academicJournals

Vol. 8(43), pp. 1284-1288, 17 November, 2014
DOI: 10.5897/JMPR2014.5501
Article Number: 505F6FA48803
ISSN 1996-0875

http://www.academicjournals.org/JMPR

Journal of Medicinal Plant Research

Full Length Research Paper

Ethnobotanical survey and phytochemical analysis of medicinal plants used for the treatment of hyperprolactinemia in Lagos State, Nigeria

Olubunmi Josephine Sharaibi[1], Oluwatoyin Temitayo Ogundipe[2], Anthony Jide Afolayan[3] and David Olaniran Aworinde[4*]

[1]Department of Botany, Lagos State University, Lagos State, Nigeria.
[2]Department of Botany, University of Lagos, Lagos State, Nigeria.
[3]Department of Botany, University of Fort Hare, Alice 5700, South Africa.
[4]Department of Biological Sciences, Ondo State University of Science and Technology, Okitipupa, Ondo State, Nigeria.

Received 26 June, 2014; Accepted 13 November, 2014

Ethnobotanical survey and phytochemical screening of medicinal plants used for the treatment of hyperprolactinemia among women in Lagos State, Nigeria was carried out using oral interviews (without questionnaire) and standard screening procedures. Ethnomedicinal data was gathered from herb sellers, herbal medicine practitioners and elderly people in the rural parts of the state. The collected data included the names of the plants, the parts used, mode of preparation, dosage, and administration of the medicinal plants. 13 plant species belonging to 10 families were identified and selected. They are: *Senna alata* L., *Jatropha gossypifolia* L., *Uvaria chemae* P. Beauv., *Morinda lucida* Benth., *Anthocleista djalonesis* Chev., *Heliotropium indicum* L., *Hoslundia opposita* Vahl., *Nymphea lotus* L., *Pistia stratiotes* L., *Vitex agnus* L., *Ocimum sanctum* L., *Ocimum gratissimum* L. and *Xylopia aethiopica* (Dunal) A. Rich. Asteraceace has the highest number of plant species used followed by Annonaceace. *N. lotus* and *P. stratiotes* were the most frequently mentioned and highly recommended of all the species. The plant parts used for the treatment are the leaves, bark and roots which are prepared by decoction, infusion or taken in powdered form. Majority of the plant materials are taken orally and/or used for bathing. The aqueous and acetone extracts of the medicinal plants implicated were screened using standard laboratory procedures for the presence of secondary metabolites. The screening revealed the presence of alkaloids, tannins, saponins, phenols, and proanthocyanidins.

Key words: Ethnobotanical survey, medicinal plants, phytochemicals, hyperprolactinemia.

INTRODUCTION

Hyperprolactinemia refers to an elevated level of serum “prolactin” in non-pregnant women and men (Torre and Falorni, 2007) and represents one of the major causes of female infertility (Azima and Zamima, 2002). Prolactin is a peptide hormone secreted by the anterior pituitary gland which plays a pivotal role in a variety hormone secreted by the anterior pituitary gland which plays a pivotal role in a variety of reproductive function. It is an

*Corresponding author. E-mail: daveaworinde@yahoo.com.

essential factor for normal production of breast milk following childbirth. However, excess prolactin negatively modulates the secretion of pituitary hormones responsible for gonadal function, including luteinizing hormone and follicle stimulating hormone (Thorner and Marcello, 2007). Hyperprolactinemia causes infertility because excess prolactin inhibits gonadotropin secretion. When gonadotropin is low, follicle-stimulating hormone (FSH) and luteinizing hormone (LH) secretions are low and so, do not stimulate gamete production and gonadal steroid synthesis (Prelevic et al., 1987). Typically, females with hyperprolactinemia will present with anovulation (lack of ovulation), amenorrhea (lack of menstruation) and sometimes galactorrhea (abnormal milk production). Hyperprolactinemia seems to be less common in males but it also causes infertility and loss of libido due to hypogonadism (Serri et al., 2003). Another concern is that decreased gonadal steroid secretion leads to osteoporosis (Mancini et al., 2008).

