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Knowledge and Risk Perceptions of Traditional Jamu Medicine among Urban Consumers

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Author's contribution

Author MCT designed the study, performed the data analysis and wrote the manuscript. I read and approved the final manuscript.

Research Article

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ABSTRACT

Aims: Although the increasing importance of traditional medicinal system (*jamu*) in Indonesia, there are no studies regarding the perceptions of the clients with respect to the risk of consuming *jamu* products. The paper addresses this gap by examining the perceptions of *jamu* and risk of consuming traditional medicine among the consumers of the city of Yogyakarta, Indonesia.
Methodology: Sixty interviews took place in the city of Yogyakarta between June and July 2010. Thirty people interviewed were clients of *jamu* sellers who have been selected in the streets and in the local markets where *jamu* products are sold. The sample has been chosen on the basis of parameters such as age, gender and socio-economic background. The software QSR NUDIST was employed to analyze the data.
Results: This study shows two thirds of local *jamu* consumers in Yogyakarta have a good understanding about the therapeutic uses of *jamu*. Results indicated that treatment is sought by all ages and across different levels of education and socio-economic background. Although the interviewees are aware of some possible risks involved in the consumption of *jamu*, data show that the attitudes and perceptions on *jamu* of the participants are generally positive among all age groups and social groups.
Conclusion: Considering the increasing popularity of traditional medicine in Indonesia, an improved understanding of the perceptions and attitudes towards *jamu* and its consumption is important.

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Keywords: Jamu; traditional medicine; risk perception; local consumers; java; Indonesia.

1. INTRODUCTION

The term traditional medicine is used to explain the traditional medical practice that has been in existence even before the advent of modern medicine. It is still widely accepted and used in prevention and treatment of physical and mental disorders. Due to its intrinsic qualities, unique and holistic approaches as well as its accessibility and affordability, it continues to be the best alternative care available for the majority of the global population [1, 2].

Experience from many countries such as those in South East Asia suggests that integration of traditional and modern health care systems can solve much of the problems by providing basic health care services for the people in developing countries particularly the underserved majority [3]. In these countries, both systems are equally developed and supplement each other in the endeavour of achieving optimal health care coverage [4]. Many of the traditionally used medicinal plants contain pharmacologically active compounds and are used in the preparation of both countries [5,6].

Jamu is the Indonesian traditional herbal medicine that has been practiced for many centuries in the Indonesian community to maintain good health and to treat diseases. Although western medicine is becoming increasingly important in Indonesia, *jamu* is still very popular in rural as well as in urban areas. Around 75% of the 200 million Indonesians consume various types of *jamu* products on a regular basis to prevent or treat diseases [7]. *Jamu* has acquired a potential benefit, both economically and clinically [8, 9]. Despite the increasing importance of traditional *jamu* system in Indonesia, there are no studies regarding the perceptions of the clients with respect to the risk of consuming *jamu* products. This paper wants to address this shortcoming by analyzing this issue among *jamu* consumers in the city of Yogyakarta, Java, Indonesia.

The study is divided in two sections. Firstly, the paper will discuss the literature on traditional *jamu* medicine and risk perception by emphasizing the existing gaps; secondly, the paper will examine the perceptions of *jamu* and risk of consuming traditional medicine among the consumers of the city of Yogyakarta, Indonesia.

1.1 Traditional Jamu Medicine: Definitions, Knowledge and Risks

The World Health Organisation (WHO) defines traditional medicine (TM) as the sum of knowledge, skills and practices based on the theories, beliefs and experiences of different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illnesses [10].

Traditional medicine is increasingly popular for treating many different problems, while the amount of information on traditional use in adults is substantial and indicates that between 33% and 50% of the general population have tried at least one form of traditional medicine [11]. Most people who use traditional medicine consider these kind of therapies to be ‘‘natural’’ and thus ‘‘safe’’; instead, many of these therapies, like other medical treatments, have the potential to be directly or indirectly harmful [12,13,14], even if the true incidence of complementary medicine-induced adverse effects is unknown.

Toxic effects, allergic reactions, lack of quality control, contaminations, interactions with concomitant medications are to be considered direct effects, while missed diagnoses, disregarding contraindications, delaying more effective treatments, discontinuation of prescribed drugs and self-medications are indirect effects [15,16]. These direct and indirect effects often derive from a lack of appropriate regulations in this field regarding either the providers or the products themselves (quality, purity, dosage), leading to an uncorrected and uncontrolled use of these remedies [17]. The majority of traditional medicine remedies are still not regulated by statute and providers are not necessarily medically qualified practitioners. Therefore, users could not be informed in a reliable way about composition, instructions for use, storage and side-effects.

