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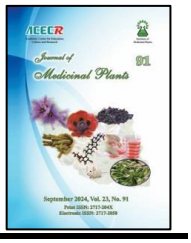

Research Article

Exploring abortifacient perspectives on the use of *Achyranthes aspera* L. and *Dendrocalamus hamiltonii* Nees & Arn. ex Munro among Karbi tribe of Assam, Northeast India

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ABSTRACT

Background: The Karbi, an indigenous tribe of Assam, uses ethnomedicinal plants for unintended pregnancies. **Objective:** The present study describes two important ethnomedicinal plants (*Achyranthes aspera* L. and *Dendrocalamus hamiltonii* Nees & Arn. ex Munro) for inducing abortion and its physicochemical and phytochemical characterization. **Methods:** Physicochemical analysis performed by simple determination techniques. **Results:** The parameters in physicochemical analysis revealed that plants are potential source of phytomedicine. The pH are slightly acidic to alkaline, signifying good value for oral administration; moisture content are in the acceptable range; highest in *A. aspera* (8.9%). The total ash content is highest in *A. aspera* (6.89 %), and higher water soluble ash (20%) signifies presence of water soluble active compounds. The value of Carr's index and Hausner ratio indicates the powder drugs signify good powder compressibility. Active phytocompounds identified in the plants like Methyl glyoxal, Arsenous acid tris (trimethylsilyl) Ester and phenol, 3-Phenoxypropionic Acid, showed potential reproductive and developmental toxicity. These compounds can be predicted as a candidate drugs as per SwissADME drugs parameters (GI absorption, BBB access, Bioavailability, P-gb substrate and drugs likeness). **Conclusion:** The knowledge of dosing and handling of the medicinal plants are cautiously practiced by the tribe and physicochemical properties helped to understand the nature and quality control of the herbal formulations. The ADME parameters of the compounds shows drugs likeness properties as per bioavailability radar and thus the compound identified in this two plants can be predicted as an orally active plant based drugs likely to be used as abortifacient agents.

1. Introduction

The Karbi tribe is one of the prominent indigenous tribe of Northeast (NE) India with unique traditions and cultures, distinct from other ethnic groups of the region. They are inhabiting in Karbi Anglong district (25°30/ to 26°36/N and

Abbreviations: GI, Gastrointestinal; BBB, Blood Brain Barrier; ADME, Absorption, Distribution; Metabolism and Excretion; P-gp, Permeability of Glycoprotein; TBA, Traditional Birth Attendant

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92°90/ to 93°54/E) in the state of Assam and adjoining parts of the North Eastern states of India and are well known for therapeutic utilization of plants drugs for various ailments including gynaecological issues [1-3].

They give immense importance to pregnancy related issues like managing the unintended pregnancies through traditional ethnomedicinal practices followed by rituals. Abortifacient are medicinal plant drugs that induce abortion for unintended pregnancies; the latter are defined as pregnancies that are unwanted, unplanned or mistimed at the time of conception and are the major reproductive health issue [4]. Managing the unintended pregnancy is most important issue and many a times, it result in adverse health effect to the mother causing various risk pregnancy complication [5]. The management practices for self induced abortion for unintended or risk pregnancies among the Karbi tribe have been carried out since time immemorial; such unintended pregnancies are identified by elderly women and Traditional Birth Attendants (TBA) who are exclusively elderly women and they managed such issue through self induced abortion at early pregnancies.

Plants has many active phytocompounds and these are used in traditional remedy and many a times, form the raw materials for the pharmaceutical industry and hence study of its bioactive compound (s) are important [6-8]. Pharmacognostic studies including physicochemical properties and organoleptic studies ensures plant identity, lays down standardization parameters to help in authentication of the plants and ensures reproducible quality of herbal products for safety and efficacy of natural products [9, 10].