Hyperprolactinemia is an endocrinological disorder that is caused by many physiological, pharmacological and pathological conditions including pituitary disorders, hypothyroidism as well as side effects of medications used (Torre and Falorni, 2007). Several drugs may cause significant increase in blood prolactin concentration in which dopamine receptor antagonists are the main causal factors (Melmed et al., 2011). They act as dopamine-receptor blocking agents. They include major tranquillizers; antipsychotic medications in general; metoclopramide (Reglan), domiperidone, cisapride used to treat gastro-oesophageal reflux, and medication inducing nausea (such as cancer drugs); and less often, alpha-methyldopa and reserpine used to control hypertension (Torre and Falorni, 2007). The sleep drug ralmelteon (Rozerem) also increases the risk of hyperprolactinemia. In particular, the dopamine antagonists' metoclopramide and domiperidone are both powerful prolactin stimulators and have been used to stimulate breast milk secretions for decades (Torre and Falorni, 2007). Dopamine agonist drugs like bromocriptine, cabergoline, pergolide and quinagolide are usually the first choice for controlling hyperprolactinemia but they have gastrointestinal, cardiovascular and neurological adverse effects (Serri et al., 2003; Colao et al., 2006; Melmed et al., 2011).

Several studies have shown that phytomedicines can be effective in the treatment of hyperprolactinemia. Hasani et al. (2010), reported that four Chinese herbs: Shakuyaku-kanso-to, Peony- Glycyrrhiza decoction, Zhuangyang capsule and Tongdatang serial recipe were found clinically effective and safe in the management of drug-induced hyperprolactinemia. Also, Yuah et al. (2008) compared the efficacy of a Chinese herb: Peony-Glycyrrhiza decoction with bromocriptine found out that the decoction treatment produced a significant baseline-end point decrease in serum prolactin levels, without exacerbating psychosis and changing other hormones. Yamada et al. (1999), reported a case with resperidone induced amenorrhea and demonstrated TJ-68 to be effective in correcting neuroleptic-induced amenorrhea and hyperprolactinemia (Yamada et al., 1999).

In Nigeria, indigenous medicinal plants have not been identified and investigated for their anti-hyperprolactinemic potential. The identification and evaluation of the potentials of indigenous medicinal plants would provide an alternative, cheaper, more effective and less toxic therapy against drug-induced hyperprolactinemia in Nigeria, as well as document the indigenous knowledge of herbal medicine in Nigeria. The result could contribute immensely to the development of novel drugs with little or no adverse effects that can be used to treat hyperprolactinemia. This study therefore, was aimed at investigating the medicinal plants used in the treatment of hyperprolactinemia as well as evaluating their phytochemical constituents.

MATERIALS AND METHODS

Ethnomedicinal information

Information on plants used in traditional medicine for the treatment of hyperprolactinemia was collected between February and September, 2010. Data was gathered by oral interview (without structured questionnaire) of herb sellers in four herbal markets: Agege (Agege), Bariga (Shomolu), Iyana- Iba (Ojo), and Mushin (Mushin) in Lagos State. Also, renowned herbal medicine practitioners (Oko-Oloyun and Sayem) as well as elderly people from rural areas (Oko-afo and Badagry) of Lagos State were interviewed. Information included local names, the parts of plants used, method of administration and the dosage of the medicinal herbs. The plants were initially identified by their local names and were later properly identified and authenticated by a plant taxonomist, Mr. S.A. Sanni of the Lagos State University herbarium. Voucher specimens (LSH/2012/06) were deposited in the herbarium.

Plant collection

Dried plant materials were purchased from the herb sellers and authenticated by Mr. S.A. Sanni of Lagos State University and Prof. O.O. Ogundipe of University of Lagos. Fresh leaves of *N. lotus* used for this study were collected from Redemption Camp, Km 46, Lagos-Ibadan Expressway, Ogun State, Nigeria (N 08° 45.116', E 04° 24.457'; Elevation 75 ft) in June, 2012. Voucher specimens were deposited in the University of Lagos Herbarium.

Sample preparation

All the fresh plant materials were carefully rinsed under running water, air-dried and later pulverized before extraction.

Extraction

Aqueous extraction: Hundred grams (100 g) of powdered plant material was soaked in 1000 ml distilled water for 48 h at 30°C on an orbital shaker (Stuart Scientific Orbital Shaker, UK). The extract was filtered using Whatman no.1 paper. The filtrate was freeze-dried using savant refrigerated vapor trap (RTV 4104, USA). The freeze-dried extract was stored at 4°C before phytochemical screening.

Table 1. Plants used for the treatment of hyperprolactinemia in Lagos State, Nigeria.

