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Research Article

SURVEY OF INDIGENOUS KNOWLEDGE AND THERAPEUTIC USES OF *PYTHON SEBAE* FAT IN TOGO

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ABSTRACT

Traditional medicine plays a central role in Togo's healthcare system, where *Python sebae* fat is widely used for its therapeutic properties. This study aimed to systematically document indigenous knowledge, harvesting practices, identification criteria, and uses of this fat in both rural and urban settings in Togo. A descriptive cross-sectional survey was conducted from June to September 2024 among 120 stakeholders (practitioners, vendors, and users), of whom 97 completed questionnaires were analyzed. Sociodemographic data, identification criteria (appearance, color, odor), sources of advice, methods of collection and preliminary processing, indications for use, and perceived constraints were collected through semi-structured interviews and analyzed using KoboToolbox, Excel 2016, and GraphPad Prism 9. Respondents were predominantly male (73.2 %) with a mean age of 48.5 ± 17.9 years and mainly from the Kara region (75.3 %). The majority relied on a combination of visual appearance, color, and odor to recognize the fat (25.8 %). Advice was primarily transmitted within families (74.2 %), and procurement occurred mainly at markets (33.0 %) or directly from practitioners (29.9 %). Nearly 80 % of users applied the crude fat without treatment, while 20 % employed preliminary sun-drying. Therapeutically, over 96 % used it as a remedy, 59.8 % specifically for its anti-inflammatory effects, reporting a satisfaction rate of 91.8 % with no adverse events. Major constraints included odor and seasonal availability. *Python sebae* fat is a valued traditional resource for its anti-inflammatory and wound-healing properties. However, artisanal use without standardized procedures leads to quality variability and raises sustainability and safety concerns. We recommend standardizing extraction methods, developing modern formulations (creams, ointments), and conducting pharmacokinetic studies to optimize its use while preserving Togo's ethnopharmacological heritage.

Keywords: Traditional medicine, *Python sebae*, Animal fat, Ethnopharmacology; Togo.

INTRODUCTION

Traditional medicine remains the primary source of health care for the majority of the Togolese population, especially in rural areas where access to biomedical facilities is limited (WHO, 2023). In sub-Saharan Africa, 70 % to 80 % of people regularly rely on traditional medical practices as their main form of treatment. Key drivers of this reliance include the low cost of remedies, cultural trust in ancestral practitioners, and the inadequate coverage of pharmacies under the national insurance scheme (Ahossi *et al*., 2014 ; Gnandi, 2018 ; WHO, 2023). Togolese traditional healers employ a wide array of treatments, encompassing both plant - based preparations and animal - derived products. Snake fats, in particular, are valued for their anti-inflammatory and antimicrobial properties across West Africa. In Ghana, Boakye *et al*. (2021) reported that among 45 traditional healers, *Python* spp. fat exhibited the highest use-value and a strong informant agreement ratio (IAR = 0.75), being applied against rheumatism, headaches, enuresis, and various inflammatory conditions.

Moreover, physicochemical and biological studies have confirmed similar properties in reptiles fats. Falodun and Owolabi (2008) characterized Boa constrictor fat, demonstrating significant antimicrobial activity against *Staphylococcus aureus* and *Streptococcus pyogenes*, as

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well as robust anti-inflammatory effects in a croton oil-induced ear edema model. These promising preliminary findings partially validate the empirical uses and underscore the need for further pharmacological investigations. The Seba's python (*Python sebae* Gmelin, 1789), which occurs throughout sub-Saharan Africa including Togo (Reptarium Reptile Database, 2014), is widely harvested in traditional markets for its fat. Yet, very few studies have systematically documented the practices and beliefs surrounding its use. Systematic documentation of indigenous knowledge on *P. sebae* fat in Togo is therefore essential for several reasons. First, it helps safeguard an intangible cultural heritage at risk due to social changes and the gradual disappearance of traditional practitioners, as highlighted by Boakye *et al*. (2022). Second, rigorously recording the methods of collection, preparation, and administration provides the necessary foundation for pharmacological validation and standardization. Finally, in a context where *Python sebae* is classified as "Near Threatened" (NT) by the International Union for Conservation of Nature owing to overexploitation and habitat loss, documenting its therapeutic uses informs sustainable management strategies and conservation measures tailored to the Togolese environment.