In particular, phytomedicines have the potential to elicit the same types of adverse reactions as synthetic drugs, since they consist of whole extracts or more commonly of defined parts of the plants (root, rhizome, leaf, flower-head) that contain numerous active molecules [18]. Moreover, in most countries herbs are sold as unlicensed food supplements or available to consumers as over-the-counter items in various preparations not regulated by the Federal Drug Administration with the same scrutiny as conventional drugs, with risks of contamination or adulteration with poisonous metals, nondeclared herbs or conventional medicines. In a review by [19], an analysis of the published data revealed that many reports of herb-induced interactions lack crucial documentation on temporal relations and on a positive identification of the herbs involved. Moreover, labelling of herbal products may not accurately reflect their contents: the addition of pharmaceutical drugs such as paracetamol, indomethacin, prednisolone and caffeine to herbal products is a particular problem with Chinese medicines [20] and heavy-metal contamination is common in Asian herbal products [21].

Indonesia traditional herbal medicines is called “jamu” [22], a tradition claimed to have originated in the Medang or Mataram Kingdom, a Hindu-Buddhist kingdom that flourished between the 8th and 10th centuries CE and was based in Central Java, and later in East Java. Although heavily influenced by Indian Ayurveda the vast Indonesian archipelago makes both its practices and plants variable. Each of the more than 300 major ethnic groups of Indonesia has its own repertoire of traditional recipes, ingredients and methods of use for these varied herbal preparations, which are mixed together as needed by a member of the family or a dukun (traditional healer) however it is generally prepared and prescribed by women who sell it on the streets. It is largely ‘live knowledge’ in the sense that it is orally transmitted although there are some texts which have been written [23]. It is widely popular among both urban and rural people. With increasing popular demand for medicinal plants, both in Asia and internationally, this trade grew to 7.2 trillion Rupiah (US$786 million) in year 2010 in Indonesia [24].

The traditional pharmacopeia (*jamu*) in Indonesia, Java, includes a huge range of herbal preparations. *Jamu* may be obtained at kiosks and shops throughout Yogyakarta in the form of a commercially prepared packet designed to make a single glass of medicine. More traditional forms of *jamu* can also be purchased from herbalists in Javanese markets, in the form of leaves and roots that are boiled in a litre or so of water, strained, and drunk over a period of a few days. *Jamu* is also sold by ambulant sellers (*jamu gendong*) that normally produce *jamu* from fresh ingredients[1] (mainly fresh leaves, roots, fruits and rhizomes) and sell their products on the streets or in the city markets.

[1] The main product of *jamu gendong* consists of some popular *jamu* such as *kunir asen* (mixture between *Curcuma domestica* rhizomes and Tamarind fruits), *beras kencur* (rice powder and *Kaempferia americans* rhizomes), *cabe*

Originally from Yogyakarta and Surakarta regions, jamu gendong is now largely used by Indonesians. The jamu producing industry now has an annual growth of 25-30%. There are about 810 companies active in Indonesian traditional medicine of which 87 are classified as IOT (Industri Obat Tradisional, Traditional Medicine Industry) and 723 as IKOT (Industri Kecil Obat Tradisional, Small Industry of Traditional Medicine). In 2005, 872 companies in this field have been registered at BPOM [17]. Despite the topicality and the relevance of jamu consumption among people living in urban areas, there are no studies that originally from Yogyakarta and Surakarta regions, *jamu gendong* is now largely used by Indonesians. The *jamu* producing industry now has an annual growth of 25-30%. There are about 810 companies active in Indonesian traditional medicine of which 87 are classified as IOT (*Industri Obat Tradisional*, Traditional Medicine Industry) and 723 as IKOT (*Industri Kecil Obat Tradisional*, Small Industry of Traditional Medicine). In 2005, 872 companies in this field have been registered at BPOM [17]. Despite the topicality and the relevance of *jamu* consumption among people living in urban areas, there are no studies that analyze the perceptions and attitudes of *jamu* clients regarding the risk of taking this traditional medicine. The studies which are available regarding the *jamu* system are mainly studies of ethnopharmacology which are based in rather general works that document the use and constituents of plant substances used medicinally [25, 26, 27]. Several of the more comprehensive presentations are at least implicitly ecological in orientation, as they divide attention among the climatologic and human histories of the region and the use not only of medicinal plants but also of flora and fauna in diet, manufacture and other applications [23, 28].

