

The Problem of Traditional African Pharmacopoeia in Obstetrics: Use of Plants for Utero-Tonic Purposes and Materno-Fetal Outcome in Douala (Cameroon)

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Abstract

Introduction: The use of traditional preparations for the induction or acceleration of labor remains a common practice in our country in particular and in Africa in general with sometimes derogatory outcomes for the mother and the fetus. **Goal:** The objective was to assess immediate maternal and neonatal outcomes in women who reported having used the traditional pharmacopoeia for utero-tonic purposes. **Methodology:** We conducted a multi-centric cross-sectional study with prospective data collection in the maternities of the Laquintinie Hospital, Bonassama District and Nylon Hospitals. It took place over a period of seven months, from 1st October 2016 to 31st April 2017. This included all women who reported having used the unconventional pharmacopoeia for utero-tonic purposes before or after contractions started. The student and Chi-square tests were interpreted at the statistical threshold of 5% and the 95% confidence intervals. **Results:** We recruited 168 cases, 68.5% of the 245 women interviewed. The mean age was 27.1 ± 0.41 years; 55% of our respondents had a secondary level of education; 80% of them were admitted at term and 43% were multiparous. Nulliparity predisposed to traditional pharmacopoeia use (RR = 1.55, CI = 0.79 - 3.03) but primiparity reduced this

risk (RR = 0.4, CI = 0.24 - 0.926). Stimulation of labor was the first indication in 85% of women, the rectal evacuation enema was the main route used (67%). The majority of plants used were those of the families Asteraceae, Anthericaceae, and Malvaceae. In per partum, 42% had a brilliant dilatation; there was a statistically significant association between the occurrence of dynamic dystocia (CI = 0.28 - 1.54, $p = 0.006$) and the risk of perineal tear (RR = 3.13, CI = 1.68 - 5.85; $p = 0.007$). The APGAR score at 5 min of life was less than 7 in 64% of cases ($p = 0.027$). The caesarean section rate was 69%. **Conclusion:** Traditional products with uterotonic effects are frequently used and unregulated with its corollary of materno-fetal complications.

Keywords

Utero-Tonic Plants, Hyperkinesia, Fetal Distress, Caesarean Section

1. Introduction

The relations between plants and men have existed since antiquity [1]. Plants, vital components of biological diversity, are used primarily for human well-being. In Africa, the use of medicine and traditional pharmacopoeia is very common in the countryside and even in urban areas. This situation could be explained by the poverty of the populations, the insufficiency of infrastructures and personnel in modern medicine, but also by religious or superstitious considerations [2]. Despite the progress of Western medicine, few people in Africa have taken a step back from traditional medicine. It provokes infatuation among the population at all levels because it is the secretion of our socio-cultural milieu. Africans, regardless of their social status or level of education, remain attached to their traditions and often resort to it whenever the need arises. Cosmogonic perceptions and religious beliefs reinforce this trend. As a result, the belief in the harmlessness of medicinal plants because of their natural origin makes them an alternative to conventional therapy [3]. In the United States, some pregnant women use *Calophyllum thalictroides* for its utero-tonic effect [4]. In China, traditional herbal preparations account for between 30% and 50% of drug consumption [5]. In France, Sophie Barbelet demonstrated the utero-tonic effect of the essential oil of *Syzigium aromaticum* [6]. In Ivory Coast, KoffiN'guessan *et al.* in 2010 highlighted the use of 34 plant species, to facilitate childbirth [7]. Studies in South Africa estimated that between 43% and 55% of women used traditional oxytocics during pregnancy [8].

Another study in Nigeria found that 62% of women surveyed had used herbal medicines during pregnancy [9]. In Kenya and Ghana, traditional birth attendants provided herbal medicines to women during pregnancy or delivery for their utero-tonic effects [10] [11]. The fact that traditional medicines can have utero-tonic effects is an important aspect of public health [12]. Studies in Malawi and Uganda have suggested that traditional medicines may be involved in a sig-

nificant proportion of maternal deaths [13] [14]. Other studies have suggested that herbal medications may be involved in maternal and fetal adverse events such as uterine rupture or foetal asphyxia [15] [16]. In Cameroon, several studies have been conducted including those of: Esther Ngadjui *et al.* in March 2013, on the in vitro evaluation of the utero-tonic activity of *Ficusasperifolia* extract in rats. It had found a similar utero-tonic activity to that of oxytocin [17]. Kidik-Pouka *et al.* in a study conducted in 2015 highlight the use by populations of flavonoid plants to facilitate childbirth [18]. Ngene *et al.* in 2015 identify plants used to facilitate deliveries [19]. It is in this context that we conducted this study on the different plants and utero-tonic substances of informal use in maternity of hospitals in Douala, to appreciate the materno-foetal outcome and hope to contribute to the improvement of knowledge on this pharmacopoeia.

