Maldivian traditional medicine: Sarubath

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ABSTRACT

Maldivian traditional medicine has been used since ancient times in the Maldives. The purpose of the medicine use includes to cure the common cold and other ailments. However, no studies to date has been conducted for its safety and quality assessment. The purpose of this study was to assess the quality and safety of the traditional medicine, 'Sarubath'. The analysis carried out include phyiscochemical and microbiological analysis of the traditional products available in the Maldivian traditional pharmacy shops. The results showed that in general the products were within the safe limits stated in the international standards. The mean ash content of the sarubaths was 0.28%, pH was 4.1, moisture content was 82% and managenese was 4.4 mg/kg. Aerobic mesophilic bacteria was present with the average of 1.5 cfu/g with maximum of 6 cfu/g, coliforms were less than one cuf/g and no Salmonella spp. observed.

Keywords: physicochemical, microbiological, ash, heavy metals, aflatoxin, fatty acids, caffeine

1 INTRODUCTION

Traditional medicine is also termed as complementary and alternative medicine [4]. Traditional medicine system include Ayurvedic medicine, traditional Chinese medicine, herbal medicine [1] and Maldives traditional medicine. Some of the traditional Chinese herbs are used as alternative medicine such as Eight Treasure Herbal Tea, Xiyangshen (Radix Panacis Quinquefolii) and Herbal Tea that are consumed as herbal medicine in Malaysia [2].

Globally, traditional medicine has received widespread attentions particularly among developing countries [1]. Majority of herbal medicine are made from the total crude extracts of crude herbs [1]. Herbal medicine is used globally 70% to 80% by primary health workers [3] and in Singapore 89% children are given Chinese herbal medicine in their first 30 months [4].

Popularity in the effectiveness of traditional medicine is wide spreading. For example, traditional Chinese medicine's efficacy are reported to increase [4]. Traditional medicine include crude medicinal materials including animal parts, minerals and plants and final dosage forms such as Chinese proprietary medicine [4].

Many factors are identified that affect the quality of herbal medicine such as substitution, contamination, misidentification, incorrect preparation, incorrect dosage, inappropriate labelling, inappropriate advertising, lack of standardisation and adulteration. Thus, the need arises for global regulations of traditional medicine and some countries already started regulating it, for example, traditional Chinese medicine available in Singapore is regulated [4]. The regulation includes to make it mandatory to have license if traditional medicines are produced and sold, and the product require labelling and the requirement of reducing microbial contamination [4]. Some of the traditional medicine in the Singapore were reported to have excessive toxic heavy metals and undeclared drugs. It should be made a requirement to let public and healthcare professional to inform traditional medicine concept, use and its potential adverse effects [4]. The good manufacturing practice will provide better quality traditional medicines. Also, research, education, reporting usage of traditional medicine, reporting traditional medicine adverse effects, and regulatory control [4].

Maldivian traditional medicine has been used since ancient times in the Maldives. The purpose of the medicine use includes to cure the common cold and other ailments. However, no studies to date has been conducted for its safety and quality assessment.The aim of this study was to assess Maldivian traditional medicines quality in terms of microbiolgoical and physiochemical properties focusing on various Sarubaths used by locals for various ailments.

2 MATERIALS AND METHODS

Various sarubath samples were purchased from the main traditional medicine shops of Male', the capital city of the Maldives. The Sarubaths were coded and packaged in styroform box with ice and sent to accredited laboratory, SGS Sri Lanka Pvt Ltd for analysis.

Srilankan standards and ISO standards were used to analyze microbial and physiochemical analysis of various sarubath samples.

pH was analyzed using LCHE/TM/SOP/015.

Ash content was analyzed using LCHE/TMSOP/052 (Srilankan Standard). **Moisture content** was analyzed using LCHE/TM/SOP/057. **Fatty acids** were analyzed

using ISO 12966-1:2014 and ISO 12966-2:2011. **Manganese** was analyzed using AOAC 985.35:2012.

Microbial analysis

Aerobic plate count (CFU/ml) at 30°C was analysed using ISO 4833-1:2013, coliforms were analyzed (MPN/ml) using ISO 4832:2006 and Salmonella was analyzed using ISO 6579-1:2017.

3 RESULTS

Table 1 shows the descriptive statistics of the Sarubath of Veymui, Annaaru, Arolhi and Inguru. The ash content varied from 0.2 to 0.4% with the mean value of 0.28. The pH of the sarubaths varied from 3.95 to 4.48 with the mean of 4.12. Moisture content varied from 70.2% to 89.1% with the mean value of 82.65. Manganese content varied from 0.44 to 11 mg/kg with the average mean of 4.4 mg/kg. The maximum aerobic mesophilic bacteria was 6 cfu/g with a mean value of 1.5 mg/kg.

