UNIVERSITI TEKNOLOGI MARA

STUDY TO LOCALIZE THE NEURO-MODULATORY SITE OF ZERUMBONE IN RATS CENTRAL NERVOUS SYSTEM (CNS)

NORSYAZWANI BINTI SAMSHUDIN

Thesis submitted in fulfillment
of the requirement for the degree of
Master of Dental Science

Faculty of Dentistry

March 2017

ABSTRACT

The aim of this study is to localize the functional site(s) of *Zerumbone* in rat CNS. Monitoring the nuclear expression of c-Fos, is an established reliable anatomical technique for the functioning mapping of the neuronal activity. In this study, we used c-Fos immunohistochemistry to identify the neuro-anatomical site of the *Zerumbone* rat brain and spinal cord. Control group of male Sprague-Dawly rats (six) were received intraperitoneal injection (i.p.) of normal saline and experimental rats (six) received i.p injection of *Zerumbone* (100mg/kg). The expression of c-fos protein immunoreactivity was detected in freeze frozen serial sections (40 μm) in rat brain and spinal cord. The c-Fos immunostaining was identified as black spot. Statistical analysis was performed using student t-test. $P<0.05$ was set as significant. Present study shows that comepare to control, there are significantly increase in c-fos expression in the nucleus of dorsal and ventral horn of spinal cord ($P<0.05$) of the experimental rats. We propose further investigation of *Zerumbone* neuromodulatory effects on brain for further findings. To our knowledge, this is the first report on localization functional neuro-anatomical site of *Zerumbone* in spinal cord. Our result indicate that *Zerumbone* may play important pharmacological function roles in the nucleus of spinal cord. Our present result suggest that spinal cord maybe the neuromodulatory sites of Zerumbone in nociception.

ACKNOWLEDGEMENTS

Foremost, I would like to express my sincere gratitude to my advisor Prof Dr. Kazi Ahsan Jamil for the continuous support of my Master study and research, for his patience, motivation, enthusiasm, and immense knowledge. His guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better advisor and mentor for my Master study.

I thank my fellow lab mate Norhasimah Ali, for the stimulating discussions, and for all the fun we have had in the last 3 years. Also I thank fellow friend in the Oral Science Lab for cooperating and helpful everytime I need them.

Last but not the least, I would like to thank my family, my parents Samshudin b. Hussain and Norriza bt. Awang Hitam , for giving birth to me at the first place and supporting me spiritually throughout my life. And also for my husband Ahmad Faidzul Abdullah for the endless support and encouragement for me to finish the thesis.

TABLE OF CONTENTS

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND OF STUDY

1.1.1 *Zingiber Zerumbet*

Natural product is a chemical element or substances produced by nature which generally possesses pharmacological or even biological function to be utilized in pharmaceutical drugs research as well as drug test. In Malaysia, 3 significant races – Malay, Chinese and Indian are applying medicative herb as part of their day-to-day wellness therapy requisite. In contrary, the Orang Asli who happen to be the autochthonal people of Malaysia are employing medicinal herbs to be their medical healing base (Batugal *et al.*, 2004).

In 2001, the Global Diversity Outlook recognized Malaysia as one of the 12 mega-diversity centers of the world. The first edition Burkill's 1935, *Dictionary of the Economic Products of the Malay Peninsula* noted 1,200-1,300 medicinal plants of Malaysia, an estimate still often quoted in the literature.Out of more than 20,000 species of vascular plants, about 10%, or approximately 2,000 species, have documented medicinal qualities (Burkill, 1966). Given modern ethnobotanical, chemical, and pharmacological literature, the number of Malaysian medicinal plants is likely greater (Herbal Medicine Research Center IfMR,2000). According to a market assessment by Josef Brinckmann, vice-president of research and development at Traditional Medicinals, an herb tea manufacturer in Sebastopol, California, and editor of the Medicinal Plants and Extracts newsletter for the International Trade Centre's Market News Service, Malaysia is a net importer of 80% of the 38 natural product categories represented in international trade by the Harmonized System Code, in dollar value. Despite this figure, Malaysia is a leading exporter of a handful of natural ingredients, offsetting the overall categories of imports. The country is a leading exporter of cocoa butter, coconut oil, black pepper (Piper nigrum, Piperaceae), capsicum fruits (*Capsicum* spp., *Solanaceae*), essential oils, tea extracts, cinchona alkaloids (from *Cinchona* spp., *Rubiaceae*), and other plant and plant-derived