RESEARCH
www.commprac.com
ISSN 1462 2815

COMPARISON OF MANUKA HONEY WITH DORSATA HONEY AS ANTIMICROBIAL, ANTIOXIDANT, AND ANTI-INFLAMMATORY IN IMMUNE SYSTEM

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DOI: 10.5281/zenodo.12741700

Abstract

Objective: To understand the differences between the two types of honey and appreciate the advantages and uniqueness of each in the context of medical applications and environmental sustainability, and can help as an immune system enhancer which contains antimicrobial, anti-inflammatory and antioxidant sources. **Methodology:** This type of research uses a scoping review with a narrative method of several international articles using electronic data base media, namely PubMed and ScienceDirect. The articles used are limited to the last 5 years, namely 2019-2024 as many as 40 articles consisting of 20 articles with the theme Manuka Honey and 20 articles with the theme Dorsata Honey. **Results:** Dorsata honey has a higher moisture content than Manuka honey. Moisture content in honey affects the quality, durability, and stability of honey. Dorsata honey has more mineral content than Manuka honey, including essential and non-essential minerals. Manuka honey is best known for its content of bioactive compounds, especially methylglyoxal, which provides strong antimicrobial and anti-inflammatory properties. In addition, Manuka honey contains leptosperin, which also has antimicrobial, anti-inflammatory, and antioxidant activities. Manuka and Dorsata honey contain phenolics and flavonoids that may provide health benefits. Manuka honey contains hydrogen peroxide and Leptosperin, which provide health benefits such as antimicrobial, anti-inflammatory, and antioxidant properties. Manuka honey also contains Methylglyoxal (MGO), which is a major component with strong antibacterial activity. Manuka honey also contains 2-methoxybenzoic acid, which has antimicrobial and anti-inflammatory activities. **Conclusion:** the author deems it necessary to conduct a more in-depth review of both. using Manuka Medical Honey as the standard, thus.

Keywords: Effectiveness, Manuka Honey, Dorsata Honey, Immunity.

INTRODUCTION

Immune responses involving the innate immune system, together with responses from the adaptive immune system, usually lead to successful virus elimination. However, excessive responses from the innate immune system can lead to viral pathologies (Carty et al., 2021). On the other hand, the adaptive immune system provides a more specific and targeted response to previously recognised pathogens. It represents one of the important branches of the immune system that contributes to the initiation and progression of chronic inflammatory diseases (Brahmer et al., 2021). Cells such as T cells and B cells in the adaptive immune system are responsible for providing antigen-specific immune responses. T cells will differentiate into effector T cells that produce pro- or anti-inflammatory cytokines, while B cells will transform into plasma cells that produce specific antibodies (Sun et al., 2020).

Honey contains phenolic compounds and flavonoids that play a role in fighting inflammation (Ranneh et al., 2021). Honey contains fructose, glucose, and sucrose, as well as several other nutrients such as riboflavin, niacin, pantothenic acid,

pyridoxine, folate and vitamin C. In addition, honey contains minerals, proteins, flavonoids (such as apigenin, pinocembrin, kaempferol, quercetin, galangin, chrysin, and hesperetin), enzymes (such as catalase, superoxide dismutase, glutathione), and phenolic acids (such as ellagic, caffeic, p-coumaric, and ferulic acids) (Kutry & Kutry, 2020).

Numerous studies have demonstrated the therapeutic effects of honey and its main components against various viral infections. Honey and its main components can fight hervers, rubella, Influenza, respiratory viruses, syncytial, viruses, hepatitis, aids, imonodeviciency, Gingiposmopatitis, rabies, and covid 19. The anti-viral mechanisms of honey and its main components are extensive (Dewi et al., 2022). Honey has immunomodulatory and anti-inflammatory activities. This means that honey has the ability to influence the immune system and reduce inflammation in the body. In addition, honey has antioxidant and antiviral activities. Antioxidant activity can help protect body cells from oxidative damage caused by free radicals (Miguel & Faleiro, 2017).

Manuka honey is known for its diverse amino acid content. Several studies have shown that certain amino acids in Manuka honey may play a role in stimulating the production of white blood cells, which are important components of the human immune system. White blood cells, such as macrophages and neutrophil cells, play a role in fighting infections and responding to foreign substances in the body. The amino acids in Manuka honey may also influence the production of cytokines, molecules that play a role in stimulating the immune response (Blair et al., 2009).