Medicinal plants and its extracts have been reported to be used in treatment of various diseases including gynaecological problem in many Indian tribal societies along with its phytochemical screening [11, 12]. Plants used in traditional gynaecological management among the Karbi have been reported by few researcher [1, 3] but physicochemical and phytochemical analysis of abortifacient plants for unplanned and risk pregnancies have not been reported. The two medicinal plants, *Achyranthes aspera* L. and *Dendrocalamus hamiltonii* Nees & Arn. ex Munro are very common, locally available plants that are well utilize for many purposes including the use as abortifacient among the Karbi. The medicinal plants were selected based on the popularity of its usage and availability of the plants and its efficacy as claimed by traditional medicinal practitioner. Hence the present paper describes the physicochemical and phytochemical characterization of two important medicinal plants used as traditional abortifacient. Such evaluations are required for scientific studies for assurance of uniformity of the quality of formulations and SwissADME analysis helps to predict the druglikeness properties of the medicinal plants to be used as plant based orally active drugs.

2. Materials and Methods

2.1. Collections and identification of the plant

Fresh parts of the plant specimens - stem of *A. aspera* and culm (long hollow internode/stem) of *D. hamiltonii* were collected from Karbi Anglong district, Assam, India (25° 57' 2.952" N92° 43' 7.86" E; 26^0 02′11″N 093^0 24′ 27″E and 25^0 53′55″N 093^0 26′ 31″E) for the experiments. The plant material used in the present study is locally available in abundance in the study areas; the former as seen as weeds while the latter are conserved and grown in their home stead garden because of its economic and cultural utilities. The plant morphology were studied on spot with due permission from the village head and the informants involved. The flowering twigs along

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with its required parts of *A. aspera* while the fresh tender culm were collected from the study area without disturbing its natural habitat, following local and national guidelines for plant collections for identifications purposes and for herbarium specimen. The plant was identified following standard literatures [13-15] and the herbarium specimen was deposited in the Herbarium of Department of Botany, Gauhati University (GUBH), Guwahati, Assam, and in the herbarium of Botany Department, Nowgong College (A), Assam, India (GUBH 19178 Dated 23/01/2021; NCBOT HRB 27 Dated 09/07/2023)

2.2. Drying and processing

The fresh parts of the plant sample (stem and culm) were washed properly to remove dust and dirt and were shade dried for about one week at room temperature with occasional indirect sunlight also. After drying, these are then grounded into a coarse powder with the help of a blender. The grounded powder was sieved and the powder was used for determination of physicochemical and phytochemical analysis and preparation of various solvent extracts (Fig. 1).

