

# Pharmacognostic Investigation Of Dried Powdered Leaves Of Traditional Medicinal Plant *Microdesmis Puberula* Used For Stopping Excessive Bleeding Of Women During Menstruation In Sierra Leone

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**Abstract:** Pharmacognostic investigation was carried out on dried powdered Leaves of traditional medicinal plant *Microdesmis puberula* used for stopping excessive bleeding of women during menstruation in Eastern Province of Sierra Leone. The powdered stem bark was found to be dark green in colour with a characteristic grass flavour and bitter taste indicating that the plant organ investigated contained alkaloids. Some constituents gave fluorescence colour changes with the reagents 1M NaOH(aq.), 1M NaOH(alc.), Ammonia, 50% HCl, and 50% HNO<sub>3</sub>. Fluorescence analysis has been reported to be one of the parameters for pharmacognostic evaluation of crude drugs in traditional medicinal plants. The results phytochemical screening indicates that carbohydrates, alkaloid, flavonoids, tannins, proteins, sterols/terpenes and saponins are present in the ethanol, methanol and aqueous extracts. The petroleum ether and acetone extracts gave the least concentration of the phytoconstituents investigated. The detection of the above secondary plant metabolites support the use of the plant in traditional medicine Elemental analysis on the dried powdered Leaves of *Microdesmis puberula* was performed with a Niton XL3t GOLD + Hand held X-ray Fluorescence (Thermo Fisher). The Niton Hand held XRF Instrument uses Ag-anode X-ray tube with a voltage of 50kV and equipped with a Si-drift detector (SDD). Accurate energy and efficiency calibrations of the spectrometer were made using a certified reference material – SRM 1573a – Tomato Leaves supplied by the International Energy Agency (IAEA), Vienna, Austria. The spectrum acquisition time was 480sec for the sample and the dead time was around 50%. A total of fifteen elements (K, Ca, Mg, Al, Ti, V, Mn, Fe, Cu, Zn, Rb, Sr, Zr, Mo, and Sc) were investigated using EDXRF. The results indicated that plant organ contained large amounts of nutrients and were rich in K (31614 ± 178.00 ppm), Ca (10872 ± 147.00 ppm), Mg (8122 ± 1434.00ppm), Al (5727 ± 258.00 ppm) and Fe (2670.7 ± 25.46ppm). The other elements present in smaller quantities were Ti (875 ± 21.00 ppm), Zr (129.36 ± 1.29 ppm), Mn (126.34 ± 13.31 ppm), Zn (119.53 ± .33ppm), Sr (68.88 ± 0.94ppm), Sc (68.00 ± 12.00ppm), Rb (45.01 ± 1.00 ppm), Cu (23.57 ± 4.46ppm), V (11.99 ± 7.50 ppm) and Mo (4.46 ± 0.81ppm). The presence of potassium, iron, calcium and magnesium in the dried powdered Leaves of *Microdesmis puberula* plant also support the use of the plant in controlling excessive blood loss during menstruation in women.

**Key words:** Pharmacognosy, therapeutic efficacy, phytochemicals, menorrhagia, herbal medicine and mineral analysis

## 1. Introduction

The cold decoction of dried powdered Leaves of traditional medicinal plant *Microdesmis puberula* used for stopping excessive bleeding of women during menstruation in Eastern Province of Sierra Leone.

### Local vernacular names in Sierra Leone

Mende: NIKILI

Kono: NINŋGINE

Kissi: KPεNDEILE

A poultice of the leaves *Microdesmis puberula* mixed with clay is reported to cure scabies [1]. It has also been reported elsewhere in Sierra Leone that the cooked Leaves of *M. puberula* with another plants are used for dysentery; mend fractures and joint pains, eye trouble; and expel pus from boils [2]. The fruits are reported to be used as a laxative, acquire immunity from boils, and the bark and leaves are used as an enema [3]. *Microdesmis puberula*; Hook F. ex Planch (Pandaceae) is a dioecious plant that can grow up to a height of about six meters if not harvested or prematurely cut [4]. It occurs predominantly from Eastern Nigeria down to DR Congo and Uganda. In Nigeria its local names include Mkpiri or Mbugbo in Igbo; Idi-apata in Yoruba and Ntabit in Ibibio language [5]. It has been reported that various parts of *M. puberula* (stem bark, leaves and roots) are used for several medicinal purposes [6, 7]. In Eastern Nigeria, the roots of *M. puberula* plant are used in the treatment of