Manuka honey is recognised for its effectiveness on the immune system based on its ingredients. Bioactive compounds such as organic acids, enzymes, polyphenols, phenolic compounds, flavonoids, hydrogen peroxide, leptosperin, and 5-hydroxymethylfurfural (HMF) in Manuka honey play an important role in supporting the human immune system. Organic acids, such as acetic acid and formic acid, have antimicrobial properties that help fight bacterial and fungal infections. Enzymes such as glucose oxidase produce hydrogen peroxide, providing additional antimicrobial effects (Alvarez-suarez et al., 2013b).

Polyphenols, phenolic compounds, and flavonoids in Manuka honey have antioxidant and anti-inflammatory properties that fight free radicals and reduce inflammation. Leptosperin, a unique compound in Manuka honey, is also believed to exert antimicrobial effects. Although 5-hydroxymethylfurfural (HMF) is found in low concentrations, several studies show its anti-inflammatory and antioxidant effects without a doubt. Thus, the effectiveness of Manuka honey on the immune system is based on the complex and diverse content of these bioactive compounds (Kwakman et al., 2012).

Dorsata honey has been shown to have antimicrobial activity against Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli, Streptococcus pyogenes, and Candida albicans. However, its effectiveness against other viruses such as human papillomavirus is not fully understood. (Ansyarif & Sari, 2018), this honey also has high antioxidant properties, which can help protect body cells from oxidative damage (Minh et al., 2017).

The antioxidant activity of dorsata honey and its relationship with the immune system was briefly described in the journal. Superoxide dismutase (SOD) is one of the antioxidants involved in protecting the body from oxidation reactions. The study

showed that dorsata honey administration can increase SOD activity in the body, which can help protect cells from oxidative damage (Minh et al., 2017).

In the context of boosting the immune system, the polyphenol content and anti-inflammatory properties of honey may provide benefits. The polyphenols in honey may protect immune cells from oxidative damage and stimulate the production of anti-inflammatory cytokines. In addition, honey can also increase immune cell activities such as phagocytosis and antibody production, which can strengthen the immune system (Martiniakova et al., 2023).

There has been no research comparing the two types of honey, namely manuka medical honey and dorsata honey, where currently the management of dorsata honey includes various aspects, ranging from the selection of suitable hive locations, the use of traditional tools, to honey collection techniques that minimise disturbance to bees. The continuation of dorsata honey management practices with local wisdom is also important to preserve biodiversity and environmental sustainability in these areas. Unlike Manuka medical honey, this type of honey has special properties and is often used in the medical field. The speciality of Manuka honey lies in its Methylglyoxal (MGO) content, which is believed to have stronger antibacterial, antifungal, and anti-inflammatory properties than regular honey. The production process of Manuka honey is also different. Bees harvest nectar from Manuka flowers, and then the honey is specially processed to retain its MGO content. This process involves laboratory testing to measure the level of MGO in the honey.

Thus, the author deemed it necessary to conduct a more in-depth review of both using Manuka Medical Honey as the standard, so as to understand the differences between the two types of honey and appreciate the advantages and uniqueness of each in the context of medical applications and environmental sustainability.

METHODOLOGY

This type of research uses a scoping review with a narrative method of several international articles using electronic data base media, namely PubMed and ScienceDirect. The articles used are limited to the last 5 years, namely 2019-2024 as many as 40 articles consisting of 20 articles with the theme of Manuka Honey and 20 articles with the theme of Dorsata Honey. This journal is then analysed and a discussion is made. The keywords in searching for articles are the source or origin of honey, characteristics, Potential of Dorsata Honey in improving the immune system, Comparison of Effectiveness on the Immune System. The inclusion criteria used are journals that have relevant titles.

This type of research uses a systematic review with a narrative method of several international articles using electronic data base media, namely PubMed and ScienceDirect. The articles used were limited to the last 5 years, namely 2019-2024. There were 58 articles identified about Manuka Honey and 43 articles about Dorsata Honey so that 101 articles were filtered. In the 101 articles, there were 13 articles that were excluded on the basis of screening duplicate titles and abstracts, so that the complete articles that were considered feasible were 88 articles. Of the 88 articles, there were 48 articles with full text and were excluded due to content discrepancies in articles that did not contain the source or origin of honey, characteristics, Potential of Honey in improving the immune system, Comparison of Effectiveness on the Immune System. So that a total of 40 articles were selected consisting of 20 articles with the

theme Manuka Honey and 20 articles with the theme Dorsata Honey. This journal was then analysed and a discussion was made. The inclusion criteria used were journals that had relevant titles.

