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Review

Jamu: Indonesian traditional herbal medicine towards rational phytopharmacological use

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ABSTRACT

Jamu is the Indonesian traditional herbal medicine that has been practised for many centuries in the Indonesian community to maintain good health and to treat diseases. Although modern (conventional) medicine is becoming increasingly important in Indonesia, *jamu* is still very popular in rural as well as in urban areas. Based on its traditional use *jamu* is being developed into a rational form of therapy, by herbal practitioners and in the form of phytopharmaceuticals. *Jamu* has acquired a potential benefit, both economically and clinically. We surveyed the most frequently used plants in *jamu* that have also been investigated regarding their constituents and pharmacological effects. The Indonesian government has divided the preparation of medicinal plants into three categories, i.e. *jamu*, standardized herbal medicines and *fitofarmaka* (phytomedicines). As the biological activity ascribed to *jamu* is largely based on empirical data, more research is needed to scientifically prove efficacy and to assure safety. In the further development of *jamu*, ethical issues such as intellectual property rights, benefit sharing, biodiversity and conservation need to be considered. This paper aims to review the current status of *jamu* and to give comprehensive views that can be used in its future development for the further improvement of its utility in curing illnesses and maintaining good health.

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1. Introduction

Next to the Amazon rain forests, Indonesia has the second biggest biodiversity in the world expressed by a high number of indigenous medicinal plants. Based on this rich source of medicinal plants, most of the Indonesian people especially in rural areas use traditional herbal medicines known as *jamu* to treat disease. *Jamu* is a word in Javanese tribal language, meaning the traditional medicine from plants. Minerals, animals and parts thereof have also been used but are not the subject of this review. Today, *jamu* has been adopted into Bahasa Indonesia with the similar meaning (Riswan and Roemantyo, 2002). *Jamu gendong* is a kind of traditional *jamu* sold without a label and freshly prepared (not preserved) from plant material in *warung*, the ubiquitous stalls along the streets in Indonesia (Limyati and Juniar, 1998; Suharmiati, 2003). *Jamu gendong* is instantly served to whom orders this *jamu* requested preparation. The sellers bring the *jamu* from door to door. The word *gendong* itself means to carry something on the back of a body. The fresh *jamu* is put inside the bottles and stored in bamboo or rattan baskets and they use a long wide shawl called *selendang* for carrying the baskets on their back (Riswan and Roemantyo, 2002). Nowadays the production of *jamu* is also being developed on an industrial scale. The Indonesian government, industry and academia all recognize that to further the development of *jamu*, extensive research is required to establish the safety and efficacy of the many traditional *jamu* preparations.

This paper reviews the use of Indonesian medicinal plants used in *jamu* medicine including its history, current status, economic potential and scientific development plus possible future developments.

2. Methodology

Both online and offline literature searches were carried out to compile this review. PubMed (Medline), Highwire and ISI Web of Science were used to retrieve any online publications using the following search terms: Indonesia, medicinal plants, ethnopharmacology, *jamu*, phytomedicine, specific plant species, herbal medicines, natural product medicines, phytochemistry, pharmacognosy. Local library searches looking at the *Medicinal Herbs Index in Indonesia* (Anonymous, 1995) were also carried out by Indonesian researchers able to read old Java language in the cities of Bandung (the capital of West-Java province) and Yogyakarta (an old cultural city in central Java). About 5000 species of medicinal plants were retrieved from the *Medicinal Herbs Index in Indonesia* and the plants that are most frequently used as constituents of *jamu* are discussed in this paper.

3. Indonesian medicinal plants

3.1. Biodiversity

Biodiversity is defined as the variety of all life forms on earth, along with the interactions between them and their physical environment. As an archipelagic state with thousands of islands, Indonesia is endowed with a rich and unique biodiversity. The area of Indonesian tropical forests covers about 143 million hectares and is home to about 80% of the world's medicinal plants. It is estimated that the Indonesian tropical forests contain 28,000 plant species. There are various reports concerning the inventory of higher plants in Indonesia. The

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