For the greatest part, these ethnobotanical inventories present botanical and pharmacologic data disembodied from their social and cultural contexts; they cannot accommodate theoretical or conceptual issues, and in fact contain little by way of analysis, or even interpretation [29,30]. They lack careful attention to the specific circumstances and contexts in which plant utilization occurs- i.e., data regarding mode of preparation and gathering of medicinal plants. In contrast to general inventories are few studies that attempt more broadly to contextualize features of perceptions about plants and of plant use, pharmacology and socio-cultural aspects of *jamu* [31]. These studies explore both biological and behavioural and cultural parameters to formulate questions within the broad outlines of a human ecology that seeks to understand human-plant interactions in the most comprehensive sense and to assess the impact of such behaviours on health.

The purpose of this study is to investigate attitude and risk perception concerning traditional medicine in Indonesia. This research thus aims to identify facets such as cognitions, feelings and behaviour related to *jamu* consumption and risk perceptions among urban consumers in the city of Yogyakarta. The theoretical framework used for this study was based on the attitudinal psychosocial conceptualization proposed by [32] and presented by [33]. According to these authors, attitudes can be defined as a subjective predisposition to classify and to respond to an object (person, situation, social group, etc.), always including an evaluative dimension. Attitudes are hypothetical constructs, that is, they are inferred and not objectively observed, and are disclosed through three reply categories: affective responses, such as psychological signs and expressions of affection or aversion; cognitive responses, such as the verbalization of representations and beliefs; and behavioural responses, such as an

puyang (*Piper retrofractum* fruits and *Zingiber americans* rhizomes) and *dlingo bengle* (*Acorus calamus* rhizomes and *Zingiber purpureum* rhizomes). The first two ones have sweet taste whilst the others have hot and bitter taste respectively. Sometimes the *jamu* sellers also mix the fresh *jamu* with the products of *jamu* companies which are usually available in sachets and bottles.

individual's conduct and reports of actions. Open qualitative methods for data collection, essentially of a descriptive and interpretative nature, permit an assessment of *jamu* consumers' perceptions. In medical sociology, qualitative methodologies are accepted as important tools to register and analyse subjective attributes of health services [34, 35].

2. MATERIALS AND METHODS

Sixty interviews took place in the city of Yogyakarta between June and July 2010. Thirty people interviewed were clients of *jamu* sellers who have been selected in the streets and in the local markets where *jamu* products are sold. In order to have a diversified sample that reflected different consumers, the sample has been chosen on the basis of parameters such as age, gender and socio-economic background. These parameters have been considered to be relevant as they could influence perceptions and uses of traditional medicine. The study looked at risks representations in a range of adults (age comprised between 25 and 65) with occupations from the primary to third economic sectors. The interviews consisted of open ended questions and wanted to gain insights on knowledge, practice and attitude and towards traditional medicine, motivation and frequency for the consumption of *jamu* and perception of risk of consumption of traditional *jamu*. Some questions aimed to know if the interviewees had some recommendations for promotion and integration of traditional medicine with the conventional system.

The interview objectives and procedures were clarified, and an assurance was given of the ethical principles of inquiry, guaranteeing participants' anonymity and data confidentiality. The interviewees were asked to give their written formed consent to participate in the research.

Interviews lasted from 30 min to 45 h and were tape recorded, while written field notes were made contemporaneously. The recordings were manually transcribed verbatim. The transcriptions were then imported into a computer using software for qualitative coding and analysis. The software QSR NUDIST was employed as a system to organize and retrieve information rather than an analytic tool. Data were submitted to a heuristic process of open coding that produced a multiplicity of primary codes. These were later grouped and indexed by recurrent themes through a reflective procedure and continuous comparative process. This iterative thematic grouping was performed independently of the order in which the questions were placed, assuring a free search into the participants' perceptions and attitudes.

3. RESULTS AND DISCUSSION

3.1 Socio-Economic Characteristics of the Interviewees

The 58% of the interviewees were female. Their educational levels varied from primary education (primary school) to higher education (high school or College and University). None of the participants had a health care occupation. Regarding the total age distribution, of the total number of the interviewees, 15 (25%) were 25-35 years of age, 15 (25%) were 36-45 years of age, 15 (25%) were 46-55 years of age and the remaining 15 (25%) were 56-65 years of age. Illiterates, those who can read and write, and those who have had modern education at elementary or senior high school levels accounted for 47%, 28% and 25%, respectively.

