

Short Communication

Evaluation of Knowledge and Practices of Omani population in Sur region about the beneficial uses of frankincense - a commonly used natural plant product

Salwa Al Kitani and Shah Alam Khan*

Department of Pharmacy, Oman Medical College, Muscat, Sultanate of Oman

***Corresponding author**

Shah Alam Khan

Email: shahalamkhan@yahoo.com, sakhan@omc.edu.om

Abstract: Background: Frankincense is one of the most commonly used natural plant product in Sultanate of Oman. It is an oleogum resin produced by *Boswellia sacra*, a tree indigenous to the Dhofar region of Oman. Frankincense, known as Luban in Arabic, is commonly and traditionally used for spiritual as well as for therapeutic purposes since ancient time in Arabian Peninsula. **Objective:** The aim of this study was to assess the knowledge, attitude and practices of general Omani population about beneficial uses of frankincense. **Materials and Methods:** This cross sectional study was conducted during May - August, 2012. A self designed questionnaire containing 12 close ended questions was administered to 100 randomly selected Omani nationals in Sur region. The collected data was analyzed by SPSS ver 13 software. **Results and Discussion:** The survey results indicated that there was no significant difference in the knowledge, attitude and practices regarding beneficial uses of Frankincense between male and female participants. Majority of the participants preferred Omani frankincense and 83.4% of them could recognize at least 1 or more than 1 kind of frankincense. In general, most of the respondents were aware of beneficial therapeutic uses of luban, but three fourth of the participants hardly had an idea that incense is considered as potential chemo preventive agent in modern medicine. Similarly, 38.46% of the participants correctly believed that luban is having anti-inflammatory actions, a fact substantiated by scientific evidences and its commercial availability in the pharmaceutical market. More than half of the study population suggested that luban could be used in cosmetic industry because of its aroma and fragrance. **Conclusion:** The results of this study confirmed that the Frankincense is a very commonly used natural plant product in Oman. Omanis frequently use frankincense to treat common ailments and in religious ceremonies. The general public knowledge about the basic facts of frankincense is excellent but they still need to be educated in the field of the new scientific discoveries as frankincense was once and still considered to be a national treasure.

Keywords: Frankincense, Oilbanum, *Boswellia sacra*, Oleogum resin.

INTRODUCTION

Frankincense or oilbanum is an oleo-gum resin produced by several species of *Boswellia*. 'Fran'-kincense or pure- incense was known to the most of the ancient civilizations who used it in rituals and prayers to the gods. It is used in the traditional medicine in Oman, India and African countries for the treatment of variety of diseases. The oldest written evidence which mentions Frankincense as a drug is papyrus Ebres [1]. The plant is native to India, Arabian Peninsula (Yemen, Sultanate of Oman), Red Sea region of North-East Africa (Somalia, Eritrea) [2,3]. *Boswellia sacra* is a tree indigenous to the Dhofar region and is one of the most famous plant of the Sultanate of Oman. It is also known as Luban, Bakhor or Kendar in Arabic [4]. It is obtained by the incision of the bark of *B. sacra* and other species of *Boswellia* belonging to family Burseraceae. The fresh gum obtained from the tree is hot dry with a pleasant flavor and slightly bitter in taste. When burned, frankincense produces a brilliant flame and produces a pleasant aroma. It was widely used by ancient Egyptians, Greeks and Romans as prized incense, fumigant as well as a multipurpose aromatic. In the past frankincense was used for trading across Asia and Europe. It was the most powerful fuel for the Arab economy as it was once more voluble than gold.

It is reported to contain volatile oils, acid resins and gums. The essential oil contains *E*- β -ocimene and limonene as the major monoterpenes (97.3%), however, *E*- caryophyllene is the main constituent of 2.7% sesquiterpenes. Composition of volatile oil differ from one variety to another, therefore, frankincense can be differentiated and classified into country of origin based on the composition of essential oils. The resin contains a mixture of four pentacyclic triterpene acids: β -boswellic acid (the most abundant), 3-O-acetyl β (ABA), 11-keto- β -boswellic acid, and 3-O-acetyl-11-keto- β -boswellic acid (AKBA), collectively called boswellic acids [5].

The pharmacological activities of Frankincense, as crude extracts, the distilled essential oil and isolated compounds have been thoroughly investigated by the researchers all over the globe in search of potent drug molecule(s). Frankincense essential oil reported to exhibit *in-vitro* antibacterial, antifungal and immunomodulatory activity [6-8]. Boswellic acid and their derivatives were investigated for anti-inflammatory, antileukotriene, anticholinestrase and anticancer activity [9,10].