gonorrhoea and erectile dysfunction [7, 8 and 9]. The analgesic and anti-stress properties of *M. puberula* have recently been reported [5]. Several polyamine derivatives were earlier identified in the hydromethanolic root extract of this plant [8, 9]. *M. puberula* is widely used in traditional medicine, the stem bark, leaves and roots have numerous medicinal uses throughout the plant's distribution area. The leaf sap, or crushed and burnt twigs and roots, are applied to snakebites or to scarification, applied as an enema to treat diarrhoea, stomach-ache, intestinal worms and genital problems such as menstrual complaints, sterility, miscarriage, loss of virility and venereal diseases, treat skin problems such as eczema, scabies, burns, circumcision wounds, abscesses and sores from gonorrhoea, treat malaria and cough, as eye drops to treat blurred vision and as ear drops to treat ear infections and used as a parturient to ease delivery, treat renal pain and severe headache [10]. Despite the wild traditional use of the plant, very little research has been carried out into the plant although traces of alkaloids have been detected in the stems and roots. Trace elements are essential components of biological structures that mediate vital effect on and play a key role in a variety of the biochemical processes necessary for life. Excessive levels higher than that needed for biological functions of these elements can be toxic for the body health. Hence any Pharmacognostic investigation of traditional medicinal plants without mineral analysis cannot be completed.



**FIGURE 1: Photo of the Fruiting branches with leaves of *Microdesmis puberula***

## 2.0. Materials and Methods

### Collection and preparation of dried plant materials

Fresh Leaves of *Microdesmis puberula* were harvested from the Gola Forest and sun-dried for 4-7 days. After drying, the dried Leaves are reduced in size by crushing it into smaller pieces using the hand. After the plant material had been dried, it was each grounded using a laboratory mill and kept in a proper container until the time of the extraction. The plants organ investigated is the Leaves of *Microdesmis puberula* and the image of the Fruiting branches with leaves plant shown in **Figure 1**. A voucher specimen No. 404 of *Microdesmis puberula* was deposited in the Herbarium of the Botany Department, Fourah Bay College (University of Sierra Leone). The plant material was used to carry out the following analyses described below:

*Organoleptic evaluation*  
*Fluorescence analysis*  
*Phytochemical screening*  
*Mineral analysis*

### 2.1. Experimental

#### Organoleptic characters

Organoleptic evaluation was carried out on the dried powdered leaves of *Microdesmis puberula* by means of sense organs, which provide the simplest as well as quickest means to establish the identity and purity to ensure quality of a particular drug. Organoleptic characters investigated [11] are size, colour, odour, taste and texture of the dried powdered fruit with the seeds. The results are shown in **Table 1** and the image of the dried powdered Leaves of *Microdesmis puberula* shown in **Figure 2**.

#### Fluorescence analysis

0.5mg of dried powdered Leaves of *Microdesmis puberula* was placed in a petri dish free from grease and 2-3 drops freshly prepared reagent solution was added, mixed by gentle with a glass rod and waited for few minutes. The following freshly prepared reagents are used; Powder + 1 N NaOH (aq), Powder + 1 N NaOH (alc.), Powder + Ammonia, Powder + Picric acid, Powder + Petroleum ether, Powder + 50% HCl, Powder + 50% H<sub>2</sub>SO<sub>4</sub>, Powder + 50% HNO<sub>3</sub>, Powder + Ethyl acetate, Powder + Ethanol, Powder + Methanol, and Powder + Bromine water. The colours of each of the contents in Petri dish were observed in visible light, short (254 nm) and long (365 nm) ultra violet radiations using a U/V Lamp. A piece of white paper was dipped in

each of the solutions and viewed using both visible light and under the U/V Lamp to compare the colours obtained. The colours observed by application of different reagents in different radiations are recorded [12] as shown in **Table 2**.