In this context, the present study aims to systematically document and analyze the knowledge, practices, and challenges related to the therapeutic use of *Python sebae* fat in Togo, thereby establishing a scientific basis for its validation and guiding its sustainable management. This work fills a significant gap in West African ethnopharmacological literature and lays the groundwork for future research on the safety, efficacy, and sustainable use of this traditional remedy.

MATERIAL AND METHODS

Material

For data collection, we primarily employed survey forms and an audio recorder.

Study setting

The study was conducted in Togo, a West African country spanning from the 6th to the 11th degree of north latitude. It is bordered to the north by Burkina Faso, to the east by Benin, to the west by Ghana, and to the south by the Atlantic Ocean. Covering an area of 56,600 km², Togo had a population of 8,095,498 according to the 2022 census. Administratively, it is divided into five regions from south to north: Maritime, Plateaux, Centrale, Kara, and Savanes.

Study Type and Duration

This was a descriptive cross-sectional study conducted through an ethnopharmacological survey among Togolese traditional practitioners. The aim was to document the various uses and knowledge related to *Python sebae* fat locally known as "Boa fat." The survey took place from June to September 2024.

Study Population

The target population included vendor–traditional therapists, traditional practitioners, and users selected based on their knowledge of and experience with *Python sebae* fat.

Inclusion, Non-inclusion, and Exclusion Criteria

Inclusion Criteria

Participants were eligible for the ethnopharmacological survey if they met all of the following:

- **Traditional practitioner or user status**: Individuals practicing traditional pharmacopeia (e.g., traditional healers, practitioners) or regular users of *P. sebae* fat.
- **Documented experience**: Had used the fat at least once within the past 12 months.
- **Geographic residence**: Resided in Togo for at least two years.
- **Knowledge of the fat**: Confirmed familiarity with *P. sebae* fat and its therapeutic uses.
- **Informed consent**: Agreed to participate and signed a free and informed consent form.

Non-inclusion Criteria

The following criteria were considered for non-inclusion in the survey:

- **Lack of experience**: Individuals who have never heard of or used *P. sebae* fat.
- **Conventional health professionals**: Physicians, pharmacists, or nurses without practice in or interest in traditional medicine.
- **Recent residents**: Individuals who have lived in Togo for less than two years.
- **Minors under 18 years**: Persons under the age of 18 without parental consent.

Exclusion Criteria

The following criteria were used to exclude participants already enrolled in the survey:

- **Withdrawal during interview**: Voluntary withdrawal from the study at any time.
- **Cognitive or linguistic incapacity**: Development of impairments preventing reliable responses (e.g., cognitive disorders, deafness, insurmountable language barrier).

- **Severe acute health condition**: Illness or hospitalization preventing continuation of the interview.
- **Major conflict of interest**: Participants with a direct commercial relationship in the sale of the fat that could bias their responses.

Data Collection Methodology

Pre-survey Phase

This preparatory phase involved drafting the informed consent form and the survey questionnaire. A pilot test was conducted in the Doufelgou prefecture (northern Togo) to assess the clarity and relevance of the questions. Feedback from this exercise was used to refine the data-collection tool.

Survey Implementation

Data were gathered via questionnaires administered during individual interviews. These interviews were conducted in French or in the local languages ("Ewé, Kabyè, Nawda, Moba, Bassar, Kotocoli"), according to each participant's preference. An introductory exchange with each respondent briefly presented the study's objectives and emphasized the importance of their input, thereby securing their informed consent. Collected information focused primarily on the respondent's sociodemographic profile, traditional uses, and the pharmacological properties attributed to *Python sebae* fat.

Statistical Analyses

Survey data were collected using the KoboToolbox platform, then exported into Microsoft Excel 2016 and analyzed with GraphPad Prism 9.