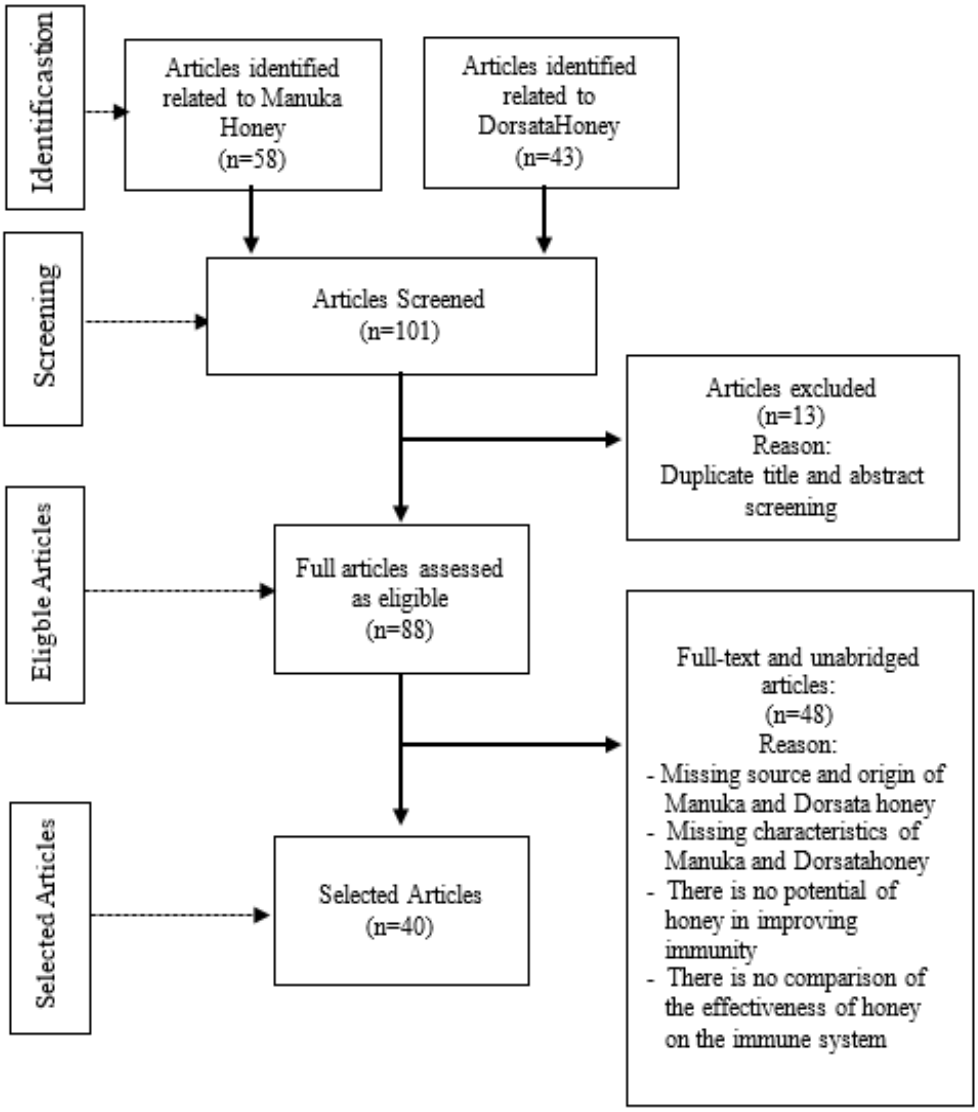


Figure 1: Identification and selection of articles for the research sample

RESULTS

Composition of Manuka Honey and Dorsata Honey

Composition refers to the combination or arrangement of various elements, materials, or elements that form a unity or system.The composition or compounds contained in Manuka Honey and Dorsata Honey are generally almost the same, the only difference is the percentage of each composition.Both Manuka Honey and Dorsata Honey contain water, sugar, protein, minerals, vitamins, amino acids, enzymes, phenolic compounds, phenolics, flavonoids and hydroxymethylfurfural (HMF). However, there are several compositions/compounds from the 20 articles that are not found in Dorsota Honey, including organic acids, hydrogen peroxide and leptosperin.