#### Phytochemical analysis

Soxhlet extraction was carried out on the powdered plant material using solvents of increasing polarity (i.e. Petroleum ether [60-80 ° C], Acetone, Chloroform Methanol, 95% Ethanol and Water. Each of the solvent extracts was concentrated, reduced to a semisolid mass using a Rotary Evaporator at 50°C and kept in special containers for phytochemical screening. The Phytochemical screening involved testing each of the **Solvent Extracts** for the various classes of secondary plant metabolites. The methods used for detection of various phytochemicals were followed by qualitative chemical test and by standard procedures [13, 14] to give general idea regarding the nature of constituents present in each of the solvent extracts of the plant part investigated [15, 16, 17, 18, 19, 20 & 21]. They are generally tested for the presence secondary plant metabolites such as Carbohydrates, alkaloids, tannins/phenolic compounds, flavonoids, Sterols/triterpenes, Amino acids/proteins and saponins/glycosides etc.

Results are shown in **Table 3**

#### Mineral analysis

#### Sample preparation

Sample was thoroughly washed with pure water and rinsed with double distilled water in order to remove the sand or dust particles and all other surface contamination. The plant sample was then air dried, grounded and homogenized in an agate mortar and sieve through a 250µm diameter sieve. A quantity of 3.0g mass of the powdered sample was weighed with an analytical balance and placed in a sample cup holder.

#### Sample analysis

Elemental analysis of the sample was performed with a Niton XL3t GOLDD + Hand held X-ray Fluorescence (Thermo Fisher). The Niton Hand held XRF Instrument uses a Ag-anode X-ray tube with a voltage of 50kV and equipped with a Si-drift detector (SDD). Accurate energy and efficiency calibrations of the spectrometer were made using a certified reference material – SRM 1573a – Tomato Leaves supplied by the International Energy Agency (IAEA), Vienna, Austria. The spectrum acquisition time was 480sec for the sample and the dead time was around 50%. X-Ray Fluorescence has long been recognized as a powerful technique for the qualitative and quantitative elemental analysis. It has the advantage of being non-destructive, multi-elemental, fast and cost-effective. Furthermore, it offers a fairly uniform detection limit across a large portion of the Periodic Table and is applicable to a wide range of concentrations. In this study, a total of fifteen elements (K, Ca, Mg, Al, Ti, V, Mn, Fe, Cu, Zn, Rb, Sr, Zr, Mo, and Sc) were determined in the dried powdered Leaves of *Microdesmis puberula* plant by using EDXRF. The mean concentrations of various metals in the plant sample are shown in **Table 4**.



**FIGURE 2:** EDXRF used for elemental analysis of powdered plant sample

EDXRF technique is well suited for multi - elemental determinations in plant samples. The samples do not need any chemical treatment and any possible contamination is therefore avoided. XRF is one of the sensitive, rapid and simple analytical techniques to study the essential element content of medicinal plants [22, 23]. Many trace elements play significant roles in various physiological and biochemical events. Excessive levels of these elements in medicinal plants could lead to toxicity. Food and Nutrition Board recommends calcium intake as 1000 mg/day whereas the recommended daily intake of sodium and potassium are 1500 mg/day and 2300 - 3200 mg/day, respectively [24].

### 3.0. Results and Discussions

The results of organoleptic evaluation of the dried powdered Leaves of *Microdesmis puberula* plant are reported in **Table 1** below with the photo of the dried powdered Leaves of *Microdesmis puberula* plant shown in **Figure 3**

**Table 1:** Results of Organoleptic evaluation of the dried powdered Leaves of *Microdesmis puberula* plant

Plant Organ Investigated	Property Tested				
	Colour	Odour	Taste	Texture	Particle Size
Whole plant	Dark green	Grass flavour	Bitter	Fine Powdered	100 # wire gauge

The bitter taste indicates that each of the powdered plant materials contain alkaloids. The colour of the powdered plant material shown in **Figure 3** will also help who so ever wish to buy and use the plant material for medicinal purpose. It helps prevent adulteration.