RESULTS AND DISCUSSION

A total of 120 individuals were surveyed. Of these, 97 (80.83 %) provided complete and usable data, while 23 (19.17 %) were excluded based on the exclusion criteria due to incomplete questionnaires and/or failure to meet the inclusion criteria. Nevertheless, the comprehensive nature of the survey (which targeted anyone with knowledge of or who uses *P. sebae* fat) strengthens its internal validity (no inclusion bias), even though the 19.17 % loss of questionnaires remains a critical limitation.

The Kara region was the most represented, accounting for 75.26 % of those familiar with *Python sebae* fat. The mean age of respondents was 48.52 ± 17.91 years, with a predominance of individuals over 60 years old (35.05 %), of whom 73.20 % were men. More than 28 % of participants had not completed secondary education, although the majority (47.42 %) had attained higher education. Additionally, over 24 % of respondents were traditional practitioners. Their main sociodemographic characteristics are presented in Table 1.

Table 1. Sociodemographic Characteristics of Respondents.

Parameters Considered	Sample size (N = 97)	Proportion (%)
Sex		
Female	26	26.80
Male	71	73.20
Age (years)		
18 – 20	00	00.00
21 – 40	32	32.99
41 – 60	31	31.96
≥ 61	34	35.05
Mean age (years) = 48.52 ± 17.91	-	-
Place of residence		
Centrale Region	2	02.06
Kara Region	73	75.26
Plateaux Region	17	17.53
Maritime Region	5	05.15
Level of education		
No formal education	11	11.34
Primary	17	17.53
Secondary	23	23.71
Tertiary	46	47.42
Occupation		
Artisan	8	08.25
Artisan and Traditional Practioner	2	02.06
Merchant	24	24.74
Civil servant	31	31.96
Civil servant and Traditional Practioner	2	02.06

Parameters Considered	Sample size (N = 97)	Proportion (%)
Traditional Practioner	20	20.62
Others	10	10.31

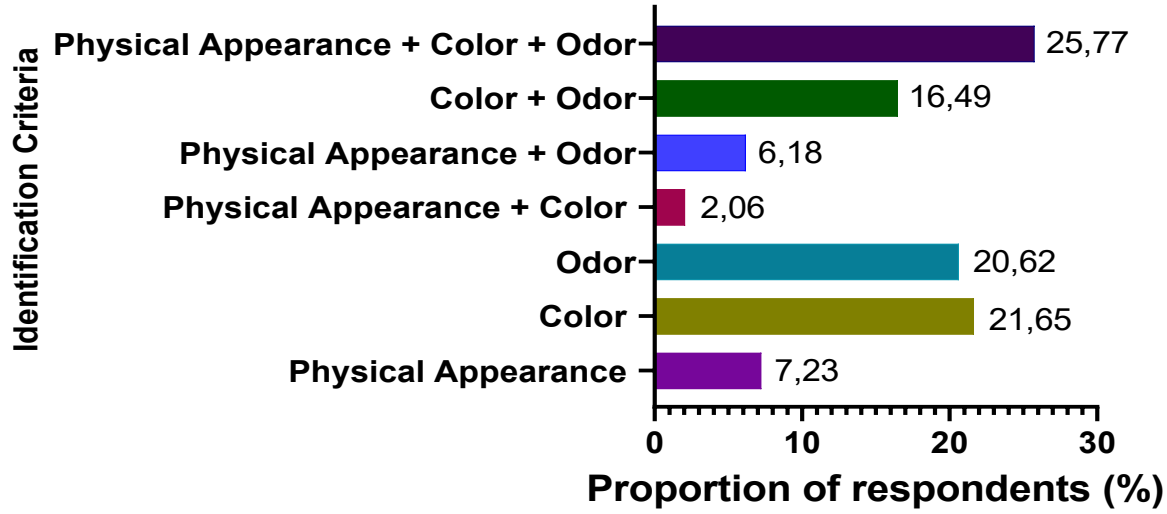

Figure 1. Distribution of Respondents According to the Criteria for Identifying *P. sebae* Fat.

