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Traditional treatments for jaundice in older people in Mbandaka (DRC): an inventory of plants, clinical risks and associated factors

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Abstract

Introduction: In the Democratic Republic of the Congo, traditional treatments for jaundice are widely used, but their risks in older people remain poorly documented. This study aimed to catalogue the plants used to treat jaundice ( ) in Mbandaka, to assess associated complications and to identify predictors of serious adverse effects.

Methods: A cross-sectional survey was conducted from January to October 2026 among 230 people aged 60 years and over who had presented with jaundice treated with herbal medicine in the preceding twelve months. A face-to-face questionnaire collected sociodemographic, clinical and ethnopharmacological data. Logistic regression analyses identified factors associated with serious complications (hospitalisation).

Results: Seven main plants were identified, dominated by Vernonia amygdalina (37.8%) and Aloe vera (23.5%). The frequency of adverse effects reached 64.8%, and 20.9% of participants required hospitalisation. In multivariate analysis, age ≥80 years (OR = 3.87), lack of education (OR = 2.56), income <50 USD/month (OR = 2.34), belief in a witchcraft-related cause (OR = 1.98), lack of information on risks (OR = 2.87) and the use of Cinchona spp. (OR = 2.51) were independently associated with hospitalisations.

Conclusion: Herbal treatment for jaundice among older people in Mbandaka carries significant risks, particularly among the very elderly, those with no formal education and the disadvantaged. Therapeutic education initiatives targeting these vulnerable populations are urgently needed.

Keywords: Jaundice, older adults, traditional medicine, herbal medicine, Mbandaka, DRC, risks, associated factors.

1. Introduction

In sub-Saharan Africa, traditional medicine is the primary form of treatment for the majority of the population, particularly in rural and peri-urban areas where access to biomedical care remains limited (Bokamba & Mpassi, 2021).

Jaundice is a common clinical manifestation in older people, which may indicate serious liver, biliary or haemolytic conditions (Farnsworth & Rosen, 2018). In Mbandaka, the capital of Equateur Province in the Democratic Republic of the Congo (DRC), seeking treatment from traditional healers for jaundice is common, but neither the community nor healthcare professionals fully understand the associated risks (Lokola & Etshindo, 2022).

Physiological ageing alters hepatic metabolism: the liver's functional reserve decreases, cytochrome P450 activity declines, and the clearance of xenobiotics slows (Chen et al., 2020). These changes make older people particularly vulnerable to the toxicity of herbal medicines, whose active ingredients are neither standardised nor measured. A recent systematic review reported that 15% of cases of plant-related hepatotoxicity involved patients over the age of 60 (Chen et al., 2020).

Furthermore, cultural perceptions of the disease strongly influence treatment choices. In Mbandaka, jaundice is sometimes attributed to witchcraft ('maladi ya lisu'), which naturally leads families to seek out traditional healers rather than hospitals (Lokola & Etshindo, 2022). Several plants are used for this purpose: Vernonia amygdalina (bitter leaves), Aloe vera, Carica papaya, Cassia occidentalis, Cinchona spp., Khaya senegalensis and Artemisia afra (Ngbolua et al., 2020). However, no study has specifically assessed the risks of these treatments among older people in Mbandaka, nor identified the socio-demographic and cultural factors associated with complications.

The aim of this research was threefold: (1) to catalogue the main traditional medicines used to treat jaundice in older people in Mbandaka; (2) to measure the frequency of clinical complications following administration of these remedies; (3) to identify predictors of serious adverse effects requiring hospitalisation.

2. Methodology

2.1. Study design and setting

This cross-sectional observational study was conducted from January to October 2026 in the three municipalities of the city of Mbandaka (Basoko, Wangata, Mbandaka) in Equateur Province. The area has a population of approximately 1,200,000, with unequal access to healthcare facilities (Bokamba & Mpassi, 2021).

2.2. Population and sampling

The target population consisted of people aged 60 years and over, residing in Mbandaka for at least six months, who had experienced an episode of jaundice diagnosed clinically or self-reported by the patient within the previous twelve months, and who had used at least one traditional herbal treatment for this episode.

The minimum sample size was calculated using Schwartz's formula for proportion estimation: $n = (Z^2 \times p \times q)/d^2$. With $Z = 1.96$ (95% confidence), $p = 0.50$ (unknown prevalence, conservative estimate), and $d = 0.07$, the calculated sample size was 196 participants. After adding 15% to account for non-response, the target was set at 230 participants. Probability quota sampling by municipality and gender was used, followed by random selection from health centre lists and community registers.