Table 1: Composition / Content / Compounds of Manuka Honey and Dorsata Honey

Composition / Compound	Manuka Honey	Dorsata Honey
Water content	17–20% (Anand et al., 2018) , 11.6 – 20.3% (Rodica et al., 2021)	22.7% (Burgett, 2020) , 20.28% (Fitriana et al., 2023)
Sugar	Fructose , glucose , sucrose , and maltose (Deng et al., 2018) , (Lane, 2019) , (Ahmed et al., 2018) , (Alvarez-suarez et al., 2014)	Glucose (24%), Fructose (31%), Sucrose (1.7%), Maltose (9%) (Mustafa et al., 2023)
Proteins	Protein (Deng et al., 2018) , (Lane, 2019)	Protein (0.1-0.4%) (Ansyarif & Sari, 2018)
Mineral	Iron (Fe), manganese (Mn), and zinc (Zn) (Deng et al., 2018)	Essential and non- essential minerals such as Al (Aluminium), Cr (Chromium), Ni (Nickel), V (Vanadium), Co (Cobalt), Ca (Calcium), Mg (Magnesium), K (Potassium), Na (Sodium), Zn (Zinc) , Fe (Iron), Mn (Manganese) (Ansyarif & Sari, 2018) , (Yumni et al., 2023)
Vitamin	Vitamin C, calcium , substances iron , sodium and potassium (Mccarthy et al., 2019)	There is a number small amount of vitamins inside honey dorsata (Ansyarif & Sari, 2018)
Amino acid	Amino acids (Lane, 2019) , (Alicja & Por, 2023) , (Mccarthy et al., 2019)	Amino acids (Ansyarif & Sari, 2018)
Organic acids	Organic acids (Lane, 2019)	-
Enzyme	Functioning protein molecules as biocatalyst in reaction chemistry (Lane, 2019)	There is activity inner diastase enzyme honey dorsata (Ansyarif & Sari, 2018) , (Yumni et al., 2023)
Polyphenols	Polyphenols (Lane, 2019) , (Alicja & Por, 2023)	-
Compound Phenolic	hydroxybenzoic acid , acid chlorogenic acid , and p-coumaric acid (Deng et al., 2018)	Content phenolic amounted to 7.51 mg GAE/g
Phenolic	Like sour protocathequat , acid syrinic , and genista acid (Wang et al., 2024) , (Alvarez-suarez et al., 2014) , (Alicja & Por, 2023)	Content phenolic amounted to 7.51 mg GAE/g (Fitriana et al., 2023)
Flavonoids	Quercetin , luteolin, kaempferol, isorhamnetin, apigenin, galangin , krisin , pinobanksin, and pinosembrin (Wang et al., 2024) , (Alvarez-suarez et al., 2014)	flavonoid content is 0.06 mg QE/g (Fitriana et al., 2023)
Hydrogen Peroxide	Own characteristic antimicrobial (Mccarthy et al., 2019)	-
Leptosperin	Leptosperin is indicator source deep Manuka pollen Manuka honey (Wang et al., 2024)	-
5-hydroxymethyl furfural (HMF)	HMF is used as indicator authenticity honey and content antimicrobial (Wang et al., 2024)	HMF levels used as indicator quality and level warmup honey (Kek et al., 2017)
Ash	-	Ash content around 0.2% (Ansyarif & Sari, 2018) , (Minh et al., 2017)
Nitrogen	-	Contains up to nitrogen triples more Lots than Apis mellifera honey (Minh et al., 2017)

Composition / Compound	Manuka Honey	Dorsata Honey
Methylglyoxal (MGO)	Component main in Manuka honey has activity antibacterial (Wang et al., 2024) , (Mccarthy et al., 2019)	-
	2-methoxybenzoic acid and acid trimethoxybenzoate (Rodica et al., 2021)	-

Difference between Manuka Honey and Dorsata Honey based on origin

Difference between Manuka Honey and Dorsata Honey based on origin can seen in table 2 as following :