**FIGURE 3:** Powdered dry Leaves of *Microdesmis puberula*

#### Fluorescence analysis

The results of fluorescence studies carried out on of the dried powdered Leaves of *Microdesmis puberula* plant using different chemical reagents are given in the **Table 2** below;

**TABLE 2:** Results of fluorescence analysis of the dried powdered Leaves of *Microdesmis puberula* plant

TEST	POWDERED PLANT MATERIAL	VISIBLE/ DAY LIGHT	ULTRA VIOLET LIGHT
1	Powder	Green	Green
2	Powder + 1M NaOH(aq)	Green	Light orange
3	Powder + 1M NaOH(alc)	Green	Bright orange
4	Powder + Ammonia	Light green	Bright orange
5	Powder + Picric acid	Green	Yellow
6	Powder + Petroleum ether	Light green	Black
7	Powder + 50% HCl	Green	Light blue
8	Powder + 50% H <sub>2</sub> SO <sub>4</sub>	Green	Green
9	Powder + 50% HNO <sub>3</sub>	Green	Cream white
10	Powder + ethyl acetate	Green	Green
11	Powder + Ethanol	Green	Black
12	Powder + Methanol	Light green	Black
13	Powder + Br <sub>2</sub> water	Light orange	Black

The above table showed a colour change in reagents 1M NaOH(aq), 1M NaOH(alc.), Ammonia, Picric acid, 50% HCl, and 50% HNO<sub>3</sub>. Some constituents show fluorescence in the visible range in daylight. The ultra violet light produces fluorescence in many natural products which do not visibly fluoresce in daylight. If substance themselves are not fluorescent, they may often be converted into fluorescent derivatives or decomposition products by applying different reagents as illustrated above. Fluorescence analysis is one of the parameters for pharmacognostic evaluation of crude drugs [14] in traditional medicinal plants. Thus the process of standardization can be achieved by stepwise pharmacognostic studies as stated above. This research work helps in identification and authentication of the dried powdered Leaves of *Microdesmis puberula* plant material used in traditional medicine. Such information can act as reference information for correct identification the dried powdered Leaves of *Microdesmis puberula* plant and also will be useful in making a monograph of the plant. Further, it will act as a tool to detect adulterants and substituent and will help in maintaining the quality, reproducibility and efficacy of natural drugs.

#### Phytochemical screening

The Results of Phytochemical Screenings the dried powdered Leaves of *Microdesmis puberula* plant are shown in **Table 3** below

**Table 3:** Showing the Results of Phytochemical Screenings the dried powdered Leaves of *Microdesmis puberula* plant

Experiment		Solvents					
Secondary Plant Metabolites	Tests/Reagents	PZ	AC	CHLO	MeOH	EtOH	Water
Carbohydrates	Molisch's Test	-	-	+	+	++	+++
	Fehling's Test	-	-	+	+	++	+++
	Benedict's Test	-	-	+	+	++	+++
	Barfoed's Test	-	-	+	+	++	+++
	Iodine Test	-	-	-	+	++	+++
Alkaloids	Mayer's Test	-	-	+	++	++	+++
	Hager's Test	-	-	+	++	++	+++
	Wagner's Test	-	-	+	++	++	++
	Dragendroff's Test	-	-	++	++	++	++
Tannins and Phenolic Compounds	Iron(III)Chloride Test	-	-	-	+++	++	+++
	Gelatin Test	-	-	-	+++	+++	+++
	Iodine Test	-	-	-	++	++	+++
	Dil.HNO <sub>3</sub> Test	-	-	-	++	++	+++
Flavonoids	Shinoda's Test	-	-	-	-	-	++
	Lead acetate Test	-	-	-	-	-	+++
	KOH Test	-	-	-	-	-	++
Sterols/Triterpenes	Liebermann-Burchard Test	-	-	-	+	++	++
	Salkowski's Test	-	-	-	+	++	++
Amino acids and Proteins	Biuret Test	-	-	-	+	+	++
	Million's Test	-	-	-	+	+	++
	Xanthoproteic test	-	-	-	+	+	++
Glycosides and Saponins	Keller Kelliani Test	-	-	+	+	++	++
	Borntrager's Test	-	-	+	+	++	++
	Froth Test	-	-	+	+	++	++