2. Methods

This was a multicentric cross-sectional study with prospective data collection conducted at Laquintinie Hospital in Douala and at Bonassama and Nylon District Hospitals over a seven-month period from October 1st, 2016 to April 31st, 2017. This included any woman who reported having used an unconventional pharmacopoeia for utero-tonic use as a self-medication before or after the onset of uterine contractions. A standardized form was submitted to them and then a survey in nature with visual identification of the substance was carried out for determination of the scientific name. This form included, in addition to the names of the plants, the sociodemographic, gestational and clinical variables collected in the records of the deliveries. The evaluation of uterine contractions (UC) was done by external tocography to record intensity, frequency and duration of the UCs. The operational definitions were:

- hyperkinesia of frequency: >5 UC/10 min;
- hyperkinesia of intensity: >80 mmHg at the tocograph or >3 +++ by manual method;
- excluded were those having benefited from conventional oxytocics or having benefited from a mixture of conventional oxytocics and medicinal plants.

- Sampling

We proceeded to a consecutive recruitment of the pregnant women for the study with a basic sample set at 245.

$$n = z^2 P(1-P)/d^2$$

So, $n = 245$.

$P = 80\%$ study done on the use of medicinal plants in Africa [20].

- Procedure

After obtaining the various research authorizations from the directors of the Laquintinie Hospital of Douala, Bonassama District and Nylon District Hospitals, and the Ethics and Institutional Committees, we proceeded on the one hand to the recruitment of parturients and post-partums, on the other hand, the harvesting of plant samples.

The recruitment procedure concerned parturient in the delivery room, post-partum deliveries as well as postoperative caesarean section women meeting the eligibility criteria, followed by the collection of data in the collection form pre-conceived for the study.

Prospecting and harvesting of the plant material consisted of the presentation of the samples to the interviewees for validation before their deposit at the Cameroonian national herbarium to obtain the scientific names.

The therapeutic properties of these plants were determined using documentation related to the work on phytochemical screening.

The data obtained was entered and processed with CSPRO 6.2, Microsoft Excel 2010, and SPSS version 20 software, and expressed as frequencies, averages and proportions. Statistical analyses were performed, with the student t-test used for quantitative variables and Chi 2 tests for qualitative variables, with a statistical threshold of $p \leq 0.05$ and 95% confidence intervals; all parturient signed a consent form.

3. Results

We included 168 deliveries out of 245 surveyed (77 respondents reported using made-up plants and bark that we could not record), a frequency of 68.5% of our deliveries. The mean age was 27.17 ± 0.41 years with extremes of 16 and 43 years and a peak in the range of 23 - 32 (69%). Our study population was predominantly married (42%), with a secondary level of education (54%) and an income generating activity (70%) (**Table 1**).

Table 1. Sociodemographic variables.

Variables	Category	Frequency	(%)
N = 168			
Age	16 - 22	27	16
	23 - 32	115	69
	33 - 43	26	15
Level of education	Uneducated	5	3
	Primary	11	7
	Secondary	92	54
	University	60	36
Income generating activity	Yes	118	70
	No	50	30
Marital status	Married	70	42
	Single	50	30
	Concubine	45	27
	Divorced	1	0.6
	Widow(er)	2	1.2

Many of them were in their first use (52%) and 54% had a favorable and healthy opinion of this practice (**Table 2**); 80% of them were admitted at term and 43% were multiparous. Nulliparity predisposed to traditional pharmacopoeia use (RR = 1.55, CI = 0.79 - 3.03), but primiparity reduced this risk (RR = 0.4, CI = 0.24 - 0.926) (**Table 3**). Stimulation of labor was the primary indication for 85% of women (**Table 4**).