Sarubaths contained 0.07% monounsaturated fatty acids, 0.11% polyunsaturated fatty acids, and 0.09% saturated fatty acids. Fatty acids found in the sarubaths include lauric acid (0.03%), myristic (0.005%), palmitic (0.043%), stearic (0.008%), oleic (0.061%), and linoleic (0.08%). Among these fatty acids saturated fatty acids are lauric acid, myristic acid, palmitic acid, stearic acid. Sarubath contained oleic acid (omega 9 fatty acid) as the monounsaturated fatty acid and linoleic acid as polyunsaturated fatty acid.

Sarubath samples had 50% of the pH between 3.95 and 3.96 and the other 50% had pH range of 4.1 to 4.5 (Figure 1).

Table 1. Descriptive statistics of Sarubath (Veymui, Annaaru, Arolhi, and ingur

	Minimum	Maximum	Mean
Ash %	0.20	0.40	0.28±0.09
pH	3.95	4.48	4.12±0.23
Moisture %	70.20	89.10	82.65±7.69
Manganese (mg/kg)	0.44	11.0	4.44±4.36
Aerobic mesophilic bacteria(cfu/g)	0	6	1.5±2.78
lauric acid %	0	0.11	0.03±0.05
myristic acid%	0	0.02	0.005±0.01
palmitic acid%	0	0.01	0.043±0.03
stearic acid%	0	0.03	0.008±0.01
oleic acid%	0	0.15	0.061±0.07
linoleic acid%	0	0.24	0.08±0.10
mono unsaturated fatty acid%	0	0.18	0.07±0.08
polyunsaturated fatty acid%	0	0.25	0.11±0.12
saturated fatty acid%	0	0.20	0.09±0.08

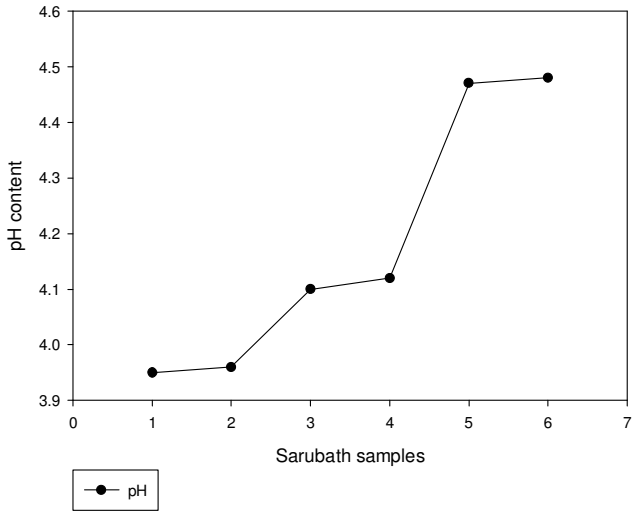

Figure 1. pH content of sarubaths

A 25% sarubaths contained 70.2 to 70.7% moisture and 75% contained moisture between 85 to 89.1% (Figure 3).

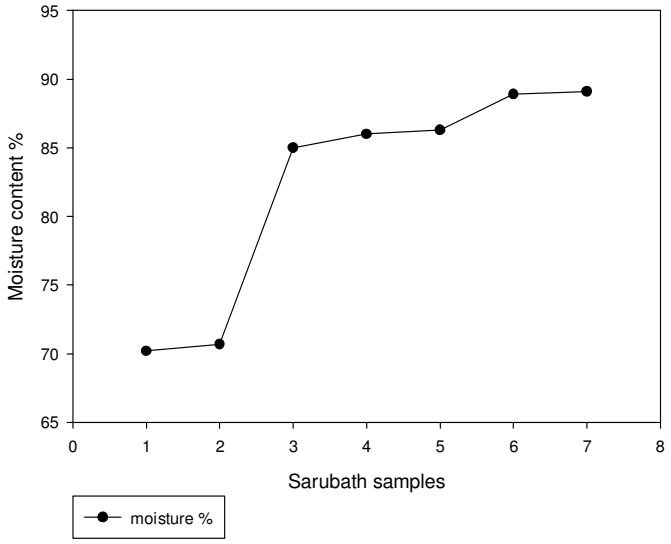

Figure 3. Moisture content of sarubaths

A 25% of Sarubath had manganese content within the range of 0.44 to 0.45 and 75% were between 1 to 11 mg/kg (Figure 2).