Traditionally it is reported to be useful in the treatment of bronchitis, asthma, cough, bad throat and various intestinal problems. It acts as both internal and external stimulant, expectorant, diuretic and stomachic. Frankincense forms a huge part of the gulf countries especially Omani history and culture. It is commonly used in almost every house hold in Oman for its fragrance during religious ceremonies, to purify the air, to cleanse drinking water, to cure gum and tooth problems etc.

It is therefore, interesting to measure the Omani public knowledge of this commonly used traditional medicinal substance of commercial and cultural importance.

METHODOLOGY

This cross sectional study was conducted during May - August, 2012 in Sur, Oman to evaluate the public knowledge of and awareness of the benefits and uses of frankincense. A 12 item close ended questionnaire was developed for this study. There was a separate section on demographic characteristics of the participant such as Age, gender, marital status and educational level etc. The designed questionnaire was

validated for content by a faculty member expert in the field of natural products and it was modified as per his suggestions. The objective and protocol of the study were explained to all participants and verbal consent was obtained. It was translated in to Arabic language prior to self administration to 100 randomly selected Omani nationals in Sur region. The collected data was analyzed by SPSS ver 13 software. Chi square test was used for determining significance. P values <0.05 were considered as significant.

RESULTS AND DISCUSSION

A total of 100 questionnaires were distributed to randomly selected Omani nationals who agreed to participate in this pilot study. But only 91 completely filled forms were collected back to give a final response rate of 91%. The socio-demographic characteristics of the respondents are presented in table 1. There were 30 males and 61 female respondents with a mean age of 35.97 ± 13.09 years, (69.23%) were less than 45 years of age. Majority of them (83.51 %) were married, Seventy three (82.22%) had secondary diploma or higher education and 10 (10.91%) had no formal education.

Table 1: Demographic characteristics of the respondents

S. No.	Parameter	Total number (%)
1.	Educational level	
	Uneducated	10 (10.91)
	Primary	8 (8.79)
	Secondary/diploma	49 (53.84)
	Bachelor/higher	24(26.37)
	Gender	
2.	Male	30 (32.97)
	Female	61(67.03)
3.	Age (in years)	
	Less than 29	37 (40.66)
	30-44	26 (28.57)
	45-59	19 (20.88)
	Above 60	9 (9.89)
	Mean age \pm Std Dev (years)	35.97 ± 13.09
4.	Marital stuats	
	Unmarired	15(16.48)
	Married	76 (83.52)

The analysis of the general public knowledge showed that the population is fully aware that frankincense is a plant extract. This is not surprising as Oman is one of the largest producer and supplier of frankincense worldwide. Also it is commonly used in almost every house hold in Oman. Many superior and inferior quality of frankincense are available in Omani market, therefore it is very difficult to recognize and differentiate various species of *Boswellia* unless one has a good knowledge of this natural product. The

results of our study indicate that 57.14 % of the participants recognized 1 to 2 types of frankincense and only 10% could not recognize any variety. It was interesting to note that majority of the respondents (86.81%) preferred the Omani frankincense followed by Indian frankincense. But there were few participants (16.48%) who failed to recognize even one variety. No significant difference was observed in the knowledge of male and female respondents.

Table 2: Responses of participants regarding practice and knowledge of Frankincense

S. No.	Variable	Male (%)	Female (%)	Total number (%)	Chi test p-value
1.	Is Frankincense a plant extract? Yes No	30 (100)	61 (100)	91 (100)	-
2.	How many varieties of Frankincense can you recognize? None 1 to 2 3- 4 More than 4	5 (16.7) 18 (60) 4 (13.3) 3 (10)	10 (16.4) 34 (55.7) 11(18.1) 6 (9.8)	15 (16.48) 52 (57.14) 15 (16.48) 9 (09. 89)	0.953351
3.	Which country's Frankincense do you prefer most? Oman Yemen India	24 (80) 1 (3.3) 5 (16.7)	55 (90.2) 0 6 (9.8)	79 (86.81) 1(1.1) 11(12.09)	0.217747
4.	How often do you use Frankincense? Regularly Irregularly (Only on certain occasions) Never	25 (83.3) 2 (6.7) 3 (10)	54 (88.5) 7 (11.5) 0	79 (86.81) 9 (9.89) 3 (3.3)	0.036287
5.	How do you use Frankincense?* By burning By chewing By drinking water soluble extract By all above methods	15 (50) 1 (3.3) 1(3.3) 10 (33.3)	31(50.8) 0 2 (3.3) 28 (45.9)	46 (51.55) 1 (1.1) 3 (3.3) 38 (41.76)	0.441918
6.	For what purpose do you use Frankincense?* Therapeutic/medicinal Fragrance Spiritual All of the above purposes	2 (6.7) 12 (40) 2 (6.7) 11 (36.7)	2 (3.3) 27 (44.3) 0 32 (52.5)	4 (4.4) 39 (42.88) 2 (2.2) 43 (47.25)	0.124616
7.	Do you believe that Frankincense usage may lead to harmful /side effects? Yes No Do not know	8 (26.7) 10 (33.3) 12 (40)	16 (26.2) 31(50.8) 14(23)	24 (26.37) 41 (45.05) 26 (28.57)	0.181577
8.	Can frankincense be used to treat pain and inflammation? Yes No Do not know	9 (30) 6 (20) 15 (50)	26 (42.6) 13 (21.3) 22 (36.1)	35 (38.46) 19 (20.88) 37 (40.66)	0.404537
9.	Can burning of frankincense kill microbes? Yes No Do not know	19 (63.3) 4 (13.3) 7 (23.3)	47 (77.1) 5 (8.2) 9 (14.7)	66 (72.52) 9 (9.9) 16 (17.58)	0.386751
10.	Can frankincense by used to treat cancers in general? Yes No Do not know	4 (13.3) 7 (23.3) 19 (63.3)	19 (31.2) 7 (11.5) 35 (57.3)	23 (25.27) 14 (15.38) 54 (59.34)	0.106290
11.	Do you think Frankincense should be avoided by asthmatics? Yes No Do not know	23 (76.7) 2 (6.7) 5 (16.7)	41 (67.2) 15 (24.6) 5 (8.2)	64 (70.33) 17 (18.68) 10 (10.99)	0.081002
12.	Do you think Frankincense should not be used by breast feeding or pregnant females? Yes No Do not know	14 (46.7) 9 (30) 7 (23.3)	34 (55.7) 12 (19.7) 15 (24.6)	48 (52.75) 21 (23.08) 22 (24.18)	0.533563

*total is not 100% because 3% of the participants never used it.

Majority (86.81%) of the respondents admitted to use frankincense on a regular basis for therapeutic or spiritual purpose. There were 3 male participants who had never used this plant product in contrast to their counterparts who have used frankincense sometime in their life. A significant difference was noted in the frequency of use of frankincense between two genders.

When study participants were asked about the methods by which they use frankincense, it was revealed more than half of the respondents prefer to use frankincense by burning only to get the fragrance and aroma. However, 41.76% use it by different methods such as by burning, chewing or drinking its aqueous extract. Thus it could be inferred that public use different methods for different purposes e.g. in religious ceremonies it is burnt because of its aroma and is chewed or taken internally as aqueous extract to treat morbid conditions. Approximately 47% of the respondents indicated that they use frankincense for several purposes including fragrance, spiritual and therapeutic use.

Omani public belief regarding the medical benefits, side effects and use of frankincense during pregnancy or treating various disorders such as inflammation, asthma, infection, cancer etc was also evaluated. The results presented in table 2 indicate that 85% of the study population correctly believed that it has medical and therapeutic value and 26.37% were of the opinion that though it is a natural product but it might have some potential side effects. Scientific studies have proved that Boswellic acids obtained from frankincense inhibit 5-lipoxygenase and COX enzymes and prevent the synthesis of mediators of inflammation [11,12]. It is considered as a novel anti-inflammatory anti anti-arthritic drug. Dried extract of oilbanum is commercially available in the international market and is used to treat various inflammatory disorders. Clinical studies have also shown boswellia to benefit cancer patients. Its concurrent use may help reduce cerebral edema in patients with brain tumors, helping reduce the need for steroids and their significant adverse side effects [13]. When respondents was asked whether frankincense can be used to treat pain and inflammation, a large proportion of the study population (40.66%) had no idea that it is a potent anti-inflammatory substance. Approximately 3/4th of the respondents mentioned that they use frankincense to fresh and clean the oral cavity because of its ability to kill germs. On the other hand, only 25.27% were aware that frankincense can be used to treat different kinds of cancer while more than half of the participants had no idea. Though the majority of the respondents had a sufficient level of education, there is a lack of knowledge and awareness about the scientific use of frankincense as several new studies has proven that it is very effective against several types of cancers [14, 15]. It was observed that females are more aware and

knowledgeable regarding therapeutic uses of frankincense than the males.