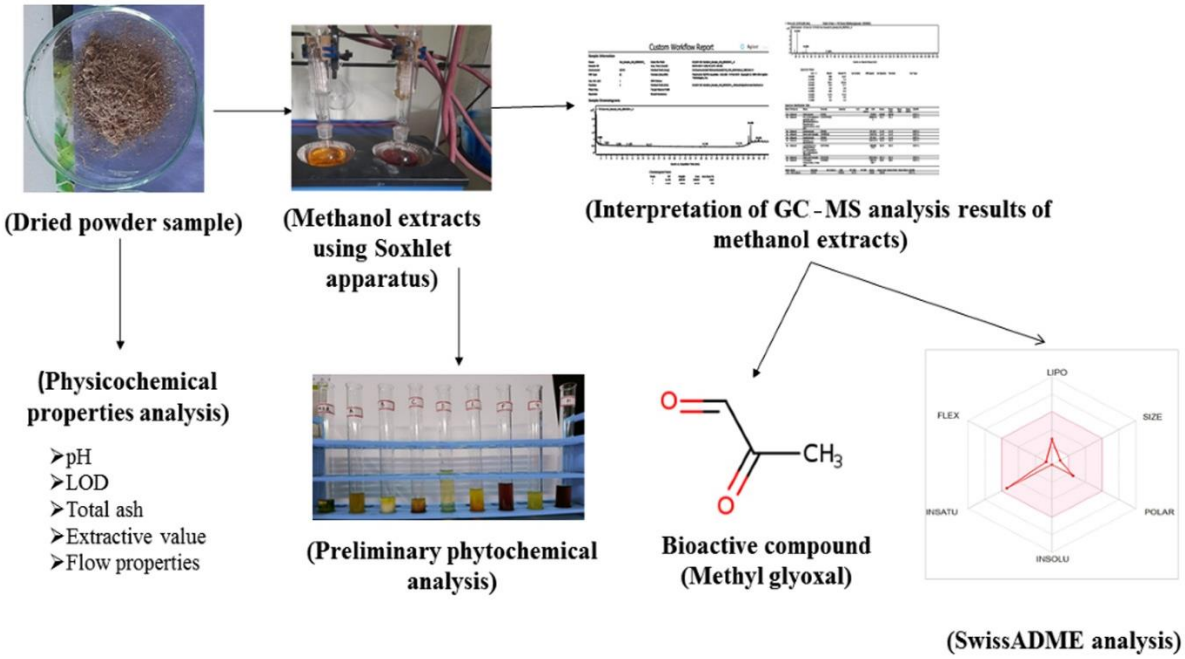

Fig. 1. Representative methods for the analysis of powder extract of plant sample (stem extract of *A. aspera*)

2.3. Pharmacognostic studies and determination of Total physicochemical parameter

Fresh parts of the plants as stated above are studied for its macroscopic characters. Morphological studies i.e. macroscopic parameters and organoleptic studies like shape, size, color, odor and taste were carried out by using simple determination technique [16]. The evaluation of physicochemical properties of the medicinal plant is essential for the assessment of the quality of medicinal plants and the sample powder was carried out for the determination of pH, swelling index, Flow properties (Hausner ratio, Carrs index), Loss of moisture on drying (LOD), total ash, water soluble ash, soluble extractive values (Methanol, water and alcohol) following standard methods [6, 16]. Each study was performed in triplicate and mean values with standard deviation (SD) were calculated.

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2.4. Preparation of the methanolic extract

All the chemicals required for the present study were of analytical grades purchased from local vendors. 10 g of samples powder was weighed using digital weighing balance and were packed in a Soxhlet apparatus and continuous extraction was done with 150 ml of Methanol for 16 hours after adjusting temperature boiling point of solvent i.e., 64.6° C. The extract obtained was concentrated at 50°C and stored in a dessicator.

2.5. Preliminary phytochemical screening

Preliminary phytochemical screening (Flavonoids, Tannins, Phenolic compound, Saponins, Terpenoids, Phlobatannins and Steroids) was done to analyses the bioactive compound present in the plant sample following standard procedure with a little modification [17, 18, 19]. The qualitative result are expressed as + for the presence and as – for absence of phytochemical compound.

2.6. In silico ADME profile

The physicochemical, drug-likeness and pharmacokinetic properties of phytochemical compounds, identified from the methanol extract of the plant sample, were analyzed using an online server (http://www.swissadme.ch/ accessed on 02-02-2024) for prediction of ADME (absorption, distribution, metabolism, and excretion).

3. Result

3.1. Medicinal plants as traditional abortifacient

The two plants – *A. aspera,* and *D. hamiltonii* are important ethnomedicinal plants used among the Karbi tribe having potential abortifacient activity and its parts used, along with its dosage and administration are shown in Table 1. The selections of parts of the plants, their dosage, mode of administration and formulations are strictly handled by elderly women and men, particularly the traditional birth attendant, having sound knowledge of traditional gynaecology or as per suggested by traditional medicinal practitioners. Oral administration is the most preferred mode of administration followed by local application (stem insertions). All the traditional formulation is prepared in water and no other solvent is used for the purpose. The part used, amount applied, dosage and mode of administration of the various extract of the medicinal plants are listed in Table 1.

The traditional methods of using the plants for managing unintended pregnancy are discussed below –

Table 1. Medicinal plants used as abortifacient and its mode of administration and dosage

Sl No.	Scientific Name and Family	Parts used	Amount/No. (Approx.)	Dosage and administration
1	*Achyranthes aspera* (GUBH 19178) (Amaranthaceae)	Stem	7-12 cm stem length	Stem inserted into reproductive tract.
2	*Dendrocalamus hamiltonii* (NCBOT HRB 27) (Poaceae)	Culm	10-15 ml	Freshly filtered ash filtrate (10-15 ml) are orally taken, twice a day for three consecutive days or till traces of blood is felt.

3.1.1. Achyranthes aspera

A. aspera (Fig. 2) belonging to family Amaranthaceae, has long been utilised as an important ethnomedicinal medicinal plants since time immemorial among the Karbi tribe [3]. The smooth, fresh stem of about 7 to 12 cm, is inserted

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into the reproductive tract carefully, usually during early pregnancy (first trimester) to cause abortion. The stem is often incised superficially to allow its extract to spread and induce abortion.