Figure 1 shows that the majority of respondents (25.77 %) use three criteria (physical appearance, color, and odor) to identify *P. sebae* fat. Next are those who rely solely on color (21.65 %) or exclusively on odor (20.62 %). The combination of color + odor is also a significant method, used by 16.49 % of respondents. Finally, a smaller proportion base their identification solely on physical appearance (7.23 %), or combine physical appearance with odor (6.18 %) or with color (2.06 %).

Figure 2 shows that in over 74 % of cases, parents transmit the advice on using *P. sebae* fat, followed by friends (16.49 %). Figure 3 indicates that the principal supply methods are purchase at the market (32.99 %) and from traditional practitioners (29.90 %). Moreover, a notable proportion of respondents obtain the fat by direct collection from a *P. sebae* specimen (18.56 %), and some combine direct collection with purchase from traditional practitioners (7.22 %) or at the market (3.09 %).

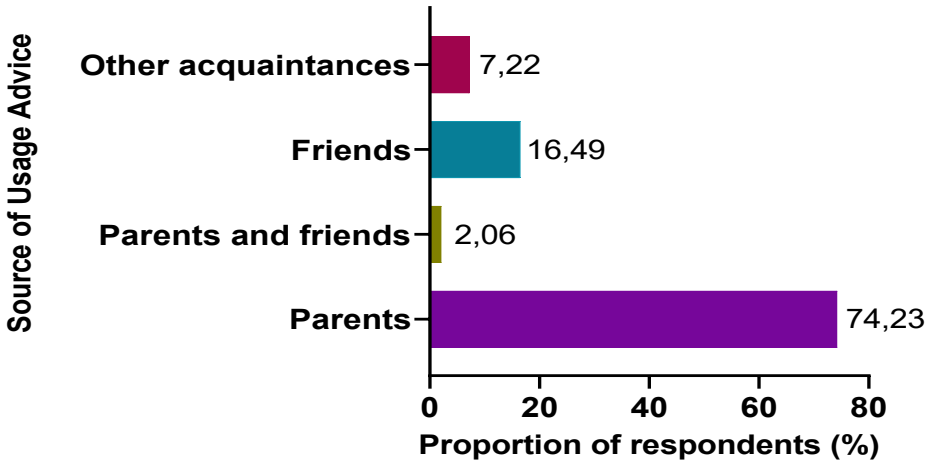

Figure 2. Distribution of Respondents by Source of Advice on the Use of *Python sebae* Fat.

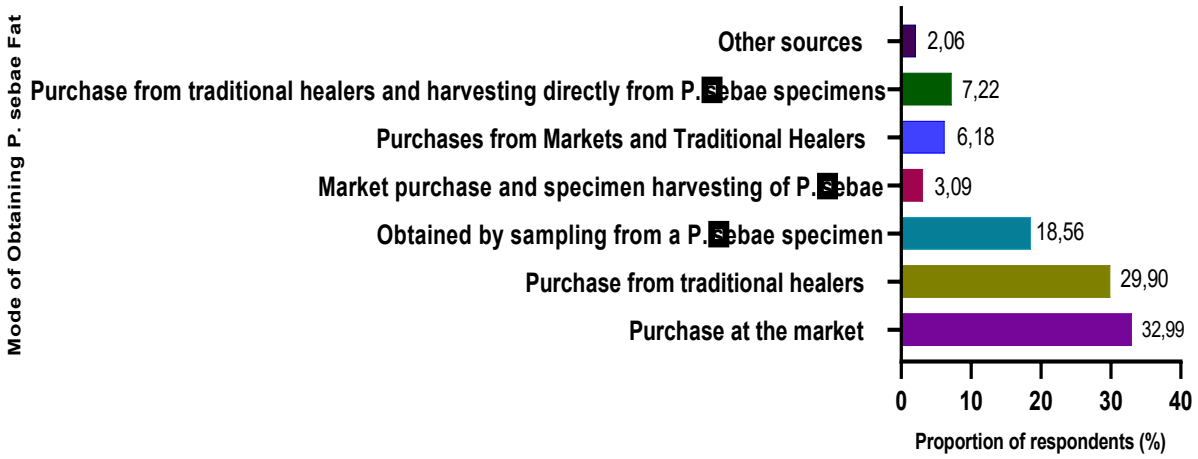

Figure 3. Distribution of Participants by Method of Obtaining *P. sebae* Fat.

