

UNIVERSITI TEKNOLOGI MARA

**EFFECT OF EXOGENOUS LEPTIN
AND EXERCISE ON BLOOD
PRESSURE, RENAL SODIUM
HANDLING AND EXPRESSION OF
LEPTIN RECEPTOR IN
NORMOTENSIVE SPRAGUE
DAWLEY RATS**

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Thesis submitted in fulfilment
of the requirements for the degree of
Master of Science

Faculty of Medicine

July 2017

AUTHOR'S DECLARATION

I hereby declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic or non-academic institution for any other degree or qualification.

I also hereby acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate Studies, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Although leptin has been shown to increase blood pressure (BP), it is however unclear if this increase can be prevented by exercise. This study therefore investigated the effect of leptin treatment with concurrent exercise on blood pressure (BP), electrolytes output, creatinine clearance, urinary protein and albumin excretion, endothelin-1 (ET-1) and ICAM-1 levels and expression and localization of leptin receptor in normotensive rats. Ninety-four Male Sprague-Dawley rats weighing 250–270 g were divided into four groups consisting of a control group, leptin-treated, non-leptin-treated exercise group, and a leptin-treated exercise group. Leptin was given subcutaneously daily for 7, 14 and 42 days (60 µg/kg/day). Animals were exercised on a treadmill for 30 minutes at a speed of 0.5 m/s and at 5° incline four times per week. Measurement of systolic blood pressure (SBP) and collection of urine samples for estimation of electrolytes and creatinine was done once a week. Serum samples were collected at the end of the experiment for determination of electrolyte excretion, creatinine, ET-1 and ICAM-1 levels. Leptin receptor for gene expression and localization were determined from the rat's kidney. Data were analysed using ANOVA and post-hoc analysis and were presented as mean \pm S.E.M. Overall, when compared the treatment between 7, 14 and 42 days, mean SBP and serum ET-1 levels in the leptin-treated group was significantly higher than that in the control group whereas mean SBP and serum ET-1 level was significantly lower in the leptin-treated exercise group than those in leptin-treated and control groups. However, in 42 days treatment, SBP was decreased slowly after 21 days till up to 42 days of leptin treatment. Creatinine clearance, urinary sodium, potassium and calcium excretion, and urine output were not different between the four groups. Regular treadmill exercise prevents leptin-induced increases in SBP in rats, which might in part result from increased urinary sodium excretion in 14 days treatment and preventing the leptin-induced increases in serum ET-1 concentration. Although more studies are needed to elucidate the precise mechanism by which exercise prevents leptin-induced increases in blood pressure, it nevertheless suggests that exercise could be used as a modality in the prevention of rise in blood pressure in hyperleptinemic individuals, particularly those who are overweight.

ACKNOWLEDGEMENTS

“Read! In the name of your Lord who created - Created the human from something which clings. Read! And your Lord is Most Bountiful- he who taught (the use of) the Pen, Taught the human that which he knew not”...Surah al-Alaq (1-5)

In the name of Allah, the Most Gracious, the Most Merciful. Thank You Allah for granting me with good health, giving me great strength, guiding me throughout this journey, make my dreams come true after successfully completing this thesis.

I am very blessed as Allah SWT has granted me His love and mercy so that I could have this great opportunity to end this journey successfully. Firstly, I am extremely thankful and indebted to my dedicated supervisor, Prof Dr. Harbindar Jeet Singh for the constant supervision and giving me such a priceless opportunity in conducting this research, sharing knowledge and his expertise, guiding me through thick and thin, teaching me precious knowledge with heart and soul not only in academic but about life too. God Bless you.

My deepest appreciation goes to my co-supervisor, Mr. Effendi Ibrahim for his ideas, help and support, sharing useful sources and bringing up my spirit during my time here. I sincerely wish to thank all the members of the adipokines interest group (AIG) Assoc. Prof Dr. Brinnell Caszo, Assoc Prof Dr. Justin Gnanou, for their experience, comments and guidance that and offered me with invaluable knowledge for my study. Also to my wonderful friends who were willing to teach, share their knowledge and spend their time together to be with me during my hard times. Thanks a lot for all the memories and attention.

I also would like to express my gratitude to the Faculty of Medicine, Institute of Medical Molecular Biotechnology (IMMB) staff and not to forget the staff of Laboratory Animal Care Unit (LACU) for providing me with all the necessary facilities for the research, for their guidance, technical support and help me out during this journey.

Also to all my family members especially to my beloved parents, Abah dan Mak, Khamarudin Ibrahim and Suraiya Abd Malek. Thanks a lot for everything, for patiently waiting till I could finish my study, for all the sacrifices, prayers and the continuous support. May Allah grant all of you with happiness and good health.

Lastly, I dedicate this thesis to my husband, Zulhakimi Yeop Razali for his remarkable patience going through this challenging time, and not to forget to the princes of our heart Afif Zafran, Afif Imtiyaz and Afif Amsyar. Many thanks for all the support and for giving me strength to carry on, and always be there when I needed to share my happy and sad story along this journey. May Allah protect us, ease our life and make our lives a success in the way of Allah. Ameen.

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