3.1.2. The use of the stem ash filtrate of Dendrocalamus hamiltonii

The use of the stem ash filtrate of *Dendrocalamus hamiltonii* (Fig. 3) as an abortifacient agent have been in practiced since time immemorial among the Karbi tribe and are reported for the first time. The hollow stem (culm), are dried and charred to obtain the ashes. Usually, the charred ashes are also collected from Jhum field after clearing the forest for cultivation, as practiced in many Northeastern states of India. The freshly collected ashes are filtered using traditional strainer or alkali distiller, locally called "*Phelobisir*", a conical shaped bamboo item crafted out of bamboo splits. Freshly collected ashes are placed into this "*Phelobisir*", added water slowly and the ash filtrate is collected on a bowl. The highly alkaline ash filtrate of about 10 -15 ml (approx.) of charred culm ash are taken orally twice a day to be continue till traces of blood comes during the initial stage of pregnancy to cause an abortion.

Fig. 2. Habit and inflorescence of *Achyranthes aspera* L.

Fig. 3. Culm (hollow internode/stem) of *Dendrocalamus hamiltonii*.

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3.2. Pharmacognostic studies of the medicinal plants used as abortifacient

3.2.1. Macroscopic parameters and Organoleptic studies

Macroscopic identity of plant materials is based on shape, size, colour, surface characteristics, texture and appearance of the cut surface.

Solid woody almost smooth and cylindrical stem of *A. aspera* are usually selected for medicinal purpose. The stem of *A. aspera* is woody, solid, cylindrical with sparse hairs and its size vary; the internode is 1.3 cm in diameter while the nodal portion is about 1.5-2 cm in diameter with light to pale green having characteristics smell. Fresh root is light brown to reddish brown like colour while dried root is translucent brown, pale colour when bark is removed; its surface is rough and wavy. The hollow stem (culm) of *D. hamiltonii* is cylindrical, about 12-18 cm in circumference but for its purposes, young, tender stem are usually selected to charred to ashes.

3.3. Determination of total physicochemical properties of the medicinal plants use as abortifacient

The pH of the aqueous extract of different parts of the selected plants is slightly acidic to alkaline which signify good value for oral administration. The pH of the aqueous extract of *A. aspera* is 7.54 respectively while that of *D. hamiltonii* is 6.92 but its ash filtrate is highly alkaline (10.87). The pH are in the acceptable range in between 4.0 -7.5 for herbaceous plants, shrubs and trees while for edible foods reported to be in between 2.0 – 9.0 [20, 21]. The total moisture content or weight loss on drying (LOD) in *A. aspera* are 8.9 ± 0.01% (stem) while in *D. hamiltonii*, the LOD is 5.6 ± 0.01 % respectively (Table 2).

Table 2. Physicochemical properties of important medicinal Plants having abortifacient activity.

Sl No.	Physicochemical Parameter	*A. aspera*	*D. hamiltonii*
1	pH	7.54	6.92
2	Loss on Drying (%)	8.9 ± 0.01 %	5.6 ± 0.01 %
3	Total ash (% w/w)	6.89 ± 0.011 %	4.4 ± 0.01 %
4	Water soluble ash (% w/w)	20 ± 0.001	17 ± 0.01
5	Water soluble extractive %	10.4 ± 0.001 %	10.0 ± 0.001 %
6	Methanol Soluble extractive %	11.83 ± 0.001 %	4.78 ± 0.001 %
7	Ethanol soluble extractive %	1.13 ± 0.001 %	0.8 ± 0.001 %
8	Bulk density	0.16g/ml	0.15g/ml
9	Tapped density	0.18g/ml	0.17g/ml
10	Hausner Ratio	1.12	1.13
11	Carr's index (%)	6.7 %	12.12 %