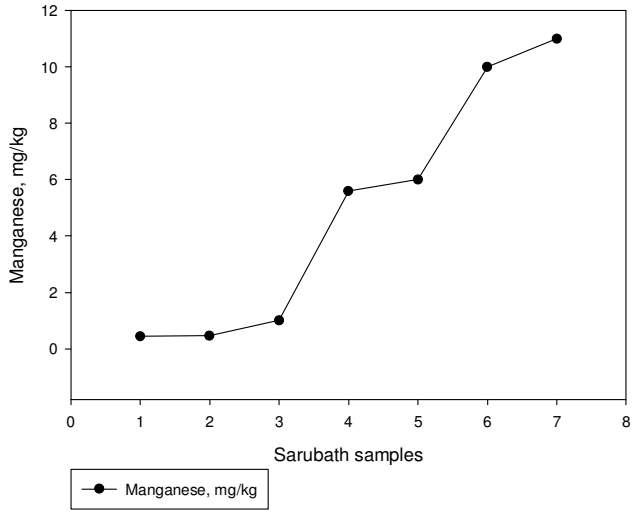

Figure 2. Manganese content of sarubaths

Sarubath contained aerobic mesophilic bacteria less than one cfu/g in 75% of the samples and 6 cfu/g in 25% of the samples. Coliforms found in the sarubaths were less than one cfu/g. Sarbaths did not contain *Salmonella spp*.

Sarubth contained saturated, monounsaturated and polyunsaturated fatty acids.
Lauric acid was not detected in 50% of the samples and the remaining 50% samples contained lauric acid level between 0.1 to 0.11%. Myristic acid was not detected in 75% of the samples and 25% of the samples contained 0.02%. Palmitic acid was not detected in 25% of the samples and 75% of the samples contained between 0.04 to 0.07%. Stearic acid was not detected in 75% of the sarubath samples while 25% contained 0.03% (Figure 4).

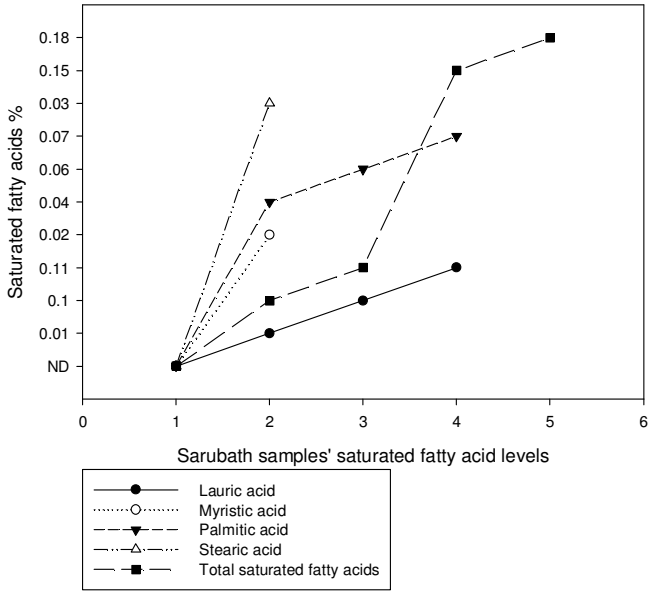

Figure 4. Saturated fatty acids in Sarubaths

Oleic acid was not detected in 50% of the samples while 50% samples contained between 0.1 to 0.15% of oleic acid (Figure 5). Monounsaturated fatty acid was not detected in 50% of sarubath samples while 50% contained 0.1 to 0.18% of MUFA.

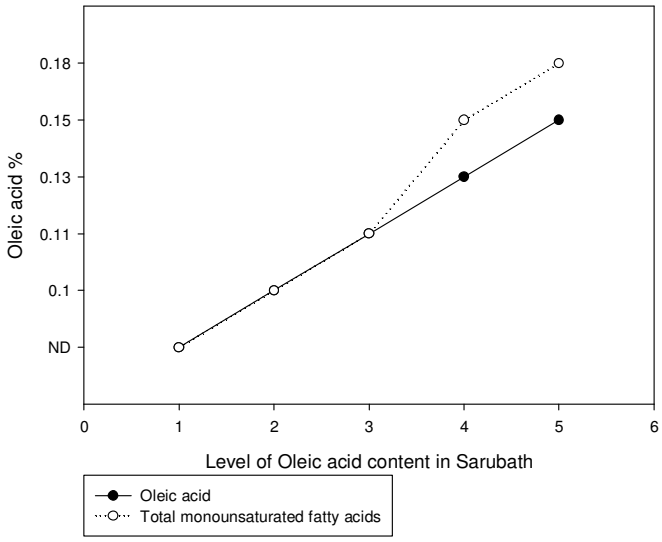

Figure 5. Monounsaturated fatty acids in sarubaths

Linoleic acid was not detected in 50% of the sarubath samples and the other 50% of the samples contained between 0.1 to 0.24% of linoleic acid (Figure 6). Total polyunsaturated fatty acids was not detect in 50% of the

samples and 50% contained between 0.17 to 0.25% of polyunsaturated fatty acids.