About 79% of the interviewees, especially women were buying *jamu* at least once every 10 days, with 15% of them buying *jamu* every 5-7 days. The majority of them (71%) believed in the importance of consuming natural *jamu* products and traditional medicine for maintaining health. The majority of the interviewees (82%) came from the city, 10% from the urban areas close to Yogyakarta and 8% from other areas of Java. Interviewees with a relatively lower socioeconomic level than their counter-parts in the urban areas, showed a tendency for greater utilization of traditional medicine than the rest of the interviewees. In terms of gender and *jamu* consumption, there was a higher rate of use by women than men for *jamu*: overall, 64% of women had used *jamu* and other Javanese traditional medicine as compared with 36% of men.

3.2 Motivations to Consume Jamu

Regarding the motivation of buying *jamu*, more than 60% of the clients interviewed, especially the young mothers with several children, affirmed that it was better to use traditional *jamu* instead of allopathic medicines for minor health complaints as *jamu* has no side effects and is freshly made so it is richer in active ingredients and thus more effective. Other clients expressed their satisfaction with the traditional *jamu* as they affirmed that the *jamu* sellers were able to customize the *jamu* products and drinks by adding different concentration of active ingredients (more spicy or less spicy etc) according to the taste of the client and also his/her health requirements. As the interviews show, the fact that some *jamu* sellers know the customer preferences and his/her health needs and health history is an aspect which is particularly considered by the consumers when deciding where to buy *jamu*. Two-thirds (forty out of sixty) of the *jamu* consumers, especially the women in their reproductive age and the elderly who are chronically ill, emphasized how this aspect was particular important to them.

Another important motivation given by the clients, especially the older ones (age group between 56-65 years old), was that *jamu* represents a medical Javanese tradition: these clients emphasized how *jamu* is something that pertains to the Javanese culture. This consideration is linked with a sense of pride as a man in his early ’60 affirms: *“In my family we keep on consuming jamu since several generations…I remember when I was a child, I use to go with my grandmother to the market and she used to buy me a glass of jamu…Jamu is part of Javanese culture, we have grown up with jamu….”.*

The motivation to buy *jamu* among the younger age groups (25-35 years old) can be more explained by “social” factors. There is a social framework to usage of *jamu*, particularly recommendations. Users cited recommendations from friends and family as being by far the most important factor in determining their use of *jamu*. Social networks seem to form the main source of information about herbal medicines and *jamu*, and the experiences related by others are trusted a great deal: *“If somebody said ‘Oh it worked for me’, then I think it’s quite important”.* In the present study, two-thirds of the interviewees believe that *jamu* has wide acceptance by their local communities. However, 82% of them affirmed that there is a form of therapeutic syncretism, according to which people easily switch from one time of medicine to the other tended and they also use modern care, if this is easily accessible. The main reason behind the preference of traditional to that of modern medicine was that the former is more efficacious than the later. This finding is in agreement with previous studies [8,21,14].

3.3 Perceptions of Jamu

Immediate associations with *jamu* and herbal medicines included such words as 'safe', 'natural' and 'pure'. It is clear that these expressions themselves express the sense of reassurance and safety of the consumption of *jamu* products expressed by the consumers interviewed, as most of them (45 out of 60) feel that natural products and medicines do not pose any danger. Many interviewees also felt that *jamu* works gently and slowly in comparison with conventional medicines, and that they are less powerful. A number of users also suggested that the long history of human use of *jamu* is evidence of their safety:

"Jamu has been used for many generations and it has been tested on many people in the past… the jamu producers know what is the good way to mix the herbs and the other ingredients in the jamu has they have learnt from their mothers or grand-mothers, so it is something already experimented and proofed…."

"Some people say that it is important to make some laboratory trials for jamu and traditional medicine to see if it is toxic…I know that some plants are toxic but in the case of jamu, the Javanese people have been using the herbs of the jamu for such a long time and it has been proved that it is good for health…"

There was a difference in the way that herbal medicines were perceived by the different genders. Women were more likely than men to associate them both with being healthy (56% v 44%) and natural (58% v 42%). Across the ages, younger people (25-35s) were much less likely than any other age group to think of herbal medicines as alternative (53%). This was also an opinion shared, by people with higher education and higher social class.