The total ash content and water soluble ash of the two different medicinal plants are analyzed and presented in Table 2. *A. aspera*, and *D. hamiltonii* have recorded a total ash content of 6.89 %, and 4.4 ± 0.01 % and its water soluble ash as 20.0 ± 0.001 mg/g and 17.0 ± 0.001 mg/g respectively. Ash analysis was done to judge the identity or purity of crude drugs and more ash content indicates presence of earthy materials and impurities like carbonate, oxalate and silicate [20, 22]. The extractive values of the crude drugs for various solvent were determined and the yield of water soluble extractive in *D. hamiltonii* (10.0 ± 0.001 %) were more in comparison to methanol soluble extractive with 4.78 ± 0.001 % while in *A. aspera*, the extractive value in water extract (10.4 ± 0.001 %) is almost equal with methanol

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extract (11.83 ± 0.001 %,); the least extractive value were found in ethanol (Table 2). The flow properties of the powder drugs for the parameters - bulk density, Tapped density, Carr's index and Hausner ratio were presented in Table 2. *A. aspera* has Carr's index and Hausner ratio as 6.7 % and 1.12 respectively indicating good compressibility. According to Chandel *et al*., 2011 and Etti *et al*. 2014 [23 24], a carr's index below 15 % and Hausner's ratio below 1.25 is considered as good flowability. Carr's index and Hausner's ratio of *D. hamiltonii* is 12.12 % and 1.13 which also shows good flowability indicating good parameters for assessment of quality of medicinal plants as per WHO standard [6].

3.4. Phytochemical characterizations

Qualitative analyses of phytocompounds reveal the presence of various bioactive compounds (Table 3). The methanol extract was found to contain important phytocompounds like flavonoids, phenolic, saponins and alkaloids in both the plants except terpenoids which remain absent in *A. aspera*; Tannin remain absence in the reported medicinal plants. Previous investigation also reveals the presence of the same compound in stem of *A. aspera* [25, 26].

Table 3. Preliminary phytochemical analysis of three medicinal plants used as abortifacient

Sl. No.	Constituent	Test	*A. aspera*		*D. hamiltonii*	
			Met.	Aq.	Met.	Aq.
1	Flavonoids	i. NaOH Test	+	+	+	+
		ii. Lead Acetate	+	+++	+	+
2	Tannins	Ferric chloride Test	_	_	_	_
3	Phenolic	Ferric chloride Test	+	_	+	_
4	Saponins	Frothing Test	+	_	+	+
5	Alkaloids	Dragendorffs Test	+	+	+	+
6	Terpenoids	Salkowski's Test	_	_	+	_
7	Phlobatannins	HCl Test	_	_	_	_
8	Steroids	Salkowski's Test	_	_	_	_

Met = Methanol extract and Aq = Aqueous extract;
Here, '+++' indicates present abundantly, '++' moderate amount, '+' in trace amount and - indicates absence of the phytocompounds.

3.5. Bioactive compounds and its SwissADME properties

The physicochemical, lipophilicity, drug-likeness, and pharmacokinetic properties of phytochemical compounds, identified from GC-MS analysis of the methanolic extract of the plant sample were estimated using an online server for ADME prediction, SwissADME (http://www.swissadme.ch/), which is a free user friendly webtool for prediction of drug likeness of a molecule, a predictive computer based model [27]. Important bioactive compounds such as Methyl glyoxal, Carbohydrazide, Heptasiloxane, hexadecamethyl-, 3-Phenoxypropionic Acid, Phenol, 3-Methyl-5-(1- Methylethyl)- and Methylcarbamate identified from the two medicinal plants, *A. aspera* and *D. hamiltonii* along with its ADME are presented in Table 4. Methyl glyoxal, having a molecular weight of 296.5 g/mole, identified from the stem extract of *A. aspera* are reported to show embryonic implantation incompetence, cause injury to embryonic, fetal development and defects to subsequent development [28, 29]. The extract also revealed the presence of Arsenous Acid, Tri (Trimethylsilyl) Ester and this compound

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are reported to be toxicant and teratogenic as well as carcinogenic [30, 31].

