

Sources of Microbial Contamination of Local Herbal Medicines Sold on the Open Market in Dar es Salaam, Tanzania.M. JUSTIN-TEMU^{1*}, E.F. LYAMUYA² AND C.K. MAKWAYA³

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Four hundred traditional herbalists operating in an open air market in Ilala, Dar es Salaam, Tanzania were interviewed using a questionnaire to establish the stage at which contamination takes place during the processing of herbal medicine preparations. Among the interviewees, 82.0 % were true traditional medicine herbalists while the rest were vendors. Most of the practitioners had received primary school education while 17.0 % were illiterate. Seventy five percent of the herbalists displayed their medicines along the streets despite being aware of the potential hazards of microbial contamination at such locations. Of the true herbalists, 70 % personally processed the herbal medicines they sold. Most of these herbalists reported using boiled and cooled tap water in the preparation of liquid forms of the medicines. The containers in which the medicines were handled were washed using unboiled tap water and soap. Previous research has shown that the use of tap water in the processing of herbal medicines and exposure in the open market are possible sources of contamination. These results point to the need for educational intervention directed at traditional medicine practitioners to curb microbial contamination of herbal medicines.

Key words: Traditional herbalists, herbal medicine, microbial contamination.

INTRODUCTION

Throughout history, all cultures have employed a variety of plants or plant-derived materials for the prevention and treatment of disease [1]. These herbal medicines have received official recognition worldwide by different health authorities [2-3]. In developing countries, as much as 80 % of the indigenous populations depend on traditional systems of medicine and medicinal plants as their primary source of health care [2, 4]. The World Health Organization (WHO) defines Traditional Medicine (TM) as the total combination of knowledge and practices, whether explicable or not, used in diagnosing, preventing or eliminating physical, mental or social diseases, which may rely exclusively on past experience and observation handed down from generation

to generation verbally or otherwise [5]. This strategy promotes the integration into health systems of traditional medicine practices and medicines for which evidence on safety, efficiency and quality is available and the generation of such evidence when it is lacking.

The Alma-Ata Declaration of 1978, the relevant recommendations of WHO governing bodies and the orientations of the Regional Health-for-All Policy for the 21st Century underscored the importance of TM and its practitioners in primary health care. Despite these policies, only a few countries have developed national policies, legal frameworks and codes of conduct for the practice of TM. The republic of Tanzania, through the Tanzania Food and Drugs Authority (TFDA), is among these few countries. Several countries, including Tanzania,

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have created associations of TM practitioners and developed programmes for the training and continuing education of TM practitioners and assistants.

A previous study conducted in Dar es Salaam found liquid and powdered herbal medicines prepared locally by herbalists to have high levels of bacterial contamination [6]. The large number of isolated microorganisms from the samples could pose a risk of acquisition of pathogenic microbial agents to those taking these herbal mixtures. This observation prompted the authors to conduct this study in order to establish the stage at which contamination takes place during the processing of herbal medicines by traditional herbalists.

METHODOLOGY

The study was conducted at the open market in Ilala District, targeting registered traditional herbalists. Four hundred herbalists were interviewed face to face by trained interviewers using a structured questionnaire. The information collected included level of knowledge on collection, processing, dispensing habits and storage methods of herbal preparations. Data analysis was done using Epi Info computer software (CDC, Atlanta, GA, USA).

RESULTS AND DISCUSSION

Data obtained revealed that 70 % of the interviewees were males with ages ranged between 12 and 89 years (mean 44 years). The duration of traditional medicine practice varied between 1 year and 55 years. It was found that 320 of the practitioners (80.0 %) had received primary school education, two (0.5 %) had received university education, and 78 (19.5 %) were illiterate. One of the two graduates was a pharmacist who has been conducting research on herbal medicines for the treatment of HIV/AIDS.

Of the herbalists interviewed, 74 % carried out their work along city streets due to better business prospects as opposed to operating indoors. This could partly explain the

preponderance of male herbalists. In the Coastal African culture, females are mostly engaged in indoor activities. The majority (98.2 %) worked at the same spot daily.

The interviewees prepared their medicines indoors to reduce contamination by dust. This indicates that most TM herbalists made an effort to practice hygiene during herbal medicine preparation. Thus it is likely that if educational intervention were initiated, it would have an impact in the reduction of contamination of herbal medicine preparations.