Table 2: Difference between Manuka Honey and Dorsata Honey based on origin

Manuka Honey	Dorsata Honey
Originate from flower Lestospermum Scoparium , which is also known as Manuka or New Zealand tea tree (Stephens et al., 2015)	Dorsata honey (Apis dorsata) was found originate from Indonesia (Semuel & Mege, 2020)
Produced from Nectar Manuka flowers by bees collector Nectar. Manuka flowers produce Nectar throughout life flowers , of quick after blossom until petals flower fall (Clearwater et al., 2018)	Apis dorsata is species Bees are found in Southeast Asia , including parts of Thailand north (Burgett, 2020) . Species scattered bees wide in variety locations around the world, including India, Thailand, Nepal, China, Malaysia, and several island big in Indonesia, (Semuel & Mege, 2020)
UMF 15+ Manuka Honey is used originate from New Zealand (Muhrbeck et al., 2022)	Sourced from four species bee namely Apis dorsata , Apis florea , Apis cerana , and Apis mellifera (Burgett, 2020)
Originate from Leptospermum Scoparium tree (Nolan et al., 2020)	Source Nectar honey dorsata originate from forests in Indonesia (Apriantini et al., 2022)
Manuka honey is produced by bees honey Europe (Apis mellifera) from Nectar native manuka plant New Zealand (Leptospermum scoparium) (Lane, 2019)	Nectar Apis dorsata honey collected from plants and flowers in the forest Rain tropical in the state of Kedah on the West Coast of Malaysia (Moniruzzaman et al., 2013)
Produced by bees eating honey of Leptospermum scoparium , which is a shrub that grows in New Zealand and eastern Australia (Alangari et al., 2023)	A. dorsata honey produced in Pakistan by bees type A. dorsata which is species popular wild bees For local consumption (Mustafa et al., 2022)

Manuka honey is type lots of honey originate from New Zealand and Australia while Dorsata Honey is Honey is found in some island big in Indonesia such as Sumatra , Kalimantan, and Sulawesi and other Asian countries such as India, Thailand, Nepal, China and Malaysia.

Manuka Honey is type honey produced by collecting bees Nectar from flower Manuka tree (Leptospermum scoparium) (Alangari et al., 2023) . and honey dorsata is type honey produced by bees from species Apis dorsata . Apis dorsata bee is bee type generally large found in the area tropical such as Southeast Asia (Safitri et al., 2023)

Activity Antimicrobial

Activity antimicrobial is ability something substance For hinder or kill microorganisms like bacteria , viruses, or mold (Carter et al., 2016) . Of the 40 articles analyzed there are 6 articles that state that Manuka Honey can hinder growth various species

microorganisms , help in treatment of otitis externa against Streptococcus bacteria , an effective antimicrobial to Gram- positive and Gram- negative bacteria . There are 5 articles that state that Dorsata Honey Own activity antimicrobial against Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli, Streptococcus pyogenes, and Candida albicans and Fusarium oxysporum fungi . Characteristics of Dorsata Honey and Their Differences With Manuka Medical Honey based Activity Antimicrobial can seen in table 3 as following :

Table 3: Characteristics of Dorsata Honey and Their Differences With Manuka Medical Honey based on Activity Antimicrobial

Manuka Honey	Dorsata Honey
Can hinder growth various species microorganisms , including resistant ones Antibiotics are effective against Mycobacterium abscessus (Nolan et al., 2020)	Own activity antimicrobial against Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli, Streptococcus pyogenes, and Candida albicans (Mcloone et al., 2016)
Own characteristic capable antibacterial help in treatment of otitis externa (Kumar et al., 2020)	Own potency antibacterial including Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, and Enterococcus faecalis (Mustafa et al., 2022)
Own activity effective antibacterial to the bacteria Streptococcus mutans and Lactobacillus, which have potential influence health tooth (Beena et al., 2018)	Effectiveness honey dorsata to Fusarium oxysporum fungus (Ansari et al., 2024)
Own activity effective antimicrobial to Gram-positive and Gram- negative bacteria (Johnston et al., 2018) , Pseudomonas aeruginosa which is often found in wounds burn (Boekema et al., 2023)	Own antibacterial to a number of species bacteria pathogens , including Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, and Enterococcus faecalis (Mustafa et al., 2022)
Own compound hydrogen peroxide , compound phenolics , and other compounds that have characteristic antimicrobial (Nikhat & Fazil, 2022) , compound like methylglyoxal (methylglyoxal) and leptosperin (Wang et al., 2024)	Own activity strong antimicrobial and can hinder growth various type bacteria and fungi (Oppenheim et al., 2020)

Activity Antioxidant

Activity antioxidant refers to ability something substance For protect cells body from damage caused by radicals free or oxidative (Valko et al., 2007) . Of the 40 articles , there are 3 articles that state that Manuka honey has Effectiveness honey as therapy antimicrobial to resistant infection against antibiotics, yes protect cell from damage oxidative and protective cells body from damage consequence radical free . There are 3 articles that state that honey dorsata own potency in reduce inflammation , increase inner SOD activity body , have content antioxidants that can help oppose stress oxidative and soothing production species oxygen excessive reactivity (ROS) . For more he explained can seen in table 4.