**KEY:** PZ = Petroleum ether, AC = Acetone, CHLO = Chloroform, MeOH = Methanol, EtOH = Ethanol; +++ = Intense; ++ = Moderate; + = Slight; - = Absent

Petroleum ether, acetone, chloroform, methanol, ethanol and aqueous crude extracts of the dried powdered Leaves of traditional medicinal plant *Microdesmis puberula* used for stopping excessive bleeding of women during menstruation in Eastern Province of Sierra Leone was evaluated for the presence of secondary plant metabolites. The Phytochemical evaluation according to **Table 3**, revealed from moderate to high contents of carbohydrates, alkaloid, sterols/terpenes, proteins and saponins in the ethanol, methanol and aqueous extracts. All of the solvent extracts apart from the petroleum ether extract revealed slight concentration of flavonoids, tannins and phenolic Compounds. The petroleum ether and acetone extracts gave the least concentration of the phytoconstituents investigated. The detection of the above secondary plant metabolites support the use of the plant in traditional medicine

**Elemental analysis**

The results of elemental analysis carried out on the dried powdered Leaves of *Microdesmis puberula* plant are shown in **Table 4** below;

**Table 4:** Showing the total contents of elements (in ppm) in the dried powdered Leaves of *Microdesmis puberula* plant

Plant Organ	K	± SD	Ca	± SD	Mg	± SD	Al	± SD
Powdered leaves	31614	178.00	10872	147.00	8122	1434.00	5727	258.00
Plant Organ	Ti	± SD	V	± SD	Mn	± SD	Fe	± SD
Powdered leaves	875	21.00	11.99	7.50	126.34	13.31	2670.7	25.46
Plant Organ	Cu	± SD	Zn	± SD	Rb	± SD	Sr	± SD
Powdered leaves	23.57	4.46	119.53	3.33	45.01	1.00	68.88	0.94
Plant Organ	Zr	± SD	Mo	± SD	Sc	± SD		
Powdered leaves	129.36	1.29	4.46	0.81	68.00	12.00		

**Table 4** revealed that all the elementals investigated (K, Ca, Mg, Al, Ti, V, Mn, Fe, Cu, Zn, Rb, Sr, Zr, Mo, and Sc) were accumulated in greater or lesser extent in the dried powdered Leaves of *Microdesmis puberula* plant. The plant organ contained large amounts of nutrients and were rich in **K** (31614 ± 178.00 ppm), **Ca** (10872 ± 147.00 ppm), **Mg** (8122