The maternal survey identified 22 plants used for supposed utero-tonic effects and hibiscus was the most commonly used, 25% of cases (**Figure 1**). Leaves were the most commonly used plant parts in the plant in 75% (**Figure 2**) prepared mainly by maceration (**Figure 3**) and a use most often by rectal enema evacuator (**Figure 4**).

This use exposed some of them to pejorative consequences with statistically significant incidences of 42% of brilliant dilatations (70 cases) with labor time < 4 h (OR: 1.45; IC: 0.35 - 2.68) $p = 0.00028$; 70% (117 cases) of intensity hyperkinesia (OR: 1.27; IC: 0.79 - 1.08) $p = 0.001$; 33% (55 cases) of dynamic dystocia (OR: 1.10; IC: 0.28 - 1.52) $p = 0.006$; a high rate of caesareans, 69% (116 cases) (OR: 1.11; IC: 0.26 - 5.49) $p = 0.007$ with 64% (112 cases) of newborns with a poor Apgar score at the 5th minute of life (OR: 1.14; IC: 0.3 - 11.13) $p = 0.027$ and 45% (75 cases) perineal tears (OR: 3.13; CI: 1.68 - 5.85) $p = 0.007$ (**Table 5**).

Table 2. Perception of the participants about the use.

Variable	Responses	Frequency	%
Opinion on the use of traditional utero-tonics	Saine	90	54
	Dangereux	78	46
Utilisation antérieure	Oui	80	48
	Non	88	52

Table 3. Risk of use and parity.

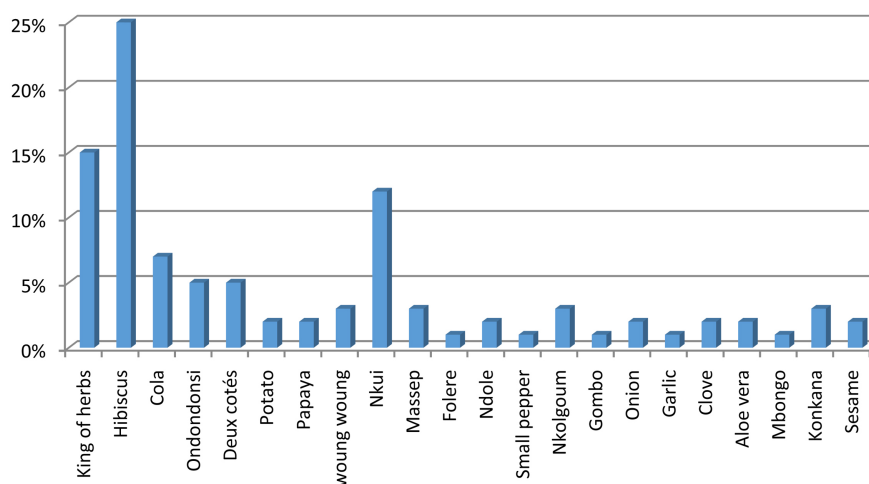
	Yes		No		P	RR	CI 95%
	N = 168	%	N = 77	%			
Nulliparous	30	18	24	31	0.039*	1.55	0.79 - 3.03
Primiparous	66	39	16	21	0.020*	0.47	0.24 - 0.926
Multiparous	72	43	37	48	0.571		

Table 4. Obstetrical characteristics.

Variable	N = 168	%
Gravid formula	Nulliparous	30
	Primiparous	66
	Multiparous	72
Term of use (weeks)	37 - 39	110
	39 - 41	58
Indication	Induction	26
	Stimulation	142

Table 5. Materno-foetal complications.

