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BIOACTIVE COMPOUND OF HOLOTHOROIDEA



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PREFACE

Praise be to Allah, gratitude is rightly poured forth to His presence. With the blessings, guidance, and favors from Him, the author has successfully completed the book entitled "Bioactive Compound of Holothuroidea" This book represents the author's concern for the utilization of natural resources derived from the marine biota of Indonesia.

Therefore, the existence of this book is undoubtedly a result of the contributions and assistance from all parties. Thus, on this occasion, the author extends appreciation and expresses gratitude to all those who have contributed significantly to the process of creating this book.

As imperfect beings, the contents of this book are still far from perfection. Thus, we earnestly welcome criticisms and suggestions from all parties. Finally, we hope that the presence of this book will be beneficial to all of us. Aamiin.

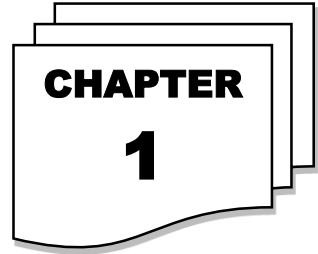
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Author Team

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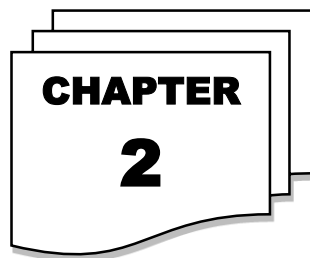


OVERVIEW BIOACTIVE HOLOTHOROIDEA

A. INTRODUCTION

Changes in lifestyle, such as diet and physical activity, increase the risk of developing diseases, which include diabetes, obesity, hypertension, cancer and others. Several prevention strategies have been tested, including the use of multiple bioactive components found in living things in the form of functional food ingredients. Sea cucumbers are a source of bioactive components that can be used in biopharmaceuticals, health foods, and industrial raw materials. Sea cucumbers have a high protein content and a variety of bioactive components. Sea cucumbers are invertebrates or thorn-skinned animals (Echinodermata) with an elongated cylindrical body and oral and aboral lines connecting the anterior and posterior parts as the axis. The potential for sea cucumbers from capture fisheries in Indonesia is quite significant, representing a 51.37% increase in average production.¹

Sea cucumbers have been used and studied for a long time. The Chinese have known sea cucumbers as a food with medicinal properties since the Ming dynasty. Sea cucumber bioactive ingredients act as antioxidants (reduce cell and tissue damage), antibacterial, antifungal, antinociceptive (painkillers), and anti-inflammatory agents (fight inflammation and reduce swelling). Among the bioactive components are mucopolysaccharides, glucosamine and chondroitin sulfate, minerals and trace minerals, steroids, collagen, Omega 3 - DHA, and

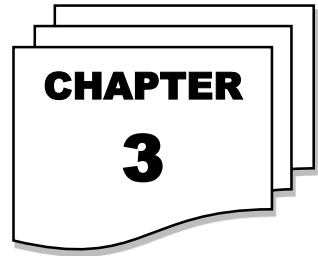


COMPOUND CONCEPTS

A. DEFINITIONS OF COMPOUNDS

Compounds are substances that can be formed in combination with elements with these subdivisions. A compound must be made by a chemical reaction between two or more elements in order to go through the reactions in formation. Compounds are substances formed by two or more elements. Through chemical reactions, compounds can be broken down into their constituent elements. In addition, the compound is also defined as a single substance that can be broken down into other simpler substances through chemical reactions. An example of a compound that we often encounter in everyday life is water. Water is a combination of the elements hydrogen (H) and oxygen (O) with the chemical formula, namely H_2O . Through chemical reactions, water can be decomposed back into hydrogen and oxygen. Even though at atmospheric pressure, hydrogen and oxygen are both gaseous, when they unite and bond with each other, their form can turn into a liquid. (Alex, 2023),

A compound is a single substance that can be broken down into two or more elements. Compounds have several elements that combine chemically with each other, so that the symbol for a compound consists of several element symbols. Analysis to find the constituent elements of a compound is usually called qualitative analysis, whereas if the analysis finds a comparison of each

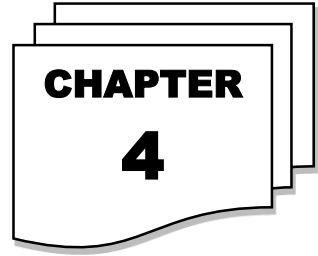


HOLOTHUROIDEA

A. THE DEFINITION OF HOLOTHUROIDEA

Holothuroidea in Indonesian is called sea cucumbers or sea cucumbers. Is a group of invertebrate animals that are found in many oceans around the world. They move slowly and live on the ocean floor. In the marine ecosystem, sea cucumbers are a group of animals that play a very important role in the ecosystem. They are deposit and suspension feeders.

Sea cucumbers or better known as sea cucumbers are one of the organisms from the phylum Echinodermata class Holothuroidea. Sea cucumbers (Holothuroidea) can be found or found throughout coastal waters, from shallow tidal areas to deeper waters for their life, sea cucumbers prefer polluted free waters, and the water is relatively calm. In general, each species has a specific habitat, for example, the white sea cucumber (*Holothuria scabra*) is found in seagrass-covered waters, while the Koro sea cucumber (*Muelleria leconoro*) and sand sea cucumber are found in deeper waters (Martoyo et al. al., 2007). The main habitat of sea cucumbers is on seagrasses and corals. The spread of sea cucumbers in Indonesia is very wide, including; coastal waters of Madura, East Java, Bali, Sumba, Lombok, Aceh, Bengkulu, Bangka, Riau and its surroundings, Belitung, Kalimantan (west, east and south), Sulawesi, Maluku, Papua and the Thousand Islands (Martoyo et al., 2007) . In (Handayani et al., 2017).

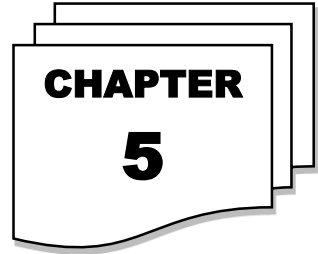


STUDY ANALYSIS

BIOACTIVE HOLOTHOROIDEA

A. LINKAGE AND CLUSTERING OF THEMES IN POTENTIAL BIOACTIVE COMPOUND HOLOTHOROIDEA

This category describes the ideas contained in 132 visualization techniques discovered in 148 articles that are related to the study's theme. A VOSviewer review also revealed 12 concept clusters (see table 1). Figure 4.1 depicts the concept identities deduced from the cluster density view. Furthermore, the color code for each cluster is used to identify the key concepts of each cluster. The goal is to identify as many themes as possible that have been frequently discussed in previous research and to make them available for future use. Figure 4.1 depicts the density of clusters as indicated by the different colors of each cluster.



CONCLUDING CONCLUSION

A. CONCLUSION

Sea cucumbers, particularly *H. atra*, *H. scabra*, *C. frondosa*, and *A. japonicus*, contain antioxidants such as phenolic acids, flavonoids, peptides, fucosylated chondroitin sulfate (FCS), fucoidan, and triterpene glycosides. These compounds may also have anticancer, anti-inflammatory, anti-glycation, anti-tyrosinase, anti-hypertension, antithrombotic, anti-diabetic, and antimicrobial properties. As a result, sea cucumber antioxidants have the potential to be used in nutraceuticals, pharmaceuticals, cosmetics, and functional foods. More research is needed to understand the detailed chemical structures, mechanisms of action, and bioaccessibility and bioavailability of sea cucumber-derived value-added products through *in vivo* analysis and clinical trials in order to support the health claims and commercialize sea cucumber-derived value-added products.

Sea cucumbers are marine invertebrates that have potential as anticancer. Sea cucumber contains a significant amount of protein, vitamins, fatty acid, collagen, essential and non-essential amino acids, and minerals that are beneficial to the body. Active compound as anticancer such as philinopside A and B, patagonicosides, holothurin A and echinosides, colohiroside A, Intercedenside A, Okhotosides and Frondoside A sticoposide originating from *Thelenota anax*, sticoposide, bivittoside A, Holocosinos A and Holotox, cumumariosides produced from different types of sea cucumbers. Each active

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Irena Ujjanti is a highly accomplished and respected lecturer in medical physiology at the Faculty of Medicine, University of Muhammadiyah Prof. Dr. Hamka. With a Doctorate degree in physiology from the prestigious Faculty of Medicine, University of Indonesia, Irena's research interests primarily revolve around nutrition and metabolic diseases. She has published several articles in top-tier academic journals related to her research interests and her work has been instrumental in advancing the understanding of diabetes mellitus and other metabolic diseases.

Irena's expertise lies in the application of physiological and biomolecular methods to investigate complex medical conditions. In addition to her academic responsibilities, Irena is an active member of several professional organizations, including the Indonesian Doctors Association (IDI), the Indonesian Association of Clinical Physiologists (PDFKI), and the Jakarta Association of Indonesian Physiological Sciences (IAIFI).

Irena's dedication to her field is further demonstrated through her involvement in several ongoing research projects related to nutrition and metabolic diseases. Her contributions to the field have been widely recognized, making her a highly sought-after speaker and consultant in the medical community.

BIOACTIVE COMPOUND OF HOLOTHOROIDEA

Holothoroidea (sea cucumbers) are a commercially significant variety of marine invertebrates that are widely consumed in Asian countries. Sea cucumbers contain various bioactive substances such as lipids, phenols, peptides, triterpene glycosides, and polysaccharides, which have a wide range of beneficial biological effects. Our research aims to provide a thorough understanding of these bioactive compounds. We discuss natural stock fishery and aquaculture as management strategies for ensuring sustainable sea cucumber populations. We also describe the extraction and purification of bioactive compounds, providing insights into the preparation of functional ingredients derived from sea cucumbers. This review aims to give academics and industry a better understanding of sea cucumbers and their potential for the development of high-value nutraceutical products.

The goal of our study is to categorize themes related to the study of Holothoroidea bioactive components and mechanisms. We analyzed 200 research articles using descriptive analysis and the Nvivo-12 software. Our findings revealed 151 relationships between the bioactive components of Holothoroidea, which could be classified into 11 groups. The discovery of the mechanism of action of the bioactive components of Holothoroidea is significant as it can aid in the development of a conceptual framework for the study of these organisms. However, a limitation of this study is the lack of references to the articles reviewed. Future research should employ a comparative analysis approach to address this limitation.