stimulated by relatively high physical exercise.[16]

The results showed a significant relationship ($p < 0,05$) on the increased levels of *β-endorphin* in the anaerobic group compared to the aerobic group and controls. This happened because the anaerobic exercise increased levels of *β-endorphin* related to lactate serum concentration, whereas aerobic exercise only had a smaller effect on the level of *β-endorphin.* Age and gender also influenced the lower levels of *β-endorphin.*[16] This result were cohesive with the Goldfarb & Jamurtas (1997) which demonstrated that aerobic and anaerobic exercise could increase levels of *β-endorphin.* However, The increase was more significant in anaerobic exercise depending on the level of metabolic demand.[17]

The results also showed a decline in the average levels of *β-endorphin* in testicular tissue. This decrease was due to the reproductive system which was very sensitive to the effects of stressors associated with physical exercise, resulting in hormonal disorders, which were influenced by the type, intensity, duration and frequency of exercise performed. Endorphins could cause an impaired function of the reproductive system and lower the secretion of LH and FSH.[18] During physical exercise, endorphins were known to have a strong

inhibitor properties on the secretion of GnRH. GnRH would directly inhibit the release of LH and prevent the synthesis testosterone to Leydig cells, inducing lower testosterone in plasma.

The results were parallel to a research conducted by Kostic et al (1997) which revealed that CRH and *β-endorphins* affected the hypothalamic-pituitary-gonad (HPG) by inhibiting the release of GnRH from the hypothalamus. CRH acted directly as an anti-reproductive peptide and *β-endorphin* served indirectly as an anti-reproduction peptide in the testes, where the two peptides to function as negative regulators of gonadotropin. GnRH would inhibit the release of LH and interupted the synthesis of testosterone directly to Leydig cells which therefore lowered testosterone in the plasma.[19] According Safanirejad, et.*all* (2009) when doing physical exercise, ACTH and secretion would intesify and LH LH levels decreased.[21] After doing physical exercises, corticotropin releasing hormone (CHR) induced the release of ACTH and *β-endorphin.* The increase of *β-endorphin* could impede the release of gonadotropin (LH secretion). The reduction of LH secretion might lead to an abatement in testosterone produced by the Leydig cells (Colon, 2007).[22]

The results also indicated that the drop in the average levels of *β-endorphin* in aerobic and anaerobic exercise group. There was a significant relationship (p <0,05) on the reduction of *β-endorphin* in aerobic and anaerobic exercise group. This took place since physical exercise

could effect hormones in the reproduction system that might be increased or decreased after an acute or chronic physical exercise.[10] In addition, *β-endorphin* had regulator effect on reproductive fuction at the level of the hypothalamus-pituitary axis.[8] From the results of this study it was concluded that aerobic and anaerobic exercise could result in changes to the levels of *β-endorphin* in the brain and the testes. There were significant differences in the brain (p <0.005) and testes (p <0.005) in terms of average levels of endorphin among wistar rats in aerobic exercise group and anaerobic exercise group.

5 CONCLUSION

There was significant distinction on the average level of β-endorphin on wistar rats' brain and testicular tissues after given aerobic and anaerobic treatments once a week for 6 weeks long.

ACKNOWLEDGEMENT

Researches would like to express their highest gratitude for the endowment of this study to Hibah Pascasarjana Kemenristekdikti 2017.

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