Table 4: Characteristics of Dorsata Honey and Differences With Manuka Honey based on Activity Antioxidant

Manuka Honey	Dorsata Honey
Effectiveness honey as therapy antimicrobial to resistant infection against antibiotics (Nolan et al., 2020)	Own potency in reduce inflammation , which is response important in system immune (Mcloone et al., 2016)
Contain compound phenolics and enzymes antioxidants that can protect cell from damage oxidative (Nikhat & Fazil, 2022)	Can increase inner SOD activity body , which can help protect cells from damage oxidative (Safitri et al., 2023)
Compound phenolics and flavonoids have ability antioxidants that can help protect cells body from damage consequence radical free (Suhana et al., 2023)	Own content antioxidants that can help oppose stress oxidative and soothing production species oxygen excessive reactivity (ROS). (Luqman & Ananda, 2022)

Effect Anti-inflammatory

Effect anti-inflammatory refers to ability something substance For reduce or hinder inflammation in body (Ricciotti & Fitzgerald, 2011) .

Table 5: Characteristics of Dorsata Honey and Their Differences With Manuka Medical Honey based on Effect Anti-inflammatory

Manuka Honey	Dorsata Honey
Can reduce inflammation , which is response important in system immune (Kumar et al., 2020)	Can reduce inflammation (Endang et al., 2023) .
Manuka Medical Honey has potency in reduce inflammation , which is response important in system immune (Johnston et al., 2018)	Own effect healing wounds , antimicrobial , antioxidant , antidiabetic , and anticancer (Khan et al., 2017)
Can reduce contributing inflammation to diseases and disorders immune (Nikhat & Fazil, 2022)	Can beneficial in treatment , pregnancy compound polyphenols that can own effect anti-inflammatory (Safitri et al., 2023)
Compound phenolics and flavonoids in Manuka honey has characteristic anti-inflammatory that can help reduce inflammation in body (Suhana et al., 2023)	Apis Dorsata Bee Venom (ADBV) is capable reduce arthritis -like symptoms swelling joints and restrictions movement joints (Nipate et al., 2015)

Of the 20 articles analysed, 4 articles stated that Manuka Honey can reduce inflammation and 4 articles stated that Dorsata Honey can reduce inflammation, has wound healing effects and has anti-inflammatory effects.

The Potential Of Dorsata Honey In Boosting The Immune System

Dorsata honey has a complex content, including water, minerals, carbohydrates in the form of sugars, organic acids, vitamins, enzymes, and bioactive compounds. These contents provide high health benefits for humans. In the context of climate change that can affect human health, consumption of good quality dorsata honey can help increase the body's resilience in the face of climate change impacts (Hidayatullah et al., 2022).

Erwan (2022), tested the antibacterial and antioxidant activities of Trigona sp honey cultivated in North Lombok Regency, NTB, as well as honey from Apis cerana and Apis dorsata species as a comparison. The results showed that the three types of honey had antibacterial activity by forming various zones of inhibition against S. aureus, S. typhi, and E. coli bacteria. The honey also has high antioxidant levels that can improve health and immunity during the Covid-19 pandemic (Erwan et al., 2022).

Wibowo (2022), in his research, found that the people of Cikijing Village, Majalengka Regency, who cultivate and process dorsata honey bees as biopharmaceutical products, especially honey, have benefits in improving health and the immune system. The honey can be utilised by many people and can be marketed to various regions (WIBOWO et al., 2022). Giving wild honey with a concentration of 50% (v/v) for 10 days can be an effective therapy for ovarian failure caused by malnutrition in female rat models. Forest honey administration in the treatment group caused an increase in SOD levels, a decrease in MDA levels, an increase in the expression of anti-inflammatory cytokine IL-13, and a decrease in the expression of pro-inflammatory cytokine TNF-α compared to the control group (Safitri et al., 2023).