Compounds identified from the stem extract of *D. hamiltonii* like, Phenol, 3-Methyl-5-(1-Methylethyl)- are known to show high level of developmental and reproductive toxicity; another compound, 3-Phenoxypropionic Acid are herbicidal in activity, hence toxic while Arsenous Acid, Tri (Trimethylsilyl) Ester are toxicant and teratogenic [32, 33]. All the compounds have high Gastrointestinal (GI) absorption characteristics and can cross blood brain barrier (BBB) except the compound Methyl glyoxal (Table 4). Drug likeness properties of the selected compounds were evaluated using the bioavailability radar to understand their oral bioavailability based on the important physicochemical properties [27]. For a molecule to be drug like, the optimal range for each property is depicted as a pink region in the radar. Within this pink region, a radar plot of the molecule must completely fall in order to be classified as drug-like.

Table 4. The ADME properties of selected bioactive compounds of medicinal plants use as abortifacient.

Bioactive Compound	Pharmacokinetics				Druglikeness	
	GI absorption	BBB permeant	P-gp substrate	Log K_p (skin permeation)	Bioavailability Score	Lipinski's rule
Methyl glyoxal	High	No	Yes	-7.72 cm/s	0.55	Yes; 0 violation
Arsenous Acid, Tri (Trimethylsilyl) Ester	High	Yes	Yes	-5.22 cm/s	0.55	Yes; 0 violation
Phenol, 3-Methyl-5-(1-Methylethyl)	High	Yes	No	-5.36 cm/s	0.55	Yes; 0 violation
3-Phenoxypropionic Acid	High	Yes	No	-6.28 cm/s	0.85	Yes; 0 violation

Gastrointestinal (GI), Blood-Brain Barrier (BBB), Permeability of Glycoprotein (P-gp)

4. Discussions

4.1. Ethnomedicinal uses of plants as abortifacient

The ethnomedicinal plants reported in the present study are utilized for managing unintended pregnancies and both these plants are equally important and its choice of selection depends upon suggestions of the medicinal practitioner, birth attendant and upon availability of the plants in the local areas. Although, the measures are not openly practiced but whenever required, this are made easily available by the local herbal practitioner, elderly women, birth attendant etc. The Karbi are using *A. aspera*, as an important abortifacient since time immemorial. The leaves and root are also reported to have abortifacient effect [11, 34]. This is an exploited plant used as antifertility, abortifacient, anti-implantation and the presence of bioactive compound like calcium, potassium, saponins, ecdysterone, achyranthine, and inokosterone significantly shows 100 % abortifacient at 200 mg/kg [34, 35]. Tender culm of *D. hamiltonii* was analysed for the presence of bioactive compound having potential activities of inducing abortion of unwanted pregnancy. Traditionally, filtrate of the charred ashed are used as an important abortifacient agent since ages; hence the bioactive compound showing efficacy for inducing abortion are studied insilico for ADME drug likeness.

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4.2. The traditional concept of unintended pregnancies and induced abortion

In Karbi society, a pregnant woman is considered revered and due respect is shown to her by the people and observed many traditional practices and restrictions and taken oral ethnomedicines as well for the overall well being of the mother and her fetus [1].They considered pregnancy and child birth as part of womanhood and are given outmost importance when it is related to management throughout the stage of pregnancy and continue till parturition and child care. When a woman intend spacing between children after a year or two or when she wants no more children but conceived either due to failed contraceptives, then unplanned and unintended pregnancy occur. In such case, the woman seeks the advice of traditional birth attendant or herbal practitioners for its solution and goes for ethnomedicinal method for inducing abortion, usually only during the first trimester only. When a woman is unhealthy, sick, ailing for months and seems she could no longer continue her pregnancy as it may pose treats to her life, then in such case also, the tribe considered it as unintended pregnancy. To summarized, the need for self induced abortion is only for the reasons like spacing between children, to limit numbers of children and also for risked pregnancy. Above all, traditional medicines is the source for managing unintended pregnancy and knowledge of this practice has been passed orally from one generation to another where elders, both men and women and Traditional Birth Attendant are the custodians of such invaluable knowledge.