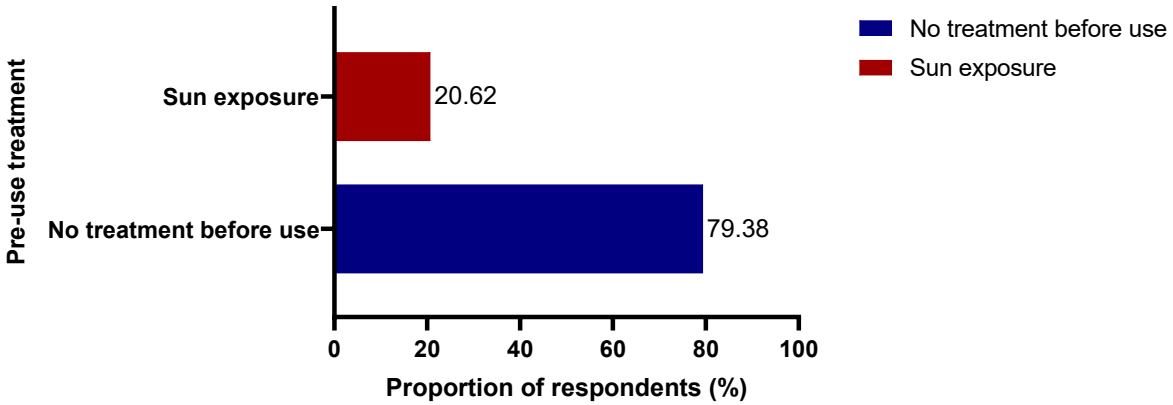

Figure 4. Distribution of respondents by the pretreatment applied to *P. sebae* fat.

Table 2. Harvesting Practices of ***P. sebae*** Fat Described by Selected Traditional Practitioners.

Expressions of Stakeholders	Sample size (N = 28)	Proportion (%)
If you extract it yourself, please describe the process :		
• After killing the animal, make an incision along the rib and remove the fat while it is still fresh.	06	21.43
• After killing the animal, cut open the rib area and remove the fat pockets.	06	21.43
• After killing the animal, extract the fat without applying fire.	7	25.00
• After killing the snake, make a ventral incision and remove the fat without exposing it to flame.	11	39.29
• Extract the fat immediately after killing the animal.	7	25.00
• Immediately after killing the animal, extract the fat without any preparation, then store it in a sealed jar.	4	14.29
• Extract the fat after killing the snake.	06	21.43
• Extract the fat while the carcass is still cool, next to the animal, immediately after killing it.	7	25.00

Expressions of Stakeholders	Sample size (N = 28)	Proportion (%)
• Remove the fat without smoking the animal.	06	21.43
• Without burning the flesh, remove the eggs (if present), then extract the fat from the ventral region.	8	28.57

Table 2 summarizes respondents' methods for extracting the fat. Of the 97 participants, 28 (28.87 %) perform the extraction themselves. All respondents reported that they extract the fat without smoking the animal. Moreover, the majority (79.38 %, or 77 users) apply no special treatment prior to use and employ the crude fat, a precaution intended to preserve its properties. The remaining users (20.62 %, or 20 users) simply expose the fat to sunlight before use (Figure 4).

Table 3 shows the indications for use: *P. sebae* fat is employed for therapeutic purposes in over 96 % of cases, with 59.79 % specifically using it as an anti-inflammatory agent. Additionally, certain ritual uses aim to protect against evil spirits and curses. Most often, the fat is applied by massaging the affected area. Dietary use (reported by only 9.28 % of respondents) involves combining the fat with honey. No side effects were reported, and over 91 % of participants expressed satisfaction with the use of *Python sebae* fat. The majority of respondents (73.20 %) used *P. sebae* fat occasionally (Figure 5), primarily for therapeutic purposes (Table 3). Furthermore, most participants indicated that *P. sebae* fat can be stored for several months, and in some cases for over a year. The main constraints on its use are availability and odor (Table 3).

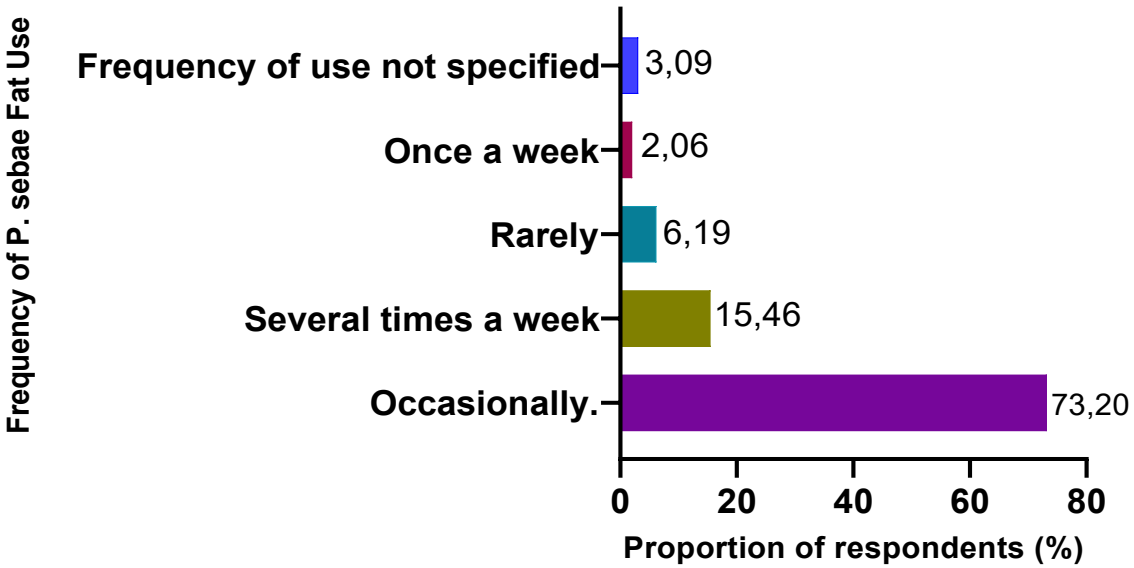

Figure 5. Frequency of Use of *P. sebae* Fat.

Table 3. Uses and Instructions for Use of ***P. sebae*** Fat.

Respondents' Answers	Sample size (N = 97)	Proportion (%)
Domains of Use of *P. sebae* Fat		
Magico-religious uses	6	06.19
Therapeutic uses	51	52.58
Therapeutic and dietary uses	7	07.22
Therapeutic, dietary, and magico-religious uses	2	02.06
Therapeutic and magico-religious uses	34	36.08
No response	2	02.06
Specific Applications		
Use for muscle aches	57	58.76

Respondents' Answers	Sample size (N = 97)	Proportion (%)
Use as an anti-inflammatory	58	59.79
Use as an antipyretic	54	55.67
Other uses	48	49.48
Indications		
Burns	26	26.80
Scars and burns	7	07.22
Wound healing	23	23.71
Cracked heels	3	03.09
Epileptic seizures in children	2	02.06
Sprains and fractures	4	04.12
Fatigue	4	04.12
Fractures and burns	19	19.59
Malaria in children	4	04.12
Bone stiffness	3	03.09
Not specified	31	31.96
Side Effects		
Reported side effects	00	00.00
No side effects	92	94.85
No response	5	05.15
Satisfaction Level		
Fully satisfied after use	89	91.75
Partially satisfied after use	6	06.19
Not satisfied after use	2	02.06
Mode of Administration		
Massage application of raw fat on the targeted body area	92	94.85
Mixed with shea butter and massaged onto the targeted body area	5	05.15
Mixed with honey for oral consumption	9	09.28
Pure application of raw fat on the body for protection against evil spirits and witchcraft	42	
Contraints		
Odor	47	48.45
Availability	43	44.33
Shelf-life		
Less than one month	00	00.00
Several months	34	35.05
One year	25	25.77
More than one year	38	39.18