$\pm 1434.00\text{ppm}$ ), **Al** ( $5727 \pm 258.00 \text{ ppm}$ ) and **Fe** ( $2670.7 \pm 25.46\text{ppm}$ ). The other elements present in smaller quantities were **Ti** ( $875 \pm 21.00 \text{ ppm}$ ), **Zr** ( $129.36 \pm 1.29 \text{ ppm}$ ), **Mn** ( $126.34 \pm 13.31 \text{ ppm}$ ), **Zn** ( $119.53 \pm .33\text{ppm}$ ), **Sr** ( $68.88 \pm 0.94\text{ppm}$ ), **Sc** ( $68.00 \pm 12.00\text{ppm}$ ), **Rb** ( $45.01 \pm 1.00 \text{ ppm}$ ), **Cu** ( $23.57 \pm 4.46\text{ppm}$ ), **V** ( $11.99 \pm 7.50 \text{ ppm}$ ) and **Mo** ( $4.46 \pm 0.81\text{ppm}$ ). It has been reported that the determination of metals in medicinal plants is a part of quality control to establish their purity, safety and efficacy according to the World Health Organization (WHO) [25, 26]. Copper plays an important role in the production of hemoglobin, myelin, collagen and melanin [27]. Potassium participates actively in the maintenance of the cardiac rhythm [28] and in constipation. Low levels of potassium in women leads to irregular, heavy periods, in addition to more painful cramping and other symptoms during menstruation. The powdered plant organ investigated contained very large quantities of potassium (**K** ( $31614 \pm 178.00 \text{ ppm}$ )) supporting the use of the plant as food supplement in preventing excessive bleeding of women during menstruation. Excessive loss of blood during entire menstrual cycle can be prevented if weeks before the start of menstruation, women choose foods packed with potassium to help regulate blood flow during their menstruation. Iron is an essential component of hemoglobin and facilitates in the oxidation of carbohydrates, protein and fat to control body weight, which is very important factor in diabetes. Mineral iron is a useful nutrient in treating menorrhagia. It is well known that iron deficiency is a common consequence of menorrhagia. However, what is less well-known is that iron can also be used to treat menorrhagia. Iron appears to help blood vessels contract, which is important if the body is to bring an end to the bleeding from the womb. The best way to have the level of iron in the body checked is with a blood test called 'ferritin'. If this is low, iron therapy may well help reduce the weight of blood loss during menstrual cycle in women. The plant organ investigated has high iron content [**Fe** ( $2670.7 \pm 25.46\text{ppm}$ )], thus supporting the use of the plant in regulating excessive blood loss by women during menstruation. Copper is an essential nutrient that plays an important role in the production of hemoglobin, myelin, collagen and melanin [27]. **Mn** plays vital role the functioning of all the metabolic processes and its deficiency causes myocardial infarction and other cardiovascular diseases, disorder of bony cartilaginous growth in infants and children, immunodeficiency disorder and rheumatic arthritis in adults [29]. Ca is the main constituent of the skeleton and is important for regulating many vital cellular activities such as nerve and muscle function, hormonal actions, blood clotting and cellular mortality. Low levels of Magnesium, Manganese, Chromium and Zinc cause difficulties in glucose metabolism and can lead to nutritionally induced adult-onset diabetes. They play important role in the process of breaking down glucose and converting it into energy. Magnesium acts as a catalyst in several hundreds of biological reactions, and acts mostly in the glycolytic enzymes [30]. The plant organ investigated contains large amount of magnesium [**Mg** ( $8122 \pm 1434.00 \text{ ppm}$ )]. It helps reducing the pain associated with blood loss during menstruation in women. Additional magnesium intake can help to relax the muscle of the womb and prevent cramping. Zinc makes a very specific contribution in the breakdown of carbohydrate and is involved in the granulation and storage of insulin in the beta cells of the pancreas [31]. Strontium is deposited in relative

large concentration in bones and teeth, replacing part of calcium in hydroxyapatite crystals [32]. Deficiency of copper, zinc, manganese and iodine causes impaired thyroid function.

#### 4.0. Summary

##### Organoleptic characters

Organoleptic evaluation involving the size, colour, odour, taste and texture was carried out on the dried powdered Leaves of **Microdesmis puberula** plant. The powdered stem bark was found to be dark green in colour with a characteristic grass flavour and bitter taste indicating that the plant organ investigated contained alkaloids. The colour of the powdered plant material will also help who so ever wish to buy and use the plant material for medicinal purpose. It helps prevent adulteration.

##### Fluorescence analysis

A portion the dried powdered Leaves of **Microdesmis puberula** plant was placed separately in each of glass petri dishes free from grease and 2-3 drops freshly prepared reagent solution of 1 N NaOH (aq), 1N NaOH (alc.), Ammonia, Picric acid, Petroleum ether, 50% HCl, 50% H<sub>2</sub>SO<sub>4</sub>, 50% HNO<sub>3</sub>, Ethyl acetate, Ethanol, ethanol, and Bromine water added, mixed gently with a glass rod and waited for few minutes for the colours to develop. The colours of each of the contents in various Petri dishes were observed in visible light, short (254 nm) and long (365 nm) ultra violet radiations using a U/V Lamp. The results indicated that Some constituents show fluorescence colour changes in reagents 1M NaOH(aq.), 1M NaOH(alc.), Ammonia, 50% HCl, and 50% HNO<sub>3</sub>. The ultra violet light produces fluorescence in many natural products which cannot visibly fluoresce in daylight. The reagents added convert the compounds into fluorescent derivatives or decomposition products. Fluorescence analysis has been reported to be one of the parameters for pharmacognostic evaluation of crude drugs [16] in traditional medicinal plants.

##### Phytochemical analysis

Soxhlet extraction was carried out on the dried powdered Leaves of **Microdesmis puberula** using solvents of increasing polarity (i.e. Petroleum ether [60-80 °C], Acetone, Chloroform Methanol, 95% Ethanol and Water. Each of the solvent extracts was concentrated, reduced to a semisolid mass using a Rotary Evaporator at 50°C and stored in specialized containers. Phytochemical screening was carried out on the various solvent extracts using standard procedures [17, 18]. The results indicate that carbohydrates, alkaloid, flavonoids, tannins, proteins, sterols/terpenes and saponins are present in the ethanol, methanol and aqueous extracts. The petroleum ether and acetone extracts gave the least concentration of the phytoconstituents investigated. The detection of the above secondary plant metabolites support the use of the plant in traditional medicine

##### Mineral analysis

Elemental analysis on the dried powdered Leaves of **Microdesmis puberula** was performed with a Niton **XL3t GOLD** + Hand held X-ray Fluorescence (Thermo Fisher). The Niton Hand held **XRF** Instrument uses Ag-anode X-ray tube with a voltage of 50kV and equipped with a Si-drift detector (SDD). Accurate energy and efficiency calibrations

of the spectrometer were made using a certified reference material – **SRM 1573a** – Tomato Leaves supplied by the International Energy Agency (**IAEA**), Vienna, Austria. The spectrum acquisition time was 480sec for the sample and the dead time was around 50%. A total of fifteen elements (K, Ca, Mg, Al, Ti, V, Mn, Fe, Cu, Zn, Rb, Sr, Zr, Mo, and Sc) were investigated using **EDXRF**. The results of the current study as shown in **Table 4** revealed that all the metals investigated (K, Ca, Mg, Al, Ti, V, Mn, Fe, Cu, Zn, Rb, Sr, Zr, Mo, and Sc) were accumulated in greater or lesser extent in the dried powdered Leaves of **Microdesmis puberula** plant. The plant organ contained large amounts of nutrients and were rich in **K** ( $31614 \pm 178.00$  ppm), **Ca** ( $10872 \pm 147.00$  ppm), **Mg** ( $8122 \pm 1434.00$ ppm), **Al** ( $5727 \pm 258.00$  ppm) and **Fe** ( $2670.7 \pm 25.46$ ppm). The other elements present in smaller quantities were **Ti** ( $875 \pm 21.00$  ppm), **Zr** ( $129.36 \pm 1.29$  ppm), **Mn** ( $126.34 \pm 13.31$  ppm), **Zn** ( $119.53 \pm .33$ ppm), **Sr** ( $68.88 \pm 0.94$ ppm), **Sc** ( $68.00 \pm 12.00$ ppm), **Rb** ( $45.01 \pm 1.00$  ppm), **Cu** ( $23.57 \pm 4.46$ ppm), **V** ( $11.99 \pm 7.50$  ppm) and **Mo** ( $4.46 \pm 0.81$ ppm). Potassium participates actively in the maintenance of the cardiac rhythm [28] and in constipation. Low levels of potassium in women leads to irregular, heavy blood loss, in addition to more painful cramping and other symptoms during menstruation. The powdered plant organ investigated contained very large quantity of potassium (**K** ( $31614 \pm 178.00$  ppm) supporting the use of the plant as food supplement in preventing excessive bleeding of women during menstruation. Excessive loss of blood during entire menstrual cycle can be prevented if weeks before the start of menstruation, women choose foods packed with potassium to help regulate blood flow during their menstruation. Mineral iron, is a useful nutrient in treating menorrhagia. It is well known that iron deficiency is a common consequence of menorrhagia. However, what is less well-known is that iron can also be used to treat menorrhagia. Iron appears to help blood vessels contract, which is important if the body is to bring an end to the bleeding from the womb. The best way to have the level of iron in the body checked is with a blood test called ‘ferritin’. If this is low, iron therapy will help reduce the weight of blood loss during menstrual cycle in women. The plant organ investigated has high iron content **Fe** ( $2670.7 \pm 25.46$ ppm), thus supporting the use of the plant in regulating excessive blood loss by women during menstruation. Ca is the main constituent of the skeleton and is important for regulating many vital cellular activities such as nerve and muscle function, hormonal actions, blood clotting and cellular mortality. Low levels of Magnesium, Manganese, Chromium and Zinc cause difficulties in glucose metabolism and can lead to nutritionally induced adult-onset diabetes. They play important role in the process of breaking down glucose and converting it into energy. Magnesium acts as a catalyst in several hundreds of biological reactions, and acts mostly in the glycolytic enzymes [30]. The plant organ investigated contains large amount of magnesium [**Mg** ( $8122 \pm 1434.00$  ppm)]. It helps reducing the pain associated with blood loss during menstruation in women. Additional magnesium intake can help to relax the muscle of the womb and prevent cramping. The presence of potassium, Iron, calcium and magnesium in the dried powdered Leaves of **Microdesmis puberula** plant also support the use of the plant in controlling excessive blood loss during menstruation in women.

## 5.0. Conclusion

Pharmacognostic investigation involving organoleptic evaluation, fluorescence analysis, phytochemical analysis and mineral analysis was carried out on in dried powdered Leaves of traditional medicinal plant **Microdesmis puberula** used for stopping excessive bleeding of women during menstruation in Eastern Province of Sierra Leone. The powdered stem bark was found to be dark green in colour with a characteristic grass flavour and bitter taste indicating that the plant organ investigated contained alkaloids. The colour of the powdered plant material will also help who so ever wish to buy and use the plant material for medicinal purpose. It helps prevent adulteration. The results indicated that Some constituents show fluorescence colour changes in reagents 1M NaOH(aq.), 1M NaOH(alc.), Ammonia, 50% HCl, and 50% HNO<sub>3</sub>. The ultra violet light produces fluorescence in many natural products which cannot visibly fluoresce in daylight. The reagents added convert the compounds into fluorescent derivatives or decomposition products. Fluorescence analysis has been reported to be one of the parameters for pharmacognostic evaluation of crude drugs [16] in traditional medicinal plants. The results of phytochemical screening carried out on the dried powdered Leaves of **Microdesmis puberula** plant indicate that carbohydrates, alkaloid, flavonoids, tannins, proteins, sterols/terpenes and saponins are present in the ethanol, methanol and aqueous extracts. The petroleum ether and acetone extracts gave the least concentration of the phytoconstituents investigated. The detection of the above secondary plant metabolites support the use of the plant in traditional medicine The plant organ contained large amounts of nutrients and was rich in **K** ( $31614 \pm 178.00$  ppm), **Ca** ( $10872 \pm 147.00$  ppm), **Mg** ( $8122 \pm 1434.00$ ppm), **Al** ( $5727 \pm 258.00$  ppm) and **Fe** ( $2670.7 \pm 25.46$ ppm). The other elements present in smaller quantities were **Ti** ( $875 \pm 21.00$  ppm), **Zr** ( $129.36 \pm 1.29$  ppm), **Mn** ( $126.34 \pm 13.31$  ppm), **Zn** ( $119.53 \pm .33$ ppm), **Sr** ( $68.88 \pm 0.94$ ppm), **Sc** ( $68.00 \pm 12.00$ ppm), **Rb** ( $45.01 \pm 1.00$  ppm), **Cu** ( $23.57 \pm 4.46$ ppm), **V** ( $11.99 \pm 7.50$  ppm) and **Mo** ( $4.46 \pm 0.81$ ppm). The presence of potassium, iron, calcium and magnesium in the dried powdered Leaves of **Microdesmis puberula** plant also support the use of the plant in controlling excessive blood loss during menstruation in women.

## 6.0. Acknowledgement

The authors are grateful to Mr. Anthony J. Kamara, Department of Physics, Fourah Bay College for carrying out elemental analysis of the dried powdered Leaves of **Microdesmis puberula** plant using EDXRF, Laboratory technicians of the Department of Chemistry, Fourah Bay College, University of Sierra Leone and the Principal Eastern Polytechnic, Kenema for providing financial assistance

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