2.3. Data collection

Data were collected through structured face-to-face interviews using a validated, pre-tested questionnaire (Cronbach's alpha = 0.78). The questionnaire comprised five sections: (a) sociodemographic data (age, gender, education, income, health insurance); (b) history of jaundice (duration, symptoms, history of liver disease); (c) traditional treatments (plants, part used, preparation, dosage, prescriber); (d) post-treatment complications (worsening of symptoms, adverse effects, hospitalisation); (e) associated factors (distance to healthcare, beliefs, trust, prior information). A brief clinical examination (skin and mucous membrane colour, temperature, blood pressure, liver palpation) was carried out by a nurse investigator.

2.4. Ethical considerations

The study was approved by the ISTM/Mbandaka Management Committee and authorised by the Equateur Provincial Health Directorate. Each participant signed an informed consent form (or provided a thumbprint in the presence of a witness for those who were illiterate). Anonymity and confidentiality were ensured by assigning codes to each participant.

2.5. Statistical analyses

Analyses were performed using SPSS version 26.0 (IBM Corp., 2019). Univariate analysis yielded frequencies, percentages, means and standard deviations. Pearson's chi-square tests explored associations between each explanatory variable and the occurrence of serious complications (defined as worsening jaundice leading to hospitalisation). A stepwise

backward binary logistic regression included all variables with a p-value < 0.20 in the bivariate analysis. Results are expressed as odds ratios (OR) with 95% confidence intervals. The significance threshold was set at $p < 0.05$.

3. Results

3.1. Characteristics of the study population

The final sample for this study consisted of **230 participants**, with a mean age of **72.4 years** (± 8.3). The table below summarises the sociodemographic distribution of the cohort.

Table 1: Sociodemographic characteristics of participants (N=230)

Variable	Category	Number (n)	Percentage (%)
Age (years)	60–69	98	42.6
	70–79	87	37.8
	≥ 80	45	19.6
Gender	Male	108	47
	Female	122	53
Health zone	Bolenge	85	37
	Wangata	92	40
	Mbandaka	53	23
Level of education	None	96	41.7
	Primary	82	35.7
	Secondary	42	18.3
	Higher education	10	4.3
Monthly income	< 50 USD	144	62.6
	50–100 USD	58	25.2
	> 100 USD	28	12.2
Health insurance	Yes	31	13.5
	No	199	86.5
Marital status	Married	97	42.2
	Widowed	114	49.5
	Other	19	8.3

Analysis and interpretation

The data in this table highlight several indicators of vulnerability

Predominance of women**:** Women account for **53.0%** of the sample. **Socio-economic fragility:** A high proportion of participants have no education (**41.7%**) and live on a precarious income of less than USD 50 per month (**62.6%**). **Health coverage:** The rate of membership of a health insurance scheme is extremely low (**13.5%**), which represents a major barrier to access to formal healthcare.

3.2. History of jaundice and treatment

Analysis of episodes of jaundice reveals prolonged symptom duration for the majority of subjects, with marked clinical symptoms (see Table 2).

Table 2: Clinical characteristics of jaundice episodes (N=230)

Variable	Category	Number (n)	Percentage (%)
Duration of jaundice	< 3 days	28	12.2
	3–7 days	67	29.1
	8–14 days	89	38.7
	> 15 days	46	20
Associated symptoms	Dark urine	187	81.3
	Severe fatigue	176	76.5
	Loss of appetite	165	71.7
	Abdominal pain	148	64.3
	Nausea / Vomiting	123	53.5
Prior medical consultation	Yes	67	29.1
	No	163	70.9
Subsequent hospitalisation	Yes	48	20.9
	No	182	79.1
**Multiple answers possible*			

Interpretation: There is a significant delay in seeking biomedical care: **70.9%** of participants did not consult any healthcare professional before starting traditional treatment. Clinically, the prevalence of dark urine (81.3%) suggests conjugated hyperbilirubinemia.

3.3. Inventory of medicinal plants used

The use of traditional medicine is diverse, dominated by the use of *Vernonia amygdalina*.