Most of the interviewees (82 %) were true traditional herbalists while the rest were just medicine vendors. A high percentage (75 %) collected the herbal medicine from source and personally prepared the formulations as opposed to about 20% who bought and sold ready made medicines. Whereas the former knew the specific disease that could be treated using the various medicines, the latter followed instruction given during the time of purchase and were, therefore, not true herbalists. About 3.8 % declined to respond (table 1).

During the survey, 88 % of the preparations encountered were in liquid form and were prepared using tap water. It was noted that 89.5 % of the herbalists treated the water used by boiling and cooling before use. In a previous study, liquid preparations from herbalists were found to be highly contaminated with *Coliform* bacteria [6]. Another study conducted in the Department of Microbiology of Muhimbili University of Health and Allied Sciences found tap water to be contaminated with *Coliform* bacteria (personal communication) confirming tap water as one source of contamination in herbal medicines.

Table 1: Source of herbal medicines

Source	Number of respondents (%)
Collect and prepare personally	302 (75.5)
Purchase	18 (4.5)
Brought by experts	57 (14.2)
Brought by trainees	8 (2.0)
No response	15 (3.8)
Total	400 (100.0)

The medicine preparations were given to clients for oral use, bathing the affected area, application on affected areas, inserting into affected cavities or inhalation. In case of contamination of a preparation, the probability of infection especially for products used on open wounds and cavities would be very high. Therefore, herbalists need to be educated on good preparation practices and good dispensing practices in order to comply with pharmaceutical practice regulations.

The containers used to prepare and store the medicines were mostly household utensils (table 2). The majority of interviewees washed the containers with tap water and soap followed by drying. To prevent contamination, some herbalists reported tight closure of containers with screw caps while 18 herbalists included unspecified additives in their formulations. Twelve of the 18 believed that the additives would kill microorganisms and prevent contamination.

Table 2: Containers used for preparation and storage of herbal drugs

Item	Preparation	Storage
	Number (%)	Number (%)
Pots	186 (60.0)	-
Pans	306 (86.0)	-
Bottles	194 (44.7)	315 (81.1)
Cans	93 (23.6)	54 (14.0)
Tins	14 (4.8)	-
Others	-	26 (4.0)

Most herbalists displayed their medicines on tables and cupboards/shelves at their working place (table 3). The majority (91.5 %) felt that storage of medicines in a clean environment could avoid dust which could affect the medicines and reduce their shelf life. About 72 % percent were aware that dust was a harmful contaminant of their medicines.

Regarding the age of the medicines on the day of survey, 52.2 % reported that the medicines were prepared within the same week while 11.7 % indicated the medicines had been prepared on the same day. About 49.2 % of the herbalists had

their medicinal preparations displayed for less than one month from the date of preparation.

Table 3: Display of medicines for sale.

Place	Number of respondents (%)
Special cupboard/shelf	127 (31.8)
Table	135 (33.8)
Mat/gunny bag	48 (12.0)
On the ground	20 (5.0)
Others	35 (8.7)
No response	35 (8.7)
Total	400 (100.0)

The herbalists reported that they would identify contaminated medicines by change of appearance and discard them immediately. Most herbalists (60 %) were aware that their medicines were not effective beyond a certain period. This was pegged on the time beyond which there was lack of relief or cure of symptoms. Sixty two percent knew the hazards of expired medicines while (81 %) were aware that when a medicine showed features suggestive of contamination, its efficacy was also destroyed and it was unfit for human consumption.

The quantity of medicine dispensed depended on the disease conditions and age. About 70 % of herbalists dispensed according to age alone while 3.5 % considered both age and body weight. Any contraindications or special instructions for a given medicine, such as the need to avoid milk or alcohol or to take with or without food, were communicated to clients. This is in line with the modern medicine practice. Fifty eight percent of the interviewees educated their clients on the medicines dispensed.

Although the medicines dispensed were not labelled, the herbalists revealed the names and gave verbal instructions on usage. However, good dispensing practices require that the patient receives both written and verbal instructions [7]. Labelling ensures the client will not forget the dose or erroneously take medication meant for someone else. The herbalsists further requested clients to report back on the progress of their

health to monitor the effect of their medicinal preparations.

CONCLUSION

In conclusion, the two most likely sources of contamination of herbal preparations were found

to be the use of untreated water and exposure to the environment including dust and other particulate matter. There is urgent need for practitioners to be educated on the hygienic preparation, storage and dispensing of herbal medicines to prevent microbial contamination.

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