Scientific name	Family	Local name (Yoruba)	Part used	Preparation	Dosage	Administration
Uvaria chamae P. Beav.	Annonaceace	Eruju	Roots	Powder	Two teaspoonfuls	To be taken with hot pap every morning for one month.
Xylopia aethiopica A.Rich.	Lamiaceace	Eeru	Fruits	Infusion	One glass cup (50 ml)	To be taken orally in the morning and evening for two-four weeks.
Hoslundia opposita Vahl.	Lamiaceace	Efinrin-oso	Leaves	Leaf juice	One glass cup (50 ml)	The leaf extract is taken early in the morning before food for three months.
Ocimum gratissimum Linn.	Lamiaceace	Efinrin-jije	Leaves	Leaf juice	The fresh leaves are plucked and cooked as vegetable soup.	The juice is drank and use to wash the breasts for two months.
Ocimum santum Linn.	Lamiaceace	Efinrin-ajase	Leaves	Decoction	About 25 ml of extract	Decoction is taken orally and used to wash the breasts for three months.
Pistia stratiotes Linn.	Aracaceace	Oju-oro	Whole plant	Decoction	A bucket-full	The decoction is used for bathing for three months.
Heliotropium indicum Linn.	Boraginaceace	Atapari-obuko	Roots	Powder	One teaspoonful soaked in a cup of hot water. Honey may be added.	To be taken twice daily for two months.
Jatropha gossypifolia Linn.	Euphorbiaceace	Botuje	Leaves	Infusion	One glass cup sweetened with honey	To be taken twice daily for two-three months
Senna alata Linn.	Fabaceace	Asunwon	Leaves	Decoction	50 ml of extract	To be taken twice daily for three months.
Anthocleista djalonensis Chev.	Longaniaceace	Sapo	Bark	Decoction	One glass cup (50 ml)	The decoction is used to rub breasts for two – three months.
Nymphaea lotus Linn.	Nymphaeaceace	Osibata	Leaves	Decoction	One glass cup (50 ml) is taken orally daily.	The decoction is used to bath for three months
Morinda lucida Benth.	Rubiaceace	Oruwo	Roots	Decoction	One glass cup (50 ml)	To be taken twice daily for two months.
Vitex agnus castus Linn.	Verbenaceace	Oori	Leaves/bark	Decoction	Two glass cups (100 ml)	To be taken daily after food for three months.

Acetone extraction: Two hundred grams (200 g) of powdered plant material was soaked in 1000 ml acetone of high analytical grade for 48 h at 30°C on an orbital shaker (Stuart Scientific Orbital Shaker, UK). The extract was filtered using a Buchner funnel and Whatman no.1 filter paper. The filtrate was concentrated to recover the solvent under reduced pressure at 50°C using Rotary evaporator (Laborota 4000-efficient, Heidolph, Germany).

Phytochemical screening

The plant samples were screened for phenols (Zovko, 2010), flavonoids (Otang et al., 2012), flavanols, proanthocyanidins (Oyedemi et al., 2012), tannins (AOAC, 2001), alkaloids, steroids (Harbone, 2005), saponins (Obadoni and Ochuko, 2002), anthraquinones and cardiac glycosides (Sofowora, 1993).

RESULTS AND DISCUSSION

Thirteen (13) plant species belonging to ten (10) families were identified for the treatment of hyperprolactinemia (Table 1). The most frequently mentioned and highly recommended were *N. lotus* and *Vitex agnus- cactus*. Plant parts used were the leaves, bark, roots, fruits and seeds. The most commonly reported plant parts were leaves followed by the roots while the bark was the least of the plant parts used. Decoction was the most commonly (53.8%) used method of preparation followed by infusion while grinding into powder form was the least method used. The medicinal plant preparations were taken orally and/or used for bathing. The preliminary phytochemical

Table 2. Phytochemical constituents of plants used for the treatment of hyperprolactinemia in Lagos State, Nigeria.

Plants	Alk	Tan	Phe	Sap	Ste	Flav	Fla	Pro	Anth	Gly
Xylopia aethiopica	+	+	+	-	-	-	+	+	-	-
Ocimum gratissimum	+	+	+	+	-	+	+	+	+	+
Ocimum santum	+	+	+	+	+	+	+	+	+	+
Heliotropium indicum	-	+	+	-	-	-	+	-	-	+
Uvaria chamae	+	+	+	+	+	-	+	+	-	+
Jatropha gossypifolia	+	-	+	+	-	-	+	-	-	+
Nymphaea lotus	+	+	+	+	+	+	+	+	+	-
Pistia stratiotes	+	+	+	+	+	-	+	+	-	-
Vitex- agnus	+	+	+	+	+	+	+	+	-	-
Senna alata	-	-	+	+	+	+	+	-	+	+
Hoslundia opposita	-	+	+	+	-	-	+	+	+	+
Morinda lucida	+	+	+	+	-	+	+	+	-	+
Anthocleista djalonensis	-	+	+	+	-	-	+	+	+	+

Character codes: Alk=Alkaloids, Tan=Tannins, Sap=Saponinis, Phe=Phenols, Ste=Steroids, Flav= Flavanols, Fla=Flavonoids, Pro=Proanthocyanidins, Anth=Anthraquinones, Gly= Cardiac glycosides, + = present, - = absent

screenings of the medicinal plants used in folklores for the treatment of hyperprolactinemia in Nigeria (Table 2) revealed the presence of many important phytochemicals such as alkaloids, phenols, tannins, saponins etc. that are of significant therapeutic effects.

All the medicinal plants contained phenols and flavonoids. Tannin was also present in all the plants except in *J. gossypifolia* and *S. alata*. Steroids were only present in five (5) plants namely: *O. sanctum, Uvaria chamae, P. stratiotes, N. lotus* and *V. agnus- castus.* These compounds (secondary metabolites) are known to exhibit pharmacological activity and support good health (Siddhanta et al., 1997). Natural phenolic compounds play an important role in cancer prevention and treatment (Huang et al., 2010). Flavonoids are involved in scavenging the oxygen derived from free radicals (Nijveldt et al., 2001). It has been discovered in a number of studies that flavonoids contain hypolipidemic potential (Harnafi and Amrani, 2007; Narender et al., 2006). It has also been established that flavonoids from medicinal plants possess high antioxidant potential due to their hydroxyl groups and protect humans more efficiently against any free radical related diseases (Vaya et al, 2003). Proanthocyanidins are anti-inflammatory, antineoplastic and anti-allergic (Wang et al., 2005). The protective role of proanthocyanidins against lipid peroxidation and peroxynitrite, as well as their antimicrobial properties was reported by Cos et al. (2004). Oligomeric proanthocyanidins, have been reported to possess a broad spectrum of biological, pharmacological and therapeutic activities against free radicals and oxidative stress (Bagchi et al., 2000). The plant extracts also contain saponins which are known to produce inhibitory effect on inflammation (Just et al., 1998). Saponins have antitumor, piscidal, molluscidal, expectorant, sedative and analgesic properties (Hamburger et al., 1991). Natural saponins have been found to possess significant anti-cancer properties (Man et al., 2010). Steroids have been reported to have antibacterial, antiviral and aphrodisiac properties (Oyedemi et al., 2012). Alkaloids have been reported to possess analgesic, antispasmodic and antibacterial properties (Robin, 2001). The phytochemicals present in the plants could be responsible for the activity of the plants in the management of hyperprolactinemia. The steroids may do well in enhancing the sexual drive of men with hyperprolactinemia whereas the tannins present would serve as anti-tumour agent as well as endocrine-regulating compound.

CONCLUSION

The study revealed that Nigeria is rich in indigenous medicinal plants that can be used to treat hyperprolactinemia. The plants contained phytochemicals that are of high therapeutic activities. Further studies on these plants may yield effective drugs that can help combat infertility.

ACKNOWLEDGEMENT

The authors would like to thank Mr. S.A. Sanni of Lagos State University and Mr. S.M. Erinoso of the Department of Botany, University of Ibadan, Ibadan, Nigeria for the technical assistance rendered.

Conflict of Interest

The authors declare no conflict of interest.

REFERENCES

Association of Official Analytical Chemists (AOAC) (2001). Association of Official Analytical Chemists. Official Methods of Analysis (21st Ed.), Washington, USA.

Azima K, Samina J (2002). Role of hyperprolactinemia in infertility. Pak. J. Med. Res. 41(3):23-29.

Bagchi D, Bagchi M, Stohs SJ, Das DK, Ray SD, Kuszynski CA, Joshi SS, Pruess HG (2000). Free radicals and grape seed proanthocyanidin extract: importance in human health and disease prevention. Toxicology 148(2-3):187-197.

Colao A, Di Sarno A, Guerra E, De Leo M (2006). Drug insight: Carbegoline and bromocriptine in the treatment of hyperprolactinemia in men and women. Nat. Clin. Pract. Endocrinol. Metab. 2(4):200-210.

Cos P, De Bruyne T, Hermans N, Apers S, Berghe DV, Vlietinck AJ (2004). Proanthocyanidins in health care: current and new trends. Curr. Med. Chem. 11(10):1345-1359.

Hamburger M, Hostettman K (1991). Bioactivity in Plants: The link between phytochemistry and medicine. Phytochemistry 30:3864-3874.

Harborne JB (2005). Phytochemical Methods- A Guide to Modern Techniques of Plant Analysis (3rd ed.). Springer Pvt. Ltd., New Delhi, India.

Harnafi H, Amrani S (2007). Flavonoids are potent phytochemicals in cardiovascular diseases prevention. Pharmacol. Rev. 1:193-202.

Hasani-Ranjibar S, Vahidi H, Taslimi S, Karimi N, Abdollahi M (2010). A systematic review on the efficacy of herbal medicines in the management of human drug-induced hyperprolactinemia: potential sources for the development of novel drugs. Int. J. Pharmacