



Knowledge and risk awareness of traditional medicine practitioners in Algeria regarding bitter almond: a qualitative interview study

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Abstract

Bitter almonds (*Prunus amygdalus*) have historically been utilized in folk medicine to treat diabetes, deworming, and reducing kidney stones. However, their use is also acknowledged as a primary cause of plant poisoning in Algeria. This study aimed to assess the awareness of risks associated with bitter almonds and understand its usage practices in the Eastern Algerian provinces. A descriptive cross-sectional investigation spanning four months involved 106 practitioners from different Algerian provinces: Constantine, Mila, Skikda, Batna, Souk-Ahras and El Taraf. The study sought insights into practitioners' knowledge about bitter almonds, and the collected data were analyzed using Microsoft Excel. The study revealed a predominant representation of males, with a sex ratio of 6.06. Indeed, most practitioners (79.25%) recognized the medicinal value of bitter almonds. Traditional healers often recommended bitter almonds for various ailments, such as diabetes (51.89%), dermatological disorders (24.53%), and other metabolic disorders (10.38%). Concerning perceived risks, only 22.64% acknowledged the potential dangers, including poisoning, gastric disorders, hormonal imbalances, and metabolic disorders.

Keywords:

Bitter Almond, *Prunus amygdalus*, Traditional Medicine Practitioners, Eastern Algeria.

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1. Introduction

Plant poisoning account for 3 to 4% of all cases reported to the Poison Control Center in Algiers, but this rate seems underestimated [1]. In the Poison Control Center of Algiers, during the period between 1991 and 2010, 1732 calls of the 57954 received were related to plant poisoning [2].

In Algeria, the leading cause of plant poisoning is attributed to the glutton (13%), followed by bitter almonds and apricot kernels (10%) and then by the oleander (7%) [1]. Interestingly, these three species, despite their botanical differences, share a common characteristic; the presence of toxic compounds classified as glycosides [1]. Bitter almond (*Prunus amygdalus* var. *amara*) come from the almond tree, a small tree that reaches heights of 10 to 12 meters. It is native to Asia Minor and Mesopotamia and is found throughout the Mediterranean countries. It belongs to Rosaceae family. Almond has two varieties, non-bitter and bitter. Bitter almond is the fruit of *Prunus amygdalus* var. *amara* that contains toxic glycoside called amygdalin [1].

The major indication of bitter almond is diabetes [1]. The oil, formerly advised as a dewormer and to reduce kidney stones, is no longer used internally. It remains very used in perfumery and cosmetology particularly for hair care and eczema [1,3].

Plants used in herbal medicine should be safe for human health. While the use of toxic plants such as bitter almond isn't prohibited, it is important to know the level of consciousness and knowledge of these plants among herbalists in order to be able to carry out preventive actions or appropriate control.

The aim of this study was to assess the risk awareness and usage custom of *Prunus amygdalus* var. *amara* in the provinces of Constantine, Mila, Skikda, Souk Ahras, Batna and El taraf in Eastern Algeria.

2. Materials and methods

A descriptive cross-sectional study was conducted over a four-month period involving 106 herbalists and healers who practice in city markets and weekly markets. These practitioners were either settled in shops or conducted their practices from home, across Algerian provinces including Constantine, Mila, Skikda, Batna, Souk-Ahras, and El Taraf. pharmacy students administered the questionnaire in the local dialect. It was designed to collect information about practitioners' knowledge regarding bitter almonds.

The questionnaire consisted of three parts. The first part gathered practitioner information, including province, rural or urban location, gender, practitioner type, and academic level. The second part collected information about bitter almonds, including indications, used parts, and routes of administration. The third part comprised two open-ended questions related to risks and usage precautions. Data were analyzed using Microsoft Excel.

3. Results

3.1. Socio-demographic characteristics

The practitioner demographics revealed a predominant male representation at 85.85%, while females constituted 14.15%, resulting in a sex ratio of 6.06.

In terms of educational backgrounds among herbal medicine practitioners, the majority (58.49%) lacked formal education, 20.75% possessed a basic level of education, 16.04% had completed secondary education, and only 4.72% held a university graduate degree.

Within the herbal medicine practitioners' spectrum, 57.55% operated from dedicated stores, 30.19% practiced ambulant, and the remaining 12.26% identified as healers. This study encompassed both urban (70.75%) and rural (29.25%) settings. The surveyed herbalists were from different provinces in Eastern Algeria, with the distribution as follows: Constantine 42.45%, Mila 24.53%, Skikda 22.64%, Batna 4.72%, Souk Ahras 3.77%, and El Tarf 1.89%.

3.2. Bitter Almond Indications

The majority of practitioners (79.25%) recognized bitter almond as having medicinal values. Nevertheless, 17.93% ignored its indications, while another group stated that it has no indications (1.87%). Additionally, a small percentage (0.94%) declined to provide any information.

Traditional healers recommended bitter almond for various ailments such as Diabetes (51.89%) and other metabolic disorders (10.38%), for Dermatological disorders (24.53%), Digestive system disorder (8.49%), Vascular Disorders (7.55%) and Gynecological disorders (0.94%). Furthermore, traditional healers considered bitter almonds beneficial for treating neurological disorders, constituting 4.72% of their recommendations. They also advised its use for managing Joint pain and cancer both garnered a recommendation rate of 1.89%. Similarly, they suggested using it for alleviating general symptoms like fever and earaches, along with respiratory disorders (1.89%).

3.3. Administration

The majority of practitioners (72.64%) indicated the part utilized. However, 24.53% did not specify the part, and another group stated that no specific part was employed (1.89%). A small percentage (0.94%) opted not to provide any information.

Likewise, a majority of practitioners (74.53%) specified the routes of administration, In contrast, 22.65% ignored the routes and 1.87% indicated that there are no specified routes. Furthermore, a small percentage (0.94%) did not respond (**Fig. 1.**).

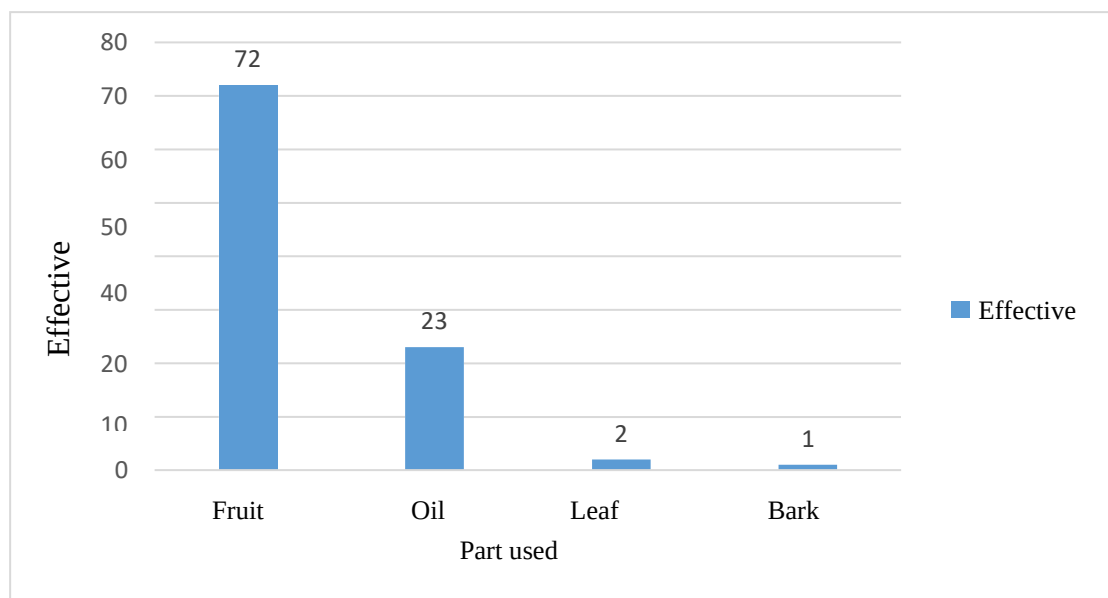


Fig. 1. Part used of bitter almond.

Based on statements from practitioners, both the fruit and oil were identified as the most commonly utilized plant parts (**Fig. 1.**).

Oral ingestion was the most frequently employed method (n=67), followed by external applications (n=33). The remaining routes of administration included rectal and ear instillation (each n=1).

3.4. Risks and precautions of use

The majority of herbalists (39.62%) stated that bitter almond has no associated risks, 36.79% overlooked its potential risks and only 22.64% recognized the presence of risks, while 0.94% did not respond. Various risks linked to the use of bitter almond were identified, including gastric disorders, hormonal imbalances, and metabolic disorders. These risks are detailed in the **tab. 1**.

Table 1. Risks Declared by Practitioners Regarding the Use of Bitter Almond

Risks related to the use	Number of respondents
Gastric disorders (vomiting, diarrhea)	6
Hormonal and metabolic disorders	7
Hepatitis and liver complications (jaundice)	3
Poisoning	8
Burns	1
Death	2

A significant portion representing 34.91% of the herbalists emphasized the importance of precautions when using bitter almond. 33.96% asserted that there were no specific precautions to consider and 30.19% ignored the need of precautions, while 0.94% did not provide a response.

The specific precautions related to usage as cited by the herbalists are presented in **Tab. 2**.

Table 2. Precautions of Bitter Almond Usage Stated by Practitioners

Precautions of use	Number of respondents
Avoid consumption of large quantities	23
Not recommended for children, elderly and chronically ill	3
Do not swallow the oil / fruit	3
Avoid all use	2
External use only	2
Avoid heating the oil	2
Do not take it alone	4
Avoid long-term use	2
Avoid contact with eyes	1

4. Discussion

Our study unveiled a significant prevalence of male practitioners, comprising 85.85% of the total, aligning with findings reported by other investigations into traditional medicine practices in Burkina Faso, Mali and South Africa [4,6]. This gender imbalance is consistent with larger patterns observed in traditional healing contexts. However, it is important to consider the cultural and geographic nuances that might contribute to these disparities.

The substantial proportion of practitioners lacking formal education (58.49%) aligns with the documented educational diversity found in studies conducted in Ethiopia, Uganda and South Africa [6,8].

In contrast, Al-Naggar and al. [9] pointed out a more educated segment within the herbalist

community, highlighting the broad spectrum of educational backgrounds within this field [9].

The various practice contexts, including dedicated stores and ambulant practitioners, emphasize the need for implementing appropriate regulations and interventions.

In the results of this study, bitter almonds were primarily recommended for managing diabetes (51.89%) which aligns with historical applications and clinical trials [10].

Around a quarter of the responses' recommendations focus on addressing dermatological issues, indicating that traditional healers view bitter almonds as a viable remedy for skin-related ailments. This observation aligns with recent reviews that emphasized the therapeutic use of bitter almonds in dermatological contexts[11, 12].

The interviewed individuals, including both established and itinerant herbalists, did not seem universally aware of the risks associated with the use of bitter almonds. The majority of herbalists (39.62%) stated that bitter almonds have no associated risks and 33.96 % asserted that there were no specific precautions to consider.

5. Conclusion

Practices and knowledge of healers regarding the use of bitter almonds in various Algerian provinces have been identified in this study. Bitter almonds were recommended for a range of ailments, including diabetes, dermatological disorders, and even cancer. Although some of these recommendations align with historical use and clinical trials, it is essential to recognize the potential risks associated with the use of bitter almonds, specifically their amygdalin content, which can be toxic. Specialized training programs and interventions are required to enhance professionalism and safety standards within the traditional herbal medicine domain.

References

- [1] Hammiche V, Merad R, Azzouz M. Plantes toxiques à usage médicinal dupourtour méditerranéen. 2013.
- [2] Zebbiche Y, Rebai I, Azzouz M, Abtroun R, Reggabi M, Alamir B. Dosage des cyanures dans les amandes amères et les noyaux d'abricot par chromatographie en phase gazeuse à détecteur ionisation de flamme en mode *Head Space* (HS-CPG- FID). *Ann Toxicol Anal*. 2013;25(2):41-5.
- [3] Gradziel TM, Martínez-Gómez P. Almond Breeding. In: Janick J, éditeur. *Plant Breeding Reviews*. 1^{re} éd. Wiley; 2013. p. 207-58.
- [4] Ouoba K, Lehmann H, Zongo A, Semdé R, Pabst JY. Phytopharmaceutical practices of traditional health practitioners in Burkina Faso: a cross-sectional study. *BMC Complement Med Ther*. 30 juin 2023;23(1):215.
- [5] Baratti-Mayer D, Baba Daou M, Gayet-Ageron A, Jeannot E, Pittet-Cuénod B. Sociodemographic Characteristics of Traditional Healers and Their Knowledge of Noma: A Descriptive Survey in Three Regions of Mali. *Int J Environ Res Public Health*. 19 nov 2019;16(22):4587.
- [6] Semanya SS, Potgieter MJ. Bapedi traditional healers in the Limpopo Province, South Africa: Their socio-cultural profile and traditional healing practice. *J Ethnobiol Ethnomedicine*. déc 2014;10(1):4.
- [7] Limenh LW, Geremew DT, Kasahun AE, Anagaw YK, Worku MC, Simegn W, et al. Assessment of Knowledge, Attitudes, and Practices of Traditional Healers toward Dosage Forms and Routes of Administration: A Cross-Sectional Study in Ethiopia. N'guessan BB, éditeur. *Evid Based Complement Alternat Med*. 27 juin 2023; 2023:1-11.
- [8] Mwaka AD, Achan J, Orach CG. Traditional health practices: A qualitative inquiry among traditional health practitioners in northern Uganda on becoming a Healer, perceived causes of illnesses, and diagnostic approaches. Olorunlana A, éditeur. *PLOS ONE*. 24 avr 2023;18(4):e0282491.
- [9] Al-Naggar RA, Bobryshev YV, Abdulghani MAMM, Rammohan S, Al-Jashamy K. Knowledge and Perceptions of Cancer and Cancer Prevention among Malaysian Traditional Healers: a Qualitative Study. *Asian Pac J Cancer Prev*. 31 août 2012;13(8):3841-50.
- [10] Saati S, Dehghan P, Azizi-Soleiman F, Mobasser M. The effect of bitter almond (*Amygdalus communis* L. var. *Amara*) gum as a functional food on metabolic profile, inflammatory markers, and mental health in type 2 diabetes women: a blinded randomized controlled trial protocol. *Trials*. 17 janv 2023; 24(1):35.
- [11] Moradi B, Heidari-Soureshjani S, Asadi-Samani M, Yang Q. A Systematic Review of Phytochemical and Phytotherapeutic Characteristics of Bitter Almond. *Int J Pharm Phytopharm Res*. 2017;7(2).
- [12] Lin TK, Zhong L, Santiago J. Anti-Inflammatory and Skin Barrier Repair Effects of Topical Application of Some Plant Oils. *Int J Mol Sci*. 27 déc 2017; 19(1):70.