There is not a wide perception that *jamu*, as the other herbal medicines could present a large risk. Only a small minority (e.g. 12 out of 60) cited concerns about purity, contamination and interaction with other drugs, and every group was able to identify at least one instance of a risk associated with herbal medicine. There was little concern about the quality or manufacturing procedures involved in producing herbal medicines, except when related to purchasing over the internet. In general, the risks that were mentioned did not shake their overall confidence that herbal medicines are natural and safe. Users did not relate things they had heard about risks to their own use of herbal medicines:

"My mother in law always used to say but I don't know if it's true, that if you combine different plants and roots and if you mix different types of jamu it can make you ill."

Only a small percentage (7%) said that 'it depends on the treatment' when asked to assess the safety of herbal medicines. As we have seen, people tend to be more confident about the risks they face when talking about conventional medicines; however the incidence of 'don't know' answers for herbal medicines is again very high in comparison.

Despite its positive contribution, traditional health care system may also incorporate some harmful practices and beliefs [31, 27, 36]. In the present finding, 67% of the healers employed one or more harmful traditional practices or at least they believe in the importance of such practices. Some of the *jamu* sellers suggested taking pharmaceutical drugs along with their traditional medicaments. This could not only be dangerous health-wise, but it is wastage of resources on the part of the poor patient. The direct consequences of such form of drug use can lead to treatment failure, adverse effects and antibiotic resistance [29, 30]. Worrisome and unpredictable interactions between medicinal herbs and modern drugs may

take place which could increase or decrease the pharmacological or toxicological effect of either or both components [8].

Such practices indicate the possible existence of utilizing traditional medicaments along with pharmaceutical preparations. Therefore, patients need to be advised against taking pharmaceutica. According to Sumono (2002), phenylbuthazone is widely used in Indonesia as analgesic and anti-inflammatory for patients having pain, joint pains and gouts. Problem of the combination of such synthetic drug to *jamu* product can arise in the long term, after a long use of *jamu*. If the dose of *jamu* consumption are higher than they should, after several years negative effects can appear, such as stomach ulcer, hepatitis, nephritis, etc.

There are also some types of *jamu* whose overconsumption can have adverse effects on health. According to some clinical laboratory tests, some types of *jamu* containing high doses of *Ruelia napifera* and *Strobillanthus crispus* can cause renal irritation due to their strong diuretic effect (Surastri et al., 1985). Studies also highlight how attention should be paid on high dose of *Ricinus communis* as laxative and to the fruit of *Piper* species that can cause stomach irritation and diarrhoea. The *jamu* vendors at some *Warung Jamu* at Yogyakarta generally ask to the consumer the manner he wants to drink *jamu*: e.g. mild, warm or hot *jamu*. If a consumer wants to drink a warm *jamu*, they will put in the *jamu* mix a certain amount of Piper and they will add the dose of this fruit for the hot *jamu*. Besides stomach aches and diarrhea, hot *jamu,* containing a high quantity of Piper fruit, can also present some levels of toxicity. It must be noted that according to some Government data, the fruit of *Piper retrofractum* or Javanese pepper has lethal dose and high sign of toxicity when administered subchronically in animals [17].

In the last years there have been several cases of difficulty in the process of birth happened at the Sardijido Hospital at Yogyakarta. The pregnant period was prolonged and after surgical operation, the fetal liquid membranes were greenish. The patients said that they consumed during the 9 months of pregnancy a special *jamu* product namely *jamu* cabe puyang, consisting of *cabe jawa* (fruits of *Piper retrofractum*) and *lempuyang emprit* (rhizomes of *Zingiber Americans*). According to the in situ pharmacological test, the extract of *jamu* product might inhibit uterine contraction due to the action of piperine alkaloid. On the contrary, the effect of *jamu kunir asem* consisting of kunir (rhizomes of *Curcuma domestica*) and asem (fruits of *Tamarindus indica*), it might cause abortion at high dose and it is not recommended to consume it during early period of pregnancy. The active constituents of this *jamu* product have not been clearly determined [17].

3.4 Perceptions of Risk

Many isolated compounds have potent biological activities. Examples are: curcumin (*Curcuma longa*) as anticancer, antihipertensive, antidiabetes and immunostimulating agent; andrographolide (*Andrographis paniculata*) as anticancer, antiviral and cardioprotective agent; 1'acetoxychavicol (*Alpinia galanga*) as anticancer, antimicrobial, antifungal and gastroprotective agent; lignans (*Phyllanthus niruri*) as antiviral and hepatoprotective agent. As the biological activity ascribed to *jamu* is largely based on empirical data, more research is needed to scientifically prove efficacy, safety and quality.

The data show that regarding the socio-economic and education background, the *jamu* consumers with a lower education (primary education and less than high school diploma) and belonging to middle-lower classes were most likely to consider that the benefits of *jamu* outweigh the risks. Many of them (64%) were not aware of possible risks of taking *jamu* and

other traditional remedies. Those aged between 25-35 years old or 60+ were most likely to give a 'don't know' response when asked about the relative risks and benefits of *jamu* and other herbal remedies. A minority of adults overall are unsure of the risks of herbal medicines. When asked about the relative benefits and risks of herbal medicines, the most common response was that people did not know, and when asked how safe they were *'Don't know'* was the second largest response.

There is however a general tendency to believe that herbal medicines and *jamu* are on the whole safe and that they are more beneficial than harmful. Almost two-thirds of the interviewees (i.e., 40) felt that herbal medicines were safe. Furthermore, when asked if they believed *jamu* was safe because it was natural, 70% agreed and only 15% actively disagreed, the remainder being neutral or not expressing an opinion. In terms of people's ability to give advice on safety to a friend or family member who was thinking of taking *jamu*, once again by far the most common response was that people consider *jamu* to be safe and healthy. The interviews show how there is a trend toward greater use of herbal medicines and *jamu* during pregnancy among women with lower education levels: out of the women who completed the secondary school, two third of them declared that they used or would use *jamu* during their pregnancy because of its alleged good results.

The results of this research emphasize that one third of them believed that it was not appropriate to drink *jamu* during the pregnancy. This group of women, especially the older ones in their late thirties/early forties declared that they were not drinking *jamu* during the pregnancy as they believed that traditional herbal medicines could be dangerous to use as it would have created problems during the delivery by reducing the contractions. In this respect, one of the interviewees affirmed: '*I am not taking any jamu when I am pregnant as I have heard that it reduces the contractions during the delivery. A friend of mine drank jamu during the pregnancy. She was feeling very healthy during the pregnancy but she had major problems for the delivery as she had very weak contractions. When the doctor found out that she drank jamu he was very negative about that and he said that she shouldn't have done that as she risked losing her baby….'.* Some of the women interviewed have also highlighted that some types of *jamu* can induce an abortion. This negative perception of certain herbal remedies during pregnancy is also confirmed by other studies [37, 38].

Because of the convenience and availability of such commercial preparations, young women tend to drink infusions from a series of packets over days or weeks when they fear that they are pregnant and wish to terminate the pregnancy. The preparations definitely cause stomach upset, but there is no scientific evidence that they are effective for abortion. Another type of traditional methods to terminate a pregnancy is the insertion of leaves, sticks, or other preparations into the vagina and cervix to induce contractions. Used by traditional healers who attribute specific powers to the objects, these interventions carry serious risks of infection, such as perforation, and bleeding, and have been implicated in cases of sepsis and death.

A woman interviewed shared the experience of her close friend: *'After my friend drunk a concoction that a traditional doctor gave to her, she started having pain in her abdomen. The pain was very intense and she could barely stand it. The traditional doctor gave her a long massage on her abdomen. She started bleeding heavily… the pain increased more and more and her bleeding continued… finally she died..'.* Though reliable evidence does not exist, researchers estimate that about two million induced abortions occur each year in the country and that deaths from unsafe abortion represent 14–16% of all maternal deaths in Southeast Asia [10]. A woman in her late fifties declare that she never used *jamu* to have an

abortion as she affirmed that this could be a dangerous practice: *'Everyone knows how one kind of jamu is used as an abortion inducer. It is sold throughout Indonesia, and it is unsafe. There are many cases to prove that the jamu did not lead to abortion, but caused the child to be born disabled instead. That is why I would never suggest anybody to take jamu to abort'.* Concerning reproductive health, there also been some customers who have affirmed that they found out that in order to avoiding pregnancy women consume "hot *jamu*" containing clove, pepper, cabe *jamu* (*Piper retrofractum*), ginger, tamarind flesh and other substances.

Another controversial use in terms of side effects of *jamu* is the one which is used during the lactation period. From the interviews emerged that the women attribute a positive function to the *jamu* during the time of lactation. There is a common belief that drinking *jamu* will increase the milk supply of the mother and will make the taste of her milk more pleasant for the baby, thus making the process of lactating easier and smoother. However, there are some women who believe that consuming hot types of *jamu* (e.g. the ones containing high quantity of *Piper*) can have side effects for the baby. This is also confirmed by Handayani (2001: 50) who reports that "the child of a lactating mother using *jamu* may suffer from constipation, and his stool may be dark and have a bad odour*"*.

3.5 Jamu Medicine and Western Medicine

A survey of the literature indicates that a number of herbs present in *jamu* have anti-platelet (ginkgo, garlic, ginseng, ginger) and anticoagulant (coumarin-containing herbs like red clover) properties and could potentially interact with nonsteroidal anti-inflammatory drugs with an increased risk of bleeding and prolonged clotting time respectively [39]. Although herb-acetaminophen interactions are not common, the possibility of such interactions has been mentioned as regards ginkgo and supplements containing coumarin derivatives like chamomile and red clover [40]. Moreover, it is reasonable to assume that the combined use of acetaminophen and herbs containing salicylate (meadow-sweet and willow) can result in nephrotoxicity [41]. Interactions may occur at the *jamu* level between opioids and herbal supplements with sedative properties [40].

Many *jamu* consumers interviewed see no problems in taking *jamu* products alongside chemical medicines. Few people, especially the young ones with a high level of education (University or college degree) commented that they were concerned about taking herbal medicines, such as *jamu* at the same time as conventional ones, and some spoke of the greater convenience of being able to use both types. These data are coherent with other researches which emphasize how there was not a clear understanding of negative interrelations for the consumption of chemical and natural drugs [23, 28, 14]. In terms of assistance when herbal medicines cause problems, conventional medicine was again in the forefront of people's minds. Nearly two-thirds (i.e., 42) of the interviewees, especially the younger ones and the ones who were 50+ thought they would see a doctor if they experienced any side-effects and another one in ten would seek hospital treatment. The figure who would seek the advice of a conventional doctor or hospital is as high amongst users as amongst non-users.

3.6 Regulation of the Jamu Sector

Although pharmacological effects of *jamu* constituents have been recorded, there is an apparent lack of records or written data reporting the effectiveness of *jamu,* especially of *jamu gendong*. To assure the proper use of such products, the Indonesian government has

divided the medicinal plants in three categories based on the way they are prepared and based on their efficacy; i.e., *jamu*, standardized herbal medicines and *fitofarmaka* (phytomedicines). All preparations have to meet basic safety criteria [42, 43, 44].

The therapeutic effects of *jamu* have to be supported by empirical data. The efficacy of standardized herbal medicines has to be proved in pre-clinical trials and standardization on active ingredients is required. The Indonesian government has launched the Centre for Development and Application of Traditional Treatment (Sentra P3T) in 1995. The Centre's activities include research, testing, education, training and service of traditional treatment. Other programmes include selecting, testing, certifying, registration/licensing, inventory, screening, clinical testing, utilization and evaluation of traditional medicine, and compilation of laws applicable to traditional treatment. The Indonesian government, through the Ministry of Health, has regulated *jamu* and phytomedicines (*fitofarmaka*). The regulations are aimed to develop herbal medicinal products, to protect the people from unwanted (adverse) effects, and to watch over the quality including efficacy and efficiency. For the production of traditional medicine in Indonesia, the industries have to refer to good manufacturing practice guidelines for traditional medicine, called CPOTB (*Cara Pembuatan Obat Tradisional yang Baik*). CPOTB is regulated by the Ministry of Health. CPOTB includes all aspects of production such as raw material, production process, quality control, factory building, workers, management, instrument, sanitation, etc. CPOTB is also to be applied in the industries to produce standardized herbal medicines and phytomedicine. The traditional medicine industry (IOT and IKOT) as well as the products have to be registered. Using this regulation, the production and distribution of traditional medicine could be controlled to fulfill the requirements according CPOTB. Despite the fact that there is a regulation existing for industrial *jamu*, the traditional *jamu* sold in the streets by local family producers is not currently regulated and pertains to the informal sector.

The majority of the interviews (92%) indicated that the government should support *jamu* and other forms of traditional medicine. Training of *jamu* producers and traditional healers was strongly felt to be important for the improvement of the service and should focus on dosage determination and side effects, while 40% stated hygienic preparation and administration of traditional medical preparations as equally important.

Original *jamu* (*jamu gendong*) exists in the form of a decoction and is sold by ladies carrying *jamu* on their back. *Jamu gendong* is produced by household scale industries in a simple and traditional way. Traditional *jamu* makers also care about hygiene, sanitation and chemical contaminations from biological or non-biological sources. They try to protect raw materials and products from contamination, although this is far from international industrial standards. The way of preparation is often different from producer to producer, and production steps like selection of raw materials, sorting, grating, scraping, crushing, mixing and cooking, followed by boiling of the plant material in a hygienic way can differ significantly. From this background professional training was necessary to introduce certain standards like standardization of the raw materials used in *jamu* according to the *Materia Medika Indonesia* (MMI). *Jamu* makers have to be trained on hygienic production methods and for semi-modern technologies.

One-fourth (i.e.,15) of the interviewees, especially the older clients (age group 56-65 years old) believed that herbal medicines such as industrial *jamu*, were regulated. As one might expect, people who thought herbal medicines were safe were more likely to believe that there was regulation in place to safeguard them. About one-third (i.e., 21) of the consumers affirmed that they prefer consuming industrial *jamu* and not the *jamu* sold by the *jamu* sellers

in the local markets because they estimated that industrial *jamu* was safer as it underwent some controls.

The majority of the consumers (i.e., 45) affirmed that it is important that herbal medicines and *jamu* products are regulated. Almost three-quarters (i.e.,48) believe that *jamu* products should be regulated to the same standard as conventional medicine. As was shown by interviewees' responses to the questions about existing aspects of regulation generally, the majority of them estimated that there was not a wide support for a range of regulatory checks or controls by the Government to assure standards for herbal medicines such as *jamu* products. Furthermore, there were relatively few dissenting voices brought against the suggestion that herbal medicines should be better regulated. In general, people showed a high level of support for checks to ensure the manufacturer had suitable quality control systems and also supported the role of a regulatory body.

Despite these affirmations, in a quite contradictory way, the majority of the consumers, especially the elderly and the middle-aged consumers, affirmed that they did not perceive any risk by consuming *jamu* from the street vendors and did not have any complaints in terms of hygiene or safety issues. As a woman in her late fifties put it: *'I totally trust this jamu seller and she has been producing jamu since many years… she learnt how to produce jamu from her mother and she is an expert in mixing the plants and the roots. I am sure that the jamu she prepares is safer and healthier of any industrial jamu'.* Some interviewees, especially the elderly, affirmed that any clinical trials should be required for *jamu* as, as an old man in his 60's put it: *'we have been drinking and producing jamu since centuries here so we know that the plants used in jamu are perfectly safe and good for health'*. Young people and the interviewees with a higher level of education also felt that regulating *jamu* may not be entirely feasible or necessary for small home-based producers. As an interviewees pointed out: *'However, management of jamu is not only related to health issues. It also concerns other issues, such as trade, human resources and the development of small-scale jamu traders'.*

4. CONCLUSION

The findings of this study show that the knowledge regarding the medical use of *jamu* by the local consumers interviewed in this study is good, although they are not always aware of the risks involved in its consumption. Results indicated that treatment is sought by all age groups and across different levels of education and socio-economic background. Therefore, jamu seems to be popular not only among the aging population of the city but also among the younger generations.

Although the interviewees are aware of some possible risks involved in the consumption of *jamu*, this study shows that consumers' attitudes and perceptions on *jamu* are generally positive among all age groups and social groups. The questions related to efficacy and safety of traditional medicine, *jamu* included, are largely unanswered at present. In particular, there are insufficient data to show that traditional medicine is safe. Nevertheless, *jamu*, especially the traditional one sold informally in the streets, is increasing its popularity in Indonesian cities of Java.

The present study does not pretend to represent the global perceptions about traditional medicine in Yogyakarta. It is therefore strongly recommended to explore the perceptions on *jamu* and on risk of consuming traditional medicine both in the urban and rural areas of Java. An improved understanding of the knowledge, perceptions and attitudes towards *jamu* and

its consumption could provide useful information for health practitioners and policy makers to plan health activities.

The integration of *jamu* with the modern healthcare system could not only adds dimensions to the Indonesia's system of healthcare but also facilitates empowerment of patients by providing them with a choice of healthcare systems and different options for treatments.

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COMPETING INTERESTS

The author declares that no competing interests exist

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