4.3. Physicochemical analysis for the assessment of quality of traditional medicinal formulation

Evaluation of physicochemical properties including determination of macroscopic and microscopic characteristics of the medicinal plant is essential for the assessment of quality of medicinal plants [6, 9]. Macroscopic identity of herbal materials is based on shape, size, colour, surface characteristics, texture, fracture characteristics and appearance of the cut surface. The moisture content is in the acceptable range. Previous investigation shows the moisture content in *A. aspera* shows similar finding [36]. Water soluble ash content gives the crude estimate of the water soluble extractable matter present in the ash. Water here acts as an important solvent since all medicinal formulation prepared by the Karbi medicinal practitioner used water as the only sovent. It is worth to mention that the charred ash of *D. hamiltonii* are dissolved in water and its filtrate, a highly alkaline solution are used for oral administration to cause abortion of unintended pregnancy. The higher water soluble ash content indicates the presence of highly soluble bioactive compound that shows potential abortifacient activity; hence, the role of water soluble ash content is important. The amounts of extracts obtained by extracting the crude drug with different solvent are indicative of approximate measures of their chemical constituents of crude drugs such as tannins, sugars, plant acids, mucilage, glycosides etc. [37]. It gives an idea of which solvent is to be used for extraction of bioactive compound to obtain the maximum yield. Hence, the more the extractive value, the higher would be the extract of biologically active compound. Water, here, is an ideal solvent for extraction of various phytocompounds for traditional formulations. The powder drug of the ethnomedicinal plants (*A. aspera and D. hamiltonii*) shows good flowability which indicates good parameters for

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assessment of quality of medicinal plants as per WHO standard.

4.4. Biological activities of selected compound and its SwissADME profiling

Using an online server for ADME, the compound identified were studied for various physicochemical properties. The selected compounds in *D. hamiltonii* have high GI absorptions and non substrate of P-gp except arsenous acids, tris (trimethylsilyl) ester. Skin permeations shows a negative value which implies the compound are not permeable through skin and are not suggested candidates for transdermal drug delivery. The compounds are considered druglikeness based on its bioavailability score (0.55 to 0.88) and obeying Lipinski's rule with 0 violations. The pharmacokinetics parameters as illustrated in SwissADME webpage for *A. aspera* stem depicts good oral absorption with good bioavailability score (0.55) that can be predicted as an orally active drug-like compound signifying the orally administered compounds reaches systemic circulation based on Lipinski's rule [38, 39]. The bioavailability radar of Methyl glyoxal shows falling in the pink region which signifies their good bioavailability as oral drugs. Skin permeation parameters shows negative value, which implies that the compounds are not permeable through skin and hence are not suggested candidates for transdermal drug delivery. Similarly, in *D. hamiltonii*, the bioavailability radar 3-Phenoxypropionic Acid, Arsenous Acid, Tris (Trimethylsilyl) Ester, are seen falling in the pink region suggesting orally bioactive drugs as well as having high GI absorption. So, all the compounds present in *D. hamiltonii* can be predicted as orally active drugs since it has good oral absorption with good bioavailability score signifying the orally active drugs. All the compounds has high GI absorption indicating a suitable pharmacokinetics parameters that can be predicted as a candidate drugs for further drugs discovery process [40]. Methyl glyoxal and Arsenous Acid, Tri (Trimethylsilyl) Ester are the substrate of the Permeability glycoprotein (P-gp) which is an essential biological barrier for removing toxins and plays a significant role in drug absorption and disposition [40]. The compound presented in Table 4 illustrated good oral absorption with good bioavailability score (0.55) that can be predicted as an orally active drug-like compounds [38, 39]. Skin permeation parameters shows negative value which implies that the compounds are not permeable through skin and hence are not suggested candidates for transdermal drug delivery.

5. Conclusions

Self induced abortion for unintended pregnancy using ethnomedicinal plants are a needed practices performed by traditional birth attendant since time immemorial. This practice is being carried out from generation to generation but it is decreasing due to availability and consciousness about medical facilities. Such induced abortion performed by birth attendant, though are not trained but they learned their expertise through years of service and experience and also through observation from other elderly birth attendant. The knowledge of dosing and handling of the medicinal plants are outmost important and cautiously practiced by the Karbi since ages. In order to be scientifically safe and sound, an alternative measures to safe abortion using the bioactive compound from this traditional medicinal plants in the form of processed pharmaceutical drugs may be suggested. Hence, the physicochemical

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properties of the ethnomedicinal plants use as abortifacient are essential so as to understand the nature of the powder drugs and quality control of the herbal formulations and also it can be consider as an important pharmaceutical products for abortifacient in the near future. The ADME parameters of the compounds shows drugs likeness properties along with its bioavailability radar and thus the compound identified in *A. aspera* and *D. hamiltonii* can be predicted as orally active plant based drug that can be considered an important abortifacient agents.