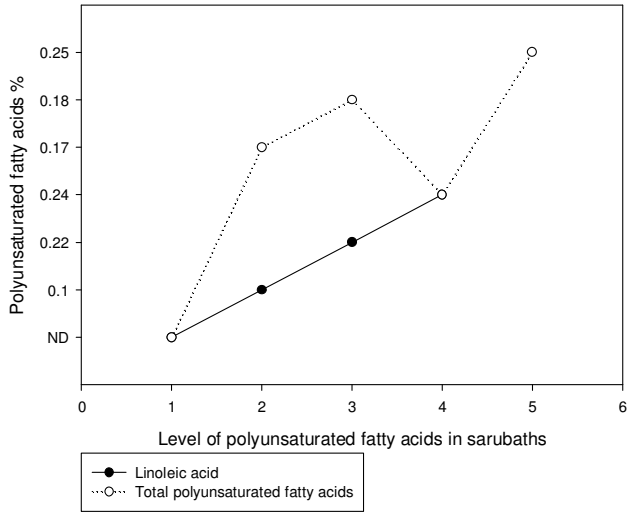

Figure 6. Polyunsaturated fatty acids in Sarubaths

4 DISCUSSION

The quality of herbal products continue to increase as efforts by global authorities strive to improve its quality although the harmonization of the quality assessments are still a challenge, concluded a study that reviewed 5 global authorities and 15 countries' regulations and guidelines on herbal medicine [5].

There are various dosage forms of herbal liquids including fluid extracts and syrups. These syrups are tested for physiochemical properties such as pH and microbial contamination [6]. Similarly this research work analyzed the sarubaths (Veymui, Annaaru, Arolhi and Inguru sarubaths), traditional Maldivian medicine for quality in terms of microbiological and physiochemical properties.

The mean ash content of the sarubaths was 0.28%. The mean pH was 4.1. The average moisture content was 82%. When heavy metals tested only managenese was present with the average of 4.4 mg/kg.

Aerobic mesophilic bacteria was present with the average of 1.5 cfu/g with maximum of 6 cfu/g. Coliforms was less than one cuf/g and no Salmonella spp. Observed. The findings of this study was somewhat similar to a Malaysian study [2] in which Malaysian herbal medicines had microbial level of 6 log10 cfu/mL microbial cells. All the tested samples had heavy metal including Fe, Zn, Cd, Cu and Mn (< 1mg/L) and after boiling only Cu concentration reduced [2]. This study only detected Mn level which was higher than the Malaysian study. The Malaysian study revealed that by boilling microbial load can be reduced but among heavy metals only Cu level reduced [2]. There was no influence between use of single herb and multi-herbs in the herbal preparation in terms of metal contamination and microbial load [2]. Thus, it was concluded that herbal medicine is safe for consumption [2]. Some plants are well known metal accumulators [7] and this include medicinal plants that are used in the herbal medicine [8].

Fatty acids such as short chain fatty acids (SCFAs) are metabolites of gut microbiota and SCFAs role is to maintain hemostatis and help in recovering diseases. Herbal medicine is known to provide SCFAs which modulate gut microbiota composition and thus regulate SCFAs production [1]. Sarubaths of this study contained 0.07% monounsaturated fatty acids, 0.11% polyunsaturated fatty acids, and 0.09% saturated fatty acids. Saturated fatty acids found in this study were lauric acid, myristic acid, palmitic acid, stearic acid. Sarubath contained oleic acid (omega 9 fatty acid) as the monounsaturated fatty acid and linoleic acid as polyunsaturated fatty acid. The SCFAs are metabolites produced by gut microflora using herbal medicines that is taken in by individuals. The gut microbiota and body cells together transfer communications in the body via the metabolites that are produced by medicines. Thus, medicine influence the type of gut microbiota available in the human body [9]. The SCFAs are saturated metabolites that consist of one to six carbons as a back bone and are aliphatic organic acids [9]. High molecular polysaccharides isolated from gut microbiota were found to reduce obesity in mouse. The beneficial metabolites that is produced by gut bacteria possess therapeutic effect of herbal medicines [1]. However, herbal medicine was evidenced to have negative effect on the gut microbiota and increase opportunistic microbes including *Serratia*, *Petococcus*, *Acinetobacter*, *Pseudomonas* and *Stenotrophomonas* [10]. Herbal medicine can have a negative effect on production of SCFAs and it is also dose dependent. For example, less quantity of saponin in the herbal may reduce SCFAs production and high quantity enhance the production [12].

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