

BAB I

PENDAHULUAN

1.1 Latar Belakang

Acne vulgaris is a common skin condition that effects many people (Tan et al., 2018). It is caused by the inflammation of pilosebaceous units, which includes the hair follicle, sebaceous gland, hair shaft, and erector pili muscle (Hoover et al., 2020). This mainly occurs in the head and upper trunk of the hair follicle because of the higher activity of the sebaceous gland in these areas (Fox et al., 2016). The main process of acne formation: follicular keratinization, increased sebum production, blockage of the sebaceous gland, colonization by *Propionibacterium* acne, and the inflammatory response of the body (Tan et al., 2018). Innate and environmental factors can influence the prevalence of acne vulgaris as well as it's severity (Masterson, 2018).

Acne vulgaris has a lifetime prevalence of 85%. Although Acne vulgaris is more common in adolescence, many still experience it in adulthood (Tan et al., 2018). Women aged 20-29 have a prevalence rate of over 50%, and women aged 40-49 have a prevalence rate of 25% (Tan et al., 2018). Acne vulgaris can cause emotional and psychological distress which can lead to depression and anxiety. One study showed that 8.8% of people with acne suffer from depression; additionally, females were twice as likely as males to have depression if they had acne (Tan et al., 2018).

Acne vulgaris is often treated with benzoyl peroxide, retinoids, and antibiotics which include clindamycin, minocycline, doxycycline, erythromycin, and azithromycin (Rathi, 2011). Frequent usage of antibiotics can lead to drug resistance; therefore, an antibacterial substitute should be researched to reduce the usage of antibiotics in treating acne. One of the plants which have be shown to have antibacterial properties is white turmeric (Rathi, 2011). *Curcuma zedoria* was choosen because it is relatively inexpensive to grow and can grow in many places in Indonesia. It is also widely used in "folk medicine" in Indonesia which makes it more accepted as a source of medication (Chiuman and Ginting, 2019). A study on the antimicrobial activity of

curcuma zedoria towards *Bacillus subtilis*, *Staphylococcus aureus*, *Micrococcus luteus*, *Escherichia coli*, *Proteus mirabilis*, and *Klebsiella pneumoniae* was conducted (Wilson et al., 2005). The extract was extracted using the Soxhlet extraction method (petroleum ether (60–80 °C), nhexane, chloroform, acetone, ethanol and water), and then it's minimum inhibitory concentration was tested (Wilson et al., 2005). The extract had antibacterial effects towards all the bacteria except *Escherichia coli* and *Staphylococcus aureus*. (Wilson et al., 2005)

Another study which extracted essential oils of curcuma zedoria was conducted to determine the antibacterial activity of the oil towards *S. aureus*, *B. cereus*, *E. coli*, *P. aeruginosa*, *V. parahaemolyticus* and *S. typhimurium* (Lai et al., 2004). The colony forming unit of the petri dish with the essential oil was compared with the control (the same medium without the bacteria) (Lai et al., 2004). The essential oil was extracted using steam distillation and solvent extraction (n-pentane and diethyl ether). The result showed inhibitory effects. *Parahaemolyticus* was the most effected followed by *S. aureus*, *B. cereus*, *S. typhimurium* and *P. aeruginosa*. (Lai et al., 2004). Curcuma zedoria contains a bioactive compound, curcumin, which has “antioxidant, anti-inflammatory, antimutagenic, antimicrobial, and anticancer properties” (Hewlings and Kalman, 2017). Curcumin was selected as the compound to be isolated because it is the main component of the antibacterial activities of curcuma zedoria; thus, the most relevant (Chiuman and Ginting, 2019). Curcumin's antibacterial and anti-inflammatory properties might be useful in the treatment of *acne vulgaris* (Hewlings and Kalman, 2017).

Extracts from plants can be made using a variety of methods, this includes fractionation. This study will be performed by comparing extracts which were extracted using fractionation (n-hexane, ethyl acetate, and ethanol) and deep eutectic solvents; the methods are described in methodology. Deep Eutectic solvents (DES) is mixture of an acid and base or two (or more) solids which are formed by hydrogen bonds and have a lower melting point than each of the components have separately (Zainal-Abidin et al., 2017). DES can be considered analogous with ionic liquids; however, DES is less toxic to the human body and causes less harm to the environment.

It is a “green” solvent which is relatively “non-flammable, recyclable, and non-volatile”; additionally it also has a low vapor pressure and a high boiling point (Zainal-Abidin et al., 2017).

1.2 Rumusan Masalah

How effective is DES extract compared to conventional crude extract of white turmeric at the growth inhibition of bacteria found in acne vulgaris

1.3 Hipotesa Penelitian

Ha : DES extracted white turmeric is effective at inhibiting the growth of bacteria found in acne vulgaris.

Ho : DES extracted white turmeric is not effective at inhibiting the growth of bacteria found in acne vulgaris

1.4 Tujuan Penelitian

1.4.1 Tujuan Penelitian Umum

To evaluate the antibacterial properties of DES extracted white turmeric towards bacteria found in acne vulgaris.

1.4.2 Tujuan Penelitian Khusus

1. To know the phytochemistry of white turmeric
2. To know how effective white turmeric is inhibiting the growth of staphylococcus epidermis, Propionibacterium acnes, and Staphylococcus aureus.

1.5 Manfaat Penelitian

1.5.1 Manfaat Teoritis

1. To understand the inhibitory effect of white turmeric on the growth of staphylococcus epidermis, Propionibacterium acnes, and Staphylococcus aureus.

1.5.2 Manfaat Praktisi

1. Providing an alternative to antibiotics used for acne vulgaris
2. To understand the optimal method of extracting the bioactive compound, especially curcumin so that it can be commercialized.