

UNIVERSITI TEKNOLOGI MARA

**HEALTH RISK ASSESSMENT OF
NITRITE CONTENTS IN
COMMERCIAL MEAT PRODUCTS
SOLD IN MALAYSIA**

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In the name of Allah, The Most Gracious, The Most Merciful.

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TABLE OF CONTENTS

TITLE	
DECLARATION BY STUDENT	ii
INTELLECTUAL PROPERTIES	ii
APPROVAL BY SUPERVISOR	iv
ACKNOWLEDGEMENT	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix
CHAPTER 1	1
INTRODUCTION	1
1.1 Background	1
1.2 Problem Statement	3
1.3 Research Objectives	5
1.4 Scope and Limitation	5
1.5 Significant of Study	6
CHAPTER 2	7
LITERATURE REVIEW	7
2.1 Background	7
2.2 An overview of meat and meat products	8
2.2.1 Definition of meat and meat products	8
2.2.2 Benefits of meat products	8
2.2.3 Recommended dietary intake of meat products	9
2.2.4 Meat products consumed in Malaysia	10
2.3 An overview of nitrite	10
2.3.1 Long-term consumption meat products can affect human health	13
2.4 Research on nitrite content in meat products and their potential health risk	14
2.4.1 Research on nitrite content in meat products	14
2.4.2 Human health risk assessment	16

ABSTRACT

Nitrite is commonly used in food processing as a colourant, preservative, and antibacterial agent, which benefits the food industry. Concerns arise when nitrite degrades into nitric acid and reacts with secondary amines, producing nitrosamine compounds that are known to cause cancer. Some individuals who consume foods containing this chemical may develop methemoglobinemia. To date, there is a limited database for the nitrite content of meat products in Malaysia. Therefore, this cross-sectional study was conducted to fill the gap by determining the level of nitrite in the commercial meat products sold in Malaysia and their potential health risk. A stratified random sampling was conducted by purchasing cured meat products (salami, sausage, beef burger, meatballs, and minced meat) from retail stores in Malaysia. The nitrite content of samples was determined using UV–visible spectrophotometry (UV-Vis). The collected data were analysed using SPSS version 28. Nitrite concentrations were detected in salami, sausage, beef burger, meatballs, and minced meat, with a mean value of 3.96 mg kg⁻¹, 16.04 mg kg⁻¹, 4.54 mg kg⁻¹, 4.78 mg kg⁻¹ and 3.96 mg kg⁻¹, respectively. Nitrite mean concentration was used for health risk assessment, which was calculated using the Target Hazard Quotient (THQ) formula by USEPA. The results showed that sausage has the highest concentration of nitrite (16.04 mg kg⁻¹) among the other meat categories, but it is less than the limit set by Malaysian food legislation. For consumption of sausage, the THQ value for child was 2.78×10^{-2} while for adult was 6.82×10^{-3} where THQ value for child was higher than adult. A THQ value <1 indicates that non-carcinogenic health effects are not expected to occur. Therefore, it can be concluded that processed meat products did not pose health risk to consumer. However, high consumption and long-term purchasing could cause health issues for the consumers. Thus, the study can be used as a resource to conduct similar research in the future.

Keywords: *Health risk, nitrite, meat products.*

CHAPTER 1

INTRODUCTION

1.1 Background

Meat and meat products are source of protein which usually can be purchase at any local stores and markets. Zinc, heme iron, iodine, bioavailable B vitamins, and essential amino acids are abundant in meat and meat products which needed by human body (Bohrer, 2017). According to Statista (2022), meat consumption per capita is expected to increase globally from 42.4 kg in 2021 to 43.7 kg in 2030. However, there are various factors that can contribute to meat spoilage, and the most common are microorganisms such as mold and bacteria (Hummel, 2021). Microorganisms in meat break down proteins and fats, spoiling the meat, or breed and reach levels that are unsafe or unpalatable to humans (Hummel, 2021). To prolong its shelf-life, nitrite is used as preservatives for the creation of a distinct flavor, the stability of the red color, and the preservation against lipid oxidation (Govari & Pexara, 2015).

Nitrates and nitrites are naturally occurring compounds found in the human body and some foods. They are widely used in food processing. For example, potassium and sodium salts of nitrite and nitrate are used in curing the mixture of meat in order to inhibit the microbial growth, enhance the colour and flavours, and slows lipid oxidation, which brings benefits to food industry (Scheeren et al., 2013). The number of preservatives added into meats processing are depends on its processing method (Parvizishad et al., 2017). Since nitrite was excellent food preservative properties, process pickles, meat and fishery products mostly contained 0.06 mg/kg nitrite (Velmurugan et al., 2020). According to the Code of Federal Regulations, nitrite