As asthmatics are well known to suffer worsening of their symptoms in response to smoke and some essences, it was expected that a large percentage of the participants will agree to restrict the use of frankincense by asthmatics. The results of the survey showed that 70% agreed that frankincense should not be used by asthmatics. Similarly 52.75% agreed to restrict use of frankincense in pregnant and breast feeding ladies. No significant difference was observed in the attitude of male and female participants.

CONCLUSION

The results of this pilot study suggest that frankincense is one of most commonly used plant derived substance in Oman. Though it is still used by Omani traditional medicine practitioners to treat many acute and chronic diseases but its use for therapeutic purpose in recent years is on decline. It is now mostly used for its pleasant aroma during religious or other auspicious ceremonies. Though the public knowledge of the basic facts of frankincense is excellent but there is a need to raise the public awareness of the importance of frankincense. Crude gum extract or its essential oil can be used in pharmaceutical, perfumery or cosmetics industry to achieve sustainable development as frankincense was once and still considered to be a national treasure.

REFERENCES

1. Martinez D, Lohs K, Janzen J, Weihrauch und Myrrhe, Kulturgeschichte und wirtschaftliche Bedeutung, Botanik, Chemie, Medizin Stuttgart: Wissenschaftliche Verlagsgesellschaft, 1989.
2. Dietrich K. Analyse der Harze, Balsame und Gummiharze neben ihrer Chemie und Pharmacognosie. Julius Springer Publication, Berlin, 1900. p. 262.
3. Leung A Y and Foster S; Encyclopaedia of Common Natural Ingredients Used in Food, Drugs and Cosmetics, 2nd Edition, John Wiley and Sons, New York, pp. 1996: 389-391.
4. Wallis T E; Text Book of Pharmacognosy, 5th Edition, J. & A. Churchill Ltd., London, 1967: 500-501.
5. Schauss A, Milholland R and Munson S; Indian frankincense (*Boswellia serrata*) gum resin extract: a review of therapeutic applications and toxicology, Nat Med J, 1999; 2(2):16-20.
6. Mikaeil B, Maatooq G, Badria F, Amer M; Chemistry and immunomodulatory activity of frankincense oil. Z. Naturforsch, 2003; 58: 230-238.
7. Ali A, Wurster M, Arnold N, Teichert A, Schmidt J, Lindequist U, Wessjohann L; Chemical Composition

and Biological Activities of Essential Oils from the Oleogum Resins of Three Endemic Soqatraen *Boswellia* Species. Rec. Nat. Prod. 2008; 2: 6-12.

8. Ammon H, Safayhi H, Mack T, Sabieraj J; Mechanism of anti-inflammatory actions of curcumine and boswellic acids. J. Ethnopharmacol. 1993; 38: 113-119.
9. Safayhi H, Sailer E, Ammon H; Mechanism of 5-lipoxygenase inhibition by acetyl-11-keto-Boswellic acid. Mol. Pharmacol. 1995; 47: 1212-1216.
10. Ota M and Houghton P; Boswellic acid with acetylcholinesterase inhibitory properties from frankincense” 53rd annual congress organized by society of medicinal plants. Societa Italiana di Fitochimica Florence, 2005; 339.
11. Ethan B, Heather B, Theresa DH, Ivo F, Sadaf H, Jens H, David S and Catherine U; *Boswellia*: An evidence-based systematic review by the natural standard research collaboration, Journal of Herbal Pharmacotherapy 2004; 4: 63-83.
12. Roy S, Khanna S and Krishnaraju AV ; Regulation of vascular responses to inflammation: inducible matrix metalloproteinase-3 expression in human microvascular endothelial cells is sensitive to anti-inflammatory *Boswellia*. Antioxidants & Redox Signaling, 2006; 8(3&4): 653-660.
13. Reising K, Meins J and Bastian B; Determination of boswellic acids in brain and plasma by high-performance liquid chromatography/tandem mass spectrometry. Anal Chem, 2005; 77: 6640-6645.
14. Flavin DF; A lipoxygenase inhibitor in breast cancer brain metastases J. Neurooncol., 2007; 82: 91-93.
15. Hostanska K, Daum G and Saller R; Cytostatic and apoptosis-inducing activity of boswellic acids toward malignant cell lines in vitro Anticancer Res., 2002; 22:2853-2862.