This study was conducted on rats (Rattus norvegicus) that experienced physical stress due to the forced swimming test as a model of physical stress. the results showed a positive effect of honey supplementation on rat liver. The expression of HIF-1α and TNF-α genes, which are associated with responses to hypoxic conditions (lack of oxygen) and inflammation, showed a decrease after honey supplementation (Plumeriastuti et al., 2023).

Comparison of Effectiveness on Immune System

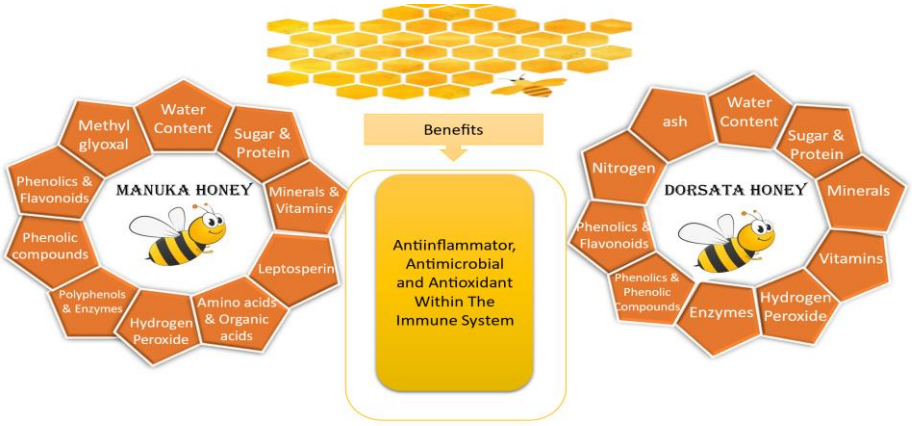
Based on the moisture content of the two types of honey, Dorsata honey has a higher moisture content than Manuka honey. The moisture content in honey can affect the quality and durability of the honey itself. Honey with high moisture content tends to oxidise more easily and can be a good place for microorganisms to grow. High moisture content can also affect the stability and nutrient content of the honey. Conversely, honey with low moisture content tends to have better quality and can have a longer shelf life.

Alvarez (2013), in his research focused on the antioxidant and antimicrobial activities of Manuka honey, as well as its ability to stimulate the immune system. The contribution of vitamins in Manuka honey to the immune system is not as great as the contribution of other bioactive compounds (Alvarez-suarez et al., 2013a). Another study mentioned that the essential oils of kanuka (Kunzea ericoides) and manuka (Leptospermum scoparium) tea trees have strong antimicrobial properties. These essential oils have been shown to be effective against the growth of various bacteria and fungi that can potentially affect the immune system (Chen et al., 2016).

Dorsata honey has also been shown to have impressive effectiveness in supporting the human immune system based on its rich content of essential nutrients. Its vitamins and minerals, such as vitamin C, vitamin B complex, and selenium, play a vital role in enhancing the body's immune response (Mustafa et al., 2022). The natural sugars found in honey, specifically glucose and fructose, provide the energy source needed for immune system cells to function optimally (Burgett, 2020). Enzymes such as glucose oxidase and catalase are present in dorsata honey to support metabolic processes and strengthen the body's defence against pathogens. Phenolic compounds, including flavonoids and phenolics, exhibit strong antioxidant activity, protecting body cells from damage caused by free radicals as well as helping to reduce inflammation (Semuel & Mege, 2020). The presence of 5-hydroxymethylfurfural (HMF) has also been linked to antioxidant and anti-inflammatory activities in honey (Fitriana et al., 2023).

DISCUSSION

The moisture content in both types of honey, Dorsata honey has a higher moisture content compared to Manuka honey. The moisture content in honey can affect the quality and durability of the honey itself. Honey with high moisture content tends to oxidise more easily and can be a good place for microorganisms to grow. High moisture content can also affect the stability and nutrient content of the honey. Conversely, honey with low moisture content tends to have better quality and can have a longer shelf life (Singh & Singh, 2019).