Use of traditional utero-tonics	Yes		No		RR	CI 95%	p
	N	%	N	%			
Complications during first use	156	93	12	7	0.40	0.23 - 0.97	0.0001
Duration of labor ≤4 h	70	42	98	58	1.45	0.35 - 2.68	0.0028
Hyperkinesia of frequency	125	75	43	25	0.96	0.79 - 2.68	0.041
Hyperkinesia of intensity	117	70	51	30	1.27	0.79 - 1.08	0.001
Foetal distress	107	64	61	36	0.45	0.87 - 2.64	0.037
Dynamic dystocia	55	33	113	67	1.10	0.28 - 1.52	0.006
Caesarienne section	115	69	53	31	1.11	0.26 - 5.49	0.007
Poor Apgar et 5th min	112	66	56	34	1.24	0.3 - 11.13	0.027
Perineal tear	65	39	103	61	3.13	1.68 - 5.85	0.007

**Figure 1.** Frequency of use of the different plant.

4. Discussion

1) Prevalence

In our study, we recorded 168 women who admitted to using an utero-tonic plant (68.57%). This prevalence is similar to that obtained in Nigeria by Olu-sanyo *et al.* in 2010 (62%) [9], from Titilayo *et al.* in 2009 (68%) [21]. However, it is higher than those obtained by Mothupi *et al.* in Kenya in 2014 (12.5%) [22], Nyeko *et al.* in 2016 in Uganda (20%) [23]. The prevalence of the use of plants and substances for utero-tonic purposes is variable in the literature and is explained by the variability of crops, study environments and indications.

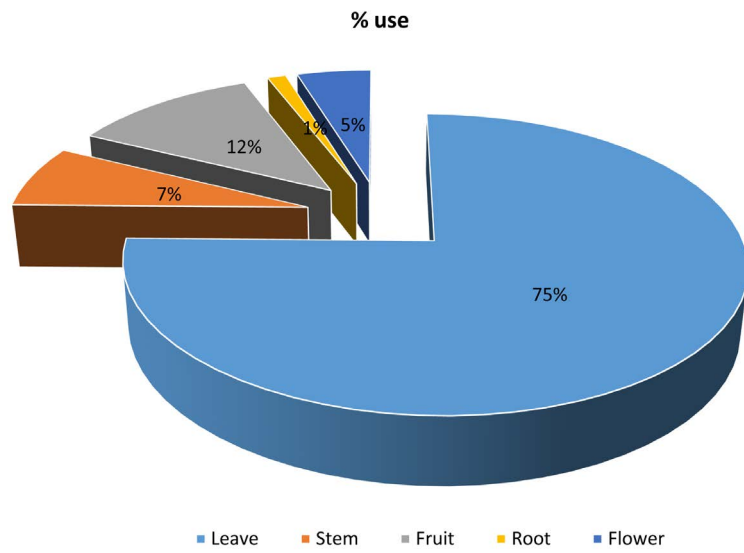


Figure 2. Plant parts mainly used.

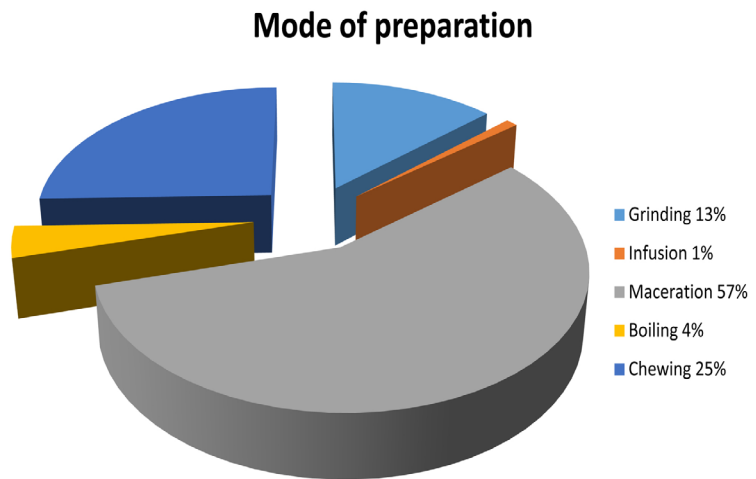


Figure 3. Declared mode of preparation.

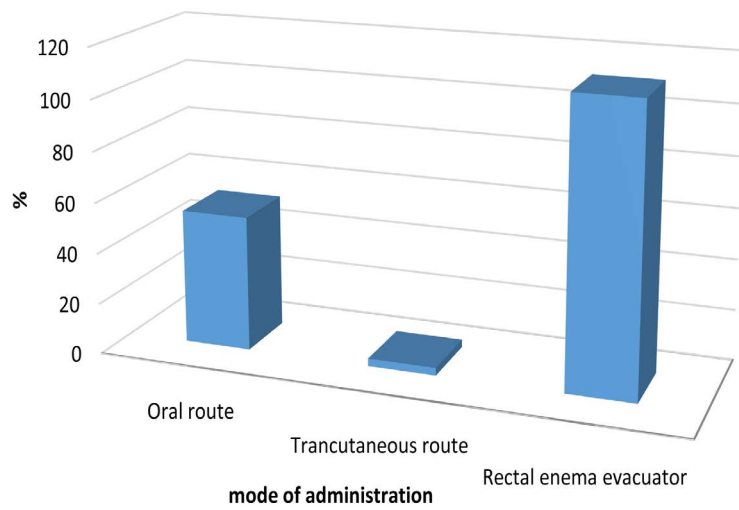


Figure 4. Mode of administration.

2) Socio-demographic characteristics

- **Age:** The average age in our series was 27.17 years, with extremes of 16 and 43 years old. These results are similar to those of Nyeko *et al.* in Uganda in 2016 (25.32 years) [22]; Aka *et al.* in Ivory Coast in 2016 (26.55 years, 17 - 35 years) [24]; Dika *et al.* in 2017 in Tanzania (26.6 years old) [25]. These age groups correspond to the physiological phase of reproduction of women.
- **Parity:** Multiparas were the majority (72 women, 43%), followed by primiparas (66 women, 39%) and nulliparas (30 women, 18%). These results are similar to those of Nyeko *et al.* In 2016 in Uganda (multiparas 22, 6%; primiparas 12.6%) [22]. However, they contrast with those of Aka *et al.* 2016 in Ivory Coast (nulliparous 51.42%, primiparas 18.57%, multiparous 10%) [24].
- **Educational level:** The population of our series consisted mainly of secondary school (55%) and university (36%) levels. This result differs from that of Nyeko *et al.* in 2016 in Uganda (secondary level 20%) [22].
- **Term of use:** In the same way as the data from the literature, the use of utero-tonic plants exclusively concerned the third trimester of pregnancy in our sample. These results are similar to those obtained by Aka *et al.* in 2016 in Ivory Coast (100% 3rd trimester) [24], Kamatenesi *et al.* 2007 in Uganda (91% in the 3rd trimester) [26]; Astin *et al.* in 1996 in Malaysia (80% in the 3rd trimester) [27]. However, these results contrast with those obtained by Nyeko *et al.* in Uganda in 2016 (2nd trimester 23.1%, 3rd trimester 20.5%) [23].

The variability in the period of use of plants in pregnancy can be explained by the difference in purpose and objective of use.

3) Factors associated with the use of plants

- Parity had a statistically significant difference. Nulliparas were more likely to use them than primiparas or multiparous. These results are consistent with those of Nyeko *et al.* 2016 in Uganda [23], where a statistically significant difference was found in terms of parity. However, these results contrast with those of Aka *et al.* 2016 in Ivory Coast [24], where no statistically significant difference was found.

4) Indications

The plants were used to facilitate deliveries. Two main indications emerged: Induction 15% and stimulation 85%. These results corroborate those obtained by Azriani *et al.* in 2008 [28] in Malaysia and M'soka *et al.* 2015 in Zambia [29] who found stimulation as their first indication (78%, 89.9%); Dika *et al.* in 2017 in Tanzania (88%) [25]; Rolanda *et al.* in 2006 in South Africa report the use of plants to increase uterine tone [30].

5) Route of administration

The rectal evacuation enema was the primary mode of utero-tonic use (67%), followed by oral (31.5%) and transcutaneous (1.5%). These results are similar to those of Aka and al in 2016 in Côte d'Ivoire, where the rectal route was mostly used (51.41%) [24].

However, other authors report a predominance of the oral route. Report made by: N'guessan *et al.* in 2010 in Côte d'Ivoire (oral route 45.23%, enema 42.85%) [7]; Nyeko *et al.* in Uganda in 2016 (69.2% oral, 19.36% skin application) [23]. This discrepancy, in our opinion, is due to the cultural disparity of the surveyed communities.