Table 3: Medicinal plants administered for jaundice (n=230)

Common name	Scientific name	Part used	Preparation	Number of cases (n)	%
Fizayi	*Vernonia amygdalina*	Leaves	Decoction	87	37.8
Losombo	*Aloe vera*	Gel	Maceration	54	23.5
Lifwa	*Carica papaya*	Leaves	Decoction	41	17.8
Nzau	*Cassia occidentalis*	Leaves	Powder	38	16.5
Kimbau	*Cinchona spp.*	Bark	Decoction	29	12.6
Mbonda	*Khaya senegalensis*	Bark	Maceration	23	10
Elombo	*Artemisia afra*	Leaves	Decoction	17	7.4
Others	Miscellaneous	-	-	18	7.8

Toxicological note: Although *Vernonia amygdalina* is traditionally used as a hepatoprotective agent, its sesquiterpene lactones pose a risk of hepatotoxicity in the elderly (Ngbolua et al., 2020). Similarly, the use of *Cinchona spp.* is of concern due to the risks of cardiac arrhythmias and cinchonism (Chen et al., 2020).

3.4. Complications and adverse effects

The use of herbal medicine in these elderly patients is associated with significant iatrogenic effects.

Table 4: Adverse effects reported following traditional treatment (n=230)

Type of complication	Number (n)	Percentage (%)
Worsening of jaundice	63	27.4
Severe vomiting	58	25.2
Increased abdominal pain	52	22.6
Severe diarrhoea	47	20.4
Dizziness	34	14.8
Bleeding (nose, gums)	11	4.8
Loss of consciousness	6	2.6
Total (at least one effect)	149	64.8

Analysis: Nearly **65%** of participants reported at least one adverse effect. The paradoxical worsening of jaundice (27.4%) highlights the hepatic vulnerability of older people and suggests either direct toxicity of the plants or a missed opportunity due to delayed management of an obstructive or viral condition.

3.5. Bivariate analysis: factors associated with worsening jaundice

The cross-tabulation analysis shows that several demographic and cultural factors significantly influence the clinical course of patients receiving traditional treatment.

Table 5: Association between sociodemographic variables and worsening of jaundice

Variable	Modality	Worsening Yes (n=63)	Worsening No (n=167)	Chi²	p-value
Age	60–69 years	18 (18.4%)	80 (81.6%)	11.87	0.003
	70–79 years	26 (29.9%)	61 (70.1%)		
	80 years and over	19 (42.2%)	26 (57.8%)		
Education	None	35 (36.5%)	61 (63.5%)	9.87	0.02
	Primary +	28 (21.0%)	106 (79.0%)		
Income	< USD 50	48 (33.3%)	96 (66.7%)	8.94	0.011
	≥ 50 USD	15 (17.4%)	71 (82.6%)		
Belief	Witchcraft	36 (38.3%)	58 (61.7%)	8.59	0.003
	Other/No	23 (22.1%)	81 (77.9%)		
Information	Not informed	52 (31.3%)	114 (68.7%)	4.47	0.034
	Informed	11 (17.2%)	53 (82.8%)		

Analysis: A **social gradient of risk** is observed: very advanced age (≥ 80 years), lack of education and financial insecurity are strongly correlated with poor outcomes. It should be noted that belief in a mystical cause (witchcraft) increases the risk of deterioration (38.3%), often acting as a barrier to hospital consultation.

3.6. Multivariate logistic regression

To identify the independent predictors of serious complications (requiring hospitalisation), a logistic regression model was applied.

Table 6: Factors independently associated with serious complications (Logistic regression model)

Variable	Reference category	Odds Ratio (OR)	95% CI	p-value
Age ≥ 80 years	Age 60–69 years	3.87	[1.92 – 7.81]	<0.001
Age 70–79	Age 60–69	2.14	[1.07 – 4.28]	0.031
No education	In education	2.56	[1.34 – 4.89]	0.004
Income < 50 USD	Income ≥ 50 USD	2.34	[1.18 – 4.63]	0.015
Belief in witchcraft	Absence	1.98	[1.08 – 3.63]	0.027
Lack of information	Informed in advance	2.87	[1.32 – 6.24]	0.008
Use of Cinchona	Other plants	2.51	[1.13 – 5.58]	0.024
Female	Male	0.92	[0.51 – 1.66]	0.782
Distance > 5 km	Distance < 1 km	1.35	[0.68 – 2.68]	0.395

Nagelkerke R^2 = 0.347; Percentage of correct classification = 76.5%.

Summary of regression results

The final model shows that six variables remain significantly associated with the risk of hospitalisation after adjustment:

1. **Very advanced age (≥ 80 years):** This is the strongest predictor (OR = 3.87), confirming the pharmacological frailty of the very elderly.