Author's contributions

First author, RT, contributed to concept mapping, ethnobotanical investigations, perform laboratory experiments and analysis of data, interpret and cross-checked the data and writing the manuscript; Second author, FY, involved in the improvement of the manuscript and cross-checked the data. All authors read and approved the final manuscript.

Conflict of interest

Authors do not have any conflict of interests to declare.

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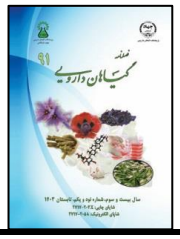

مقاله تحقیقاتی

بررسی دیدگاه‌های سقط جنین در استفاده از *Achyranthes aspera* L. و *Dendrocalamus hamiltonii* Nees & Arn. ex Munro در میان قبیله کربی از آسام، شمال شرقی هند

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اطلاعات مقاله

گل‌واژگان:

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بارداری ناخواسته

ترکیب فعال زیستی

داروهای خوراکی موثر

قبیله کربی

فراهمی زیستی

شباهت به دارو

چکیده

مقدمه: قبیله کربی، قبیله بومی منطقه آسام هندوستان، از گیاهان دارویی منطقه با دانش بومی خود برای مقابله با بارداری‌های ناخواسته استفاده می‌کند. **هدف:** مطالعه حاضر دو گیاه مهم مورد استفاده در دانش بومی منطقه (قوم گیاهشناسی) شامل (*Achyranthes aspera* L. و *Dendrocalamus hamiltonii* Nees & Arn. ex Munro) را برای القای سقط معرفی کرده و خصوصیات فیزیکوشیمیایی و فیتوشیمیایی آنها را توصیف می‌کند. **روش بررسی:** آنالیزهای فیزیکوشیمیایی با تکنیک‌های ساده آزمایشگاهی مشخص شد. **نتایج:** آنالیز پارامترهای فیزیکوشیمیایی نشان داد که گیاهان مورد نظر منبع بالقوه درمان‌های گیاهی هستند. pH عصاره کمی اسیدی تا قلیایی است که نشان‌دهنده ارزش مناسب آن برای تجویز خوراکی است. میزان رطوبت در محدوده قابل قبول است و بیشترین در *A. aspera* (۸/۹ ٪) دیده می‌شود. محتوای خاکستر کل بالاتر نیز در *A. aspera* (۶/۸۹ ٪) است و خاکستر محلول در آب بیشتر (۲۰٪) نشان‌دهنده وجوداجزای فعال محلول در آب است. مقدار شاخص Carr و نسبت Hausner دلالت می‌کند که داروهای پودری تراکم‌پذیری خوبی دارند. ترکیبات گیاهی فعال شناسایی شده در گیاهان مانند متیل گلیوکسال، اسید آرسنوس تریس (تری متیل سیلیل) استر و فنل و ۳-فنوکسی پروپیونیک اسید سمیت بالقوه تولیدمثلی و رشدی را نشان دادند. پیش‌بینی می‌شود که بر اساس پارامترهای دارویی SwissADME شامل (جذب GI، دسترسی BBB، فراهمی زیستی، بستر P-gb و شباهت داروها) این ترکیبات را می‌توان به عنوان داروهای موثر بر سقط معرفی کرد. **نتیجه‌گیری:** دانش تعیین میزان و نحوه استفاده از گیاهان دارویی با احتیاط توسط افراد قبیله انجام می‌شود. پارامترهای ADME ترکیبات، خواص شباهت داروها را بر اساس فراهمی زیستی نشان می‌دهد و بنابراین ترکیبات شناسایی شده در این دو گیاه را به عنوان یک داروی گیاهی فعال خوراکی که به عنوان عوامل سقط جنین استفاده می‌شود، می‌توان معرفی کرد.

مخففها: GI، گوارشی؛ BBB، سد خونی مغزی؛ ADME، جذب، توزیع، متابولیسم و دفع؛ P-gp، نفوذپذیری گلیکوپروتئین؛ TBA، متصدی زایمان سنتی

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