The comprehensive survey of *Python sebae* fat users in the targeted localities revealed a strong representation from the Kara region, reflecting a dynamic network of local knowledge (Dubois & Kouassi, 2015; Adoté *et al*., 2017). Practitioners averaged 48.52 ± 17.91 years of age and were predominantly male (73.7 %), consistent with gender norms observed in West African traditional medicine (WHO, 2023; Ackah *et al*., 2016). Only 21 % practiced exclusively as traditional healers; most combined this role with other occupations, indicating that traditional healing often complements additional livelihoods in resource-limited settings (Kaboré *et al*., 2020). These findings underscore the urgent need to formalize and transmit the expertise of experienced practitioners particularly by engaging younger generations and women—before such knowledge is irretrievably lost (M'Baye & Tchabi, 2018). The predominance of using a combination of physical appearance, color, and odor to identify *P. sebae* fat (25.77 %) suggests that traditional practitioners favor a multisensory approach, deemed more reliable than any single criterion, as reported by Fangueiro *et al*. (2016) for other lipid matrices in ethnopharmacological contexts. Exclusive reliance on color (21.65 %) and, to a similar extent, on odor alone (20.62 %) confirms the respective importance of visual and olfactory indices in the qualitative evaluation of animal fats, a practice also noted by Kouadio & Yao (2019) among Ivorian healers. The combined use of color + odor (16.49 %) reflects a compromise between simplicity and reliability, as highlighted by N'Dri *et al*. (2014) in their study of sensory indicators for edible oils. Conversely, the small proportion of respondents relying solely on texture (7.23 %) or partially combining it with another criterion (2.06 % color + texture, 6.18 % odor + texture) illustrates the lesser confidence placed in consistency-based identification, which is viewed as subjective and variable depending on sample origin.

The predominance of familial transmission (parents being cited by over 74 % of respondents) as the main channel for

usage advice underscores the family's central role in preserving and disseminating traditional knowledge, a phenomenon well documented in ethnopharmacology (Gambari *et al*., 2017). The secondary role of friends (16.49 %) indicates that smaller social networks also contribute to knowledge transfer, particularly among informal practitioners (Agbeko *et al*., 2020). Regarding procurement, the high frequency of market purchases (32.99 %) and acquisitions directly from traditional healers (29.90 %) reflects the growing commercialization of *P. sebae* fat in local trade circuits, as observed by Kouadio & Yao (2019) in the Ivorian context. In contrast, direct harvesting from specimens (18.56 %) demonstrates the continuation of ancestral self-collection practices, which ensure free and controlled access but may raise sustainability and conservation concerns (Ekoue & Hounkpati, 2025). Finally, mixed strategies (harvesting followed by purchase from healers (7.22 %) or at the market (3.09 %)) reveal users' flexibility in combining personal expertise with trust in specialized vendors to guarantee product quality and authenticity (Tchatchueng *et al*., 2017).

The high degree of practitioner autonomy (27.8 % extracting the fat themselves) indicates direct control over processing methods but leads to variability in quality and chemical composition (WHO, 2013 ; Adoté *et al*., 2017). The widespread practice of harvesting without smoking, intended to preserve heat-sensitive lipophilic compounds (carotenoids, sterols), minimizes thermal and chemical oxidation of active ingredients (Adebayo *et al*., 2018). Moreover, 79.4 % of respondents use the crude fat directly, thereby conserving its natural composition intact (Menut *et al*., 2020). However, the absence of a formal disinfection protocol increases microbiological risk (ISO 21871 :2006). Additionally, 20.6 % expose the fat to sunlight as a gentle pre-treatment, which promotes moisture evaporation and microbial load reduction without reaching harmful oxidation temperatures (Gupta & Rao, 2015), although prolonged exposure can induce photo-oxidation detrimental to natural antioxidants (Kumar & Bisset, 2012). In light of these practices, it is necessary to implement good manufacturing practices (e.g., temperatures below 60 °C, controlled durations), introduce rapid microbial load and lipid peroxidation assays, and train practitioners through participatory guidelines to balance active-compound preservation with safety (Adebayo *et al*., 2018 ; Menut *et al*., 2020).