Honey contains phenolic compounds and flavonoids that play a role in fighting inflammation (Ranneh et al., 2021). Honey contains fructose, glucose, and sucrose, as well as several other nutrients such as riboflavin, niacin, pantothenic acid, pyridoxine, folate, and vitamin C. It also contains minerals, proteins, flavonoids (such as apigenin, pinocembrin, pinocembrin, and vitamin C). In addition, honey contains minerals, proteins, flavonoids (such as apigenin, pinocembrin, kaempferol, quercetin, galangin, chrysin, and hesperetin), enzymes (such as catalase, superoxide dismutase, glutathione), and phenolic acids (such as ellagic, caffeic, p-coumaric, and ferulic acids) (Kutry & Kutry, 2020).

Both manuka honey and dorsata honey contain sugars including fructose, glucose, sucrose, maltose, and protein. Some studies show that the mineral content is more in dorsata honey including essential and non-essential minerals such as Al (Aluminium), Cr (Chromium), Ni (Nickel), V (Vanadium), Co (Cobalt), Ca (Calcium), Mg (Magnesium), K (Potassium), Na (Sodium), Zn (Zinc), Fe (Iron), Mn (Manganese) (Ansyarif & Sari, 2018), (Yumni et al., 2023) compared to manuka honey, 2023) compared to manuka honey which includes iron (Fe), manganese (Mn), and zinc (Zn) (Deng et al., 2018).

Both types of honey contain vitamins, amino acids, and enzymes. However, both of them have small vitamin content. Manuka honey is not known for its vitamin content (Alvarez-suarez et al., 2013a). Instead, Manuka honey is best known for its bioactive compounds, especially methylglyoxal, which provides strong antimicrobial and anti-inflammatory properties (Alvarez-suarez et al., 2013a).

Phenolic compounds in Manuka honey consisted of p-hydroxybenzoic acid, chlorogenic acid, p-cumaric acid (Deng et al., 2018), p-hydroxybenzoic acid, chlorogenic acid, and p-cumaric acid (Deng et al., 2018) and Dorsata honey had a phenolic content of 7.51 mg GAE/g. Likewise, Flavonoids were present in Manuka and

Dorsata honey. Although the specific levels are not described in this context. This study provides a deeper understanding of the composition of phenolic compounds in both types of honey that may provide significant health benefits.

Hydrogen Peroxide (Mccarthy et al., 2019), Leptosperi are present in Manuka honey (Wang et al., 2024) and in some articles not found in Dorsata honey. Hydrogen peroxide is a chemical compound consisting of two hydrogen atoms and two oxygen atoms (H2O2). This compound is known to have strong antimicrobial properties, which means it is capable of killing various types of microorganisms such as bacteria, viruses and fungi. In the context of the immune system, hydrogen peroxide can provide benefits by helping to fight infections and maintain overall health (Mccarthy et al., 2019). When the body is exposed to pathogens, hydrogen peroxide production increases as part of the immune response. This compound also plays an important role in the wound healing process and recovery after injury (Mccarthy et al., 2019).

Leptosperin is a compound found primarily in Manuka honey, which is derived from the flower nectar of the Manuka plant (Leptospermum scoparium). This compound has an important role in providing health benefits, especially in the context of the immune system. Leptosperin has been associated with antimicrobial, anti-inflammatory, and antioxidant properties. In the immune system, leptosperin may help fight bacterial, viral, and fungal infections, as well as reduce inflammation associated with various disease conditions. In addition, its antioxidant properties can help protect body cells from oxidative damage caused by free radicals (Lin et al., 2009).

Dorsata honey contains about 0.2% ash (Ansyarif & Sari, 2018), (Minh et al., 2017) and up to three times more nitrogen in Dorsata honey (Minh et al., 2017). This indicates that the honey contains minerals that can be found in ash. Ash content is often measured to determine the amount of non-organic minerals in a substance, including in honey. This mineral content can come from nectar sources and the environment in which bees collect it. These minerals are important for human nutrition as they play a role in many biological processes, including bone formation and muscle function (H et al., 2022).

Methylglyoxal (MGO) is the main component in Manuka honey that has antibacterial activity (Wang et al., 2024), (Mccarthy et al., 2019). Manuka honey is famous for its bioactive compound methylglyoxal. This compound is known to have strong antimicrobial activity, which plays a role in Manuka honey's ability to fight bacteria, fungi, and other microorganisms. MGO is produced from the degradation of glucose in Manuka honey, and its concentration is considered an indicator of the quality of Manuka honey. The benefits of MGO to the immune system lie in its ability to fight pathogens and strengthen the body's defences.

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