2. **Lack of information on risks:** Increases the risk of serious complications by nearly threefold (OR = 2.87).

3. **The use of *Cinchona spp*.:** Specifically associated with complications (OR = 2.51), probably due to its cardiac and hepatic toxicity.

4. **Social and cultural factors:** Low income and belief in witchcraft remain independent structural barriers.

Conversely, **gender** and **geographical distance** lose their statistical significance, suggesting that their initial influence was mediated by socio-economic status or educational level.

4. Discussion

4.1. Main findings and comparison with the literature

This study provides the first detailed characterisation of the risks associated with traditional treatments for jaundice among older people in Mbandaka. The main finding is alarming: nearly two-thirds of participants experienced an adverse effect, and one in five was hospitalised. These proportions far exceed those reported in previous studies on herbal medicine in Africa, which generally cite rates of side effects ranging from 10 to 30% (Chen et al., 2020). The discrepancy is likely due to the specific characteristics of the elderly population, whose impaired hepatic metabolism increases the toxicity of xenobiotics (Farnsworth & Rosen, 2018).

The list of plants partially overlaps with that of Ngbolua et al. (2020) in the DRC, but with different frequencies: Vernonia amygdalina is by far the most common (37.8%), whilst other plants such as Cassia occidentalis appear to be used less than elsewhere. This regional variation highlights the importance of local contexts in therapeutic choices.

4.2. Risk factors and clinical implications

Multivariate analysis highlighted a range of social, cultural and pharmacological risk factors. Age ≥80 years (OR = 3.87) is the strongest determinant, implying that the very elderly should be subject to increased vigilance when herbal medicines are prescribed. This finding is consistent with pharmacokinetic data showing a 30–40% reduction in hepatic clearance of drugs after the age of 75 (Chen et al., 2020).

A lack of education and low income double the risk of hospitalisation, illustrating social inequalities in health in terms of access to information and quality care (Bokamba & Mpassi, 2021). The belief that jaundice is caused by witchcraft, held by 40.9% of participants, constitutes a major cultural barrier to early medical consultation. This finding confirms the anthropological observations of Lokola and Etshindo (2022) in Mbandaka.

The association between the use of Cinchona spp. and a high risk of hospitalisation (OR = 2.51) warrants particular attention. The quinine present in this bark can cause a syndrome known as cinchonism (tinnitus, vertigo, visual disturbances), as well as cytolytic hepatitis and cardiac arrhythmias, which are particularly dangerous in older adults

who often have cardiovascular comorbidities (Chen et al., 2020). Traditional healers and families should be made aware of these specific risks.

4.3. Implications for geriatric nursing

Several recommendations emerge from these findings. Firstly, systematically questioning elderly patients with jaundice about the possible use of herbal medicines should become standard practice among nurses in Mbandaka. Secondly, therapeutic education sessions targeting families and traditional practitioners must be developed, emphasising the warning signs (worsening jaundice, bleeding, altered consciousness) that require immediate referral to hospital. Thirdly, a respectful, two-way dialogue with traditional healers, recognising their cultural legitimacy whilst discussing the risks, is preferable to a blanket ban, which would be ineffective.

4.4. Limitations of the study

This research has several limitations. The cross-sectional design does not allow for the establishment of a causal relationship between traditional treatments and complications, nor does it rule out the effect of the underlying disease itself. The absence of laboratory tests (bilirubin, transaminases, creatinine) does not permit objective confirmation of either the diagnosis of jaundice or liver toxicity. As data collection relied on participants' memories, recall bias may have been introduced, particularly as the episode of jaundice sometimes occurred several months prior. Finally, caution is required when generalising the results to other regions of the DRC or Central Africa due to local variations in flora and cultural practices.

5. Conclusion

Traditional treatments for jaundice in the elderly in Mbandaka are associated with a very high incidence of adverse effects (64.8%) and hospitalisations (20.9%). Vernonia amygdalina, Aloe vera and Carica papaya are the most commonly used plants, but Cinchona spp. carries a particularly high risk of serious complications. Very advanced age (≥80 years), lack of education, poverty, belief in a witchcraft-related cause, and lack of prior information constitute independent risk factors.

As a public health and social emergency, these findings argue for the cautious yet realistic integration of the issue of herbal medicines into the initial and continuing training of nurses in Mbandaka. Community-based therapeutic education initiatives, which respect local beliefs yet are scientifically grounded, are necessary to reduce iatrogenic harm among the elderly.

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