The near-universal therapeutic use of *P. sebae* fat (> 96 %) reflects deep trust in its healing virtues, widely shared across African traditions for its bioactive wound-healing and analgesic compounds (Bussmann & Sharon, 2006). Nearly 60 % of practitioners employ it specifically for its anti-inflammatory effects, likely due to phyto-sterols and essential fatty acids that inhibit pro-inflammatory mediator synthesis (Menut *et al*., 2020). These proportions are comparable to those reported by Todounou *et al*. (2004) in Benin, which highlighted predominant use of this fat for similar symptoms and for beef or goat fats in West Africa (50–65 %), confirming a common empirical foundation (Ackah *et al*., 2016 ; Adoté *et al*., 2017).

Ritual applications are also notable, as most respondents use it topically for protective properties against malevolent influences (Mora *et al*., 2017). Oral use, while minor (9.28 %), follows a digestive and immunostimulant tradition often enhanced with honey (Akoto *et al*., 2015; Kouassi *et al*., 2019). The absence of reported side effects aligns with in vitro HET-CAM tolerability data, which showed no irritation or hemorrhage (Fangueiro *et al*., 2016). A high satisfaction rate (> 91 %) further confirms perceived acceptability (N'Dri *et al*., 2014). These observations support the pharmaceutical standardization of modern external formulations (creams, ointments) that optimize lipophilic active diffusion while masking organoleptic drawbacks (Djamni *et al*., 2020), and encourage exploration of potential nutraceutical synergies for oral use enriched with excipients such as honey.

Most practitioners use *P. sebae* fat only occasionally (> 60 %), reflecting confidence in its mild profile and low risk of adverse effects, as seen with other animal fats used sporadically to limit potential toxicity (Bussmann & Sharon, 2006). This intermittent use is viewed as a therapeutic boost rather than a maintenance treatment—traditional remedies often complement phytotherapeutic or allopathic protocols for acute symptom relief (WHO, 2013). However, irregular use complicates scientific evaluation of dosage and frequency required for sustained anti-inflammatory effect, underscoring the need for standardized protocols (Menut *et al*., 2020). Studies in Ghana and Benin report comparable rates of occasional use (60–80 %) for treating joint or skin disorders, attesting to the symptomatic nature of this practice (Adoté *et al.,* 2017 ; Ackah *et al*., 2016). To improve rigor and efficacy, pharmacokinetic studies comparing single versus repeated administration, the development of precise dosing guidelines for traditional practitioners, and adherence-promotion measures are necessary to reduce result variability.

Furthermore, the long shelf life of this fat (attributable to its low water activity and saturated fatty acid content) is offset by seasonal availability tied to hunting cycles (Belitz *et al*., 2009; Maqsood & Benjakul, 2010; Yameogo *et al*., 2015). Lastly, its strong odor poses a major organoleptic barrier, prompting investigation into deodorization processes or the incorporation of essential oils as masking agents without compromising anti-inflammatory and wound-healing properties (Nguyen *et al*., 2017; Traoré *et al*., 2018).

CONCLUSION

The ethnopharmacological survey conducted in Togo confirms that *Python sebae* fat is a major traditional therapeutic resource, primarily used as an anti-inflammatory and wound-healing agent, and valued for its long shelf life (several months to over a year) despite constraints related to availability and odor. Predominantly artisanal harvesting practices without prior treatment

highlight the need to harmonize and standardize methods to ensure product quality and safety. Moreover, limited acceptability due to odor paves the way for deodorization strategies or formulation into ointments and creams incorporating essential oils—whose efficacy has been demonstrated without altering pharmacological properties. Overall, these results call for further investigations to physicochemically and biologically characterize this fat, optimize its pharmaceutical formulations, and regulate its traditional use within a framework of scientific and therapeutic valorization.

ACKNOWLEDGMENT

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CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL

The study protocol was approved by the Bioethics Committee of the Faculty of Health Sciences at the University of Lomé (Togo), and all participants provided informed consent. Furthermore, all data were handled in strict anonymity.

AI TOOL DECLARATION

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

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