6) Complications

Both maternal and fetal complications were observed when utero-tonic plants were taken in our series. Frequency hyperkinesia, intensity hyperkinesia, fetal distress, dynamic dystocia, an APGAR score of less than 7, brilliant dilatation, and perineal tears showed a statistically significant difference. The immediate consequence was a doubling of the number of caesareans with a frequency of 69% and the duration of labor influenced the mode of delivery. These results are similar to those obtained by Aka *et al.* in Côte d'Ivoire in 2016, who had foetal heart rate abnormalities, dynamic dystocia and a caesarean section frequency of 68.57% [24]; Ezechi *et al.* in Nigeria in 2004 who found uterine rupture complications [31]; Guerrier *et al.* in 2013 in Nigeria and Johnson *et al.* in 2009 in Nigeria revealed the occurrence of neonatal asphyxia [32] [33].

7) Plants and substances

a) Floristic inventory: During this study, we identified 22 plants belonging to 16 botanical families. This result differs from that of Nguessan *et al.* in 2010, with 34 plants belonging to 24 families [7]. In contrast to Nguessan whose study was rural, our study was based on the urban environment.

b) Botanical family: The listed plants belonged mostly to families: Asteraceae, Anthericaceae, Malvaceae. Nguessan *et al.* in 2010 in Ivory Coast found Euphorbiaceae and Fabaceae mainly [7]. However, there are similarities in the families Asteraceae, Euphorbiaceae, Zingiberaceae. This is because tropical plants are common to most of sub-Saharan Africa. This variability is due to the different methods of investigation (localities and vegetation).

c) Plant part: The most used part was the leaf (75%), followed by fruits (12%), and finally stems (7%). This result is consistent with that obtained by Ngene *et al.* in 2015 [19] in an ethnobotanical survey in the city of Douala (52%). However, this result contrasts with those obtained by Nguessan *et al.* in 2010 [7] where stems and their bark were mostly used (45.92%). This is because our plants were mostly herbaceous with easy access to the leaves. Unlike the Ivorian study where the predominance of trees was noted making it difficult to access the leaves.

d) Mode of preparation: Maceration is the most popular method of preparation (57%), followed by chewing (25%) and grinding (13%). This result is close to that established by Adjanohoun and Aké Assi (1979). However, this result contrasts with that of Nguessan *et al.* in 2010 in an ethnobotanical study had found kneading (69.70%) [7]. This is explained by the fact that in our study the most used vegetable part was the leaves whose maceration is the best mode of extraction. Nguessan *et al.* 2010 had found the bark whose best extraction is kneading [7].

e) Secondary metabolites: The plants resulting from our investigation and which were used for their utero tonic effect by the parturient are globally flavonoids and alkaloids. These results corroborate those of N'guessan *et al.* in Ivory Coast 2009 [34]: flavonoids of the flavanone type, indole alkaloids and pyrrolizidine alkaloids (Nacoulma 1996) have utero-tonic effects; Gruber *et al.* 2011 reveals that certain chemical compounds found in plants have the potential to trigger uterine contractions [35].

f) Plants and studies: Of the plants in the study, *Hibiscus rosa-sinensis* belonging to the family Malvaceae was the most used by 25% of parturient. It possesses utero-tonic properties due to flavonoids. Nguene *et al.* in 2015 found similar results in an ethnobotanical study of flavonoid plants. In this study, *Hibiscus-rosa-sinensis* was used to facilitate childbirth [19].

5. Conclusion

The reported use of utero-tonic plants in pregnant women is an effective practice at the Hospital Laquintinie; this practice is more the responsibility of multiparas and induces dynamic dystocia, a high rate of caesarean section with a bad neonatal state. Given the maternal and foetal complications reported in our study, it is necessary to initiate case-control studies with hibiscus mainly used in our study in order to assess its operability and thus the prevention of uncontrolled issues.

Limits of the Study

We have not been able to identify all utero-tonic plants of informal use. Such were the case of those in the form of made-up products and the barks and concerned 77 surveyed.

The concept of utero-tonic plants was declarative and therefore subjective, which could lead to over or underestimation of the effect.

The dosage and the dose-effective effect were not analysed in our study. This therefore limits any relevance in the analysis and conclusion.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

Authors' Contributions

Essome collected the data and wrote the article, Mve, Ekono, Nana, Boten, Penda, Tocki, Foumane read and corrected the article and Mboudou corrected and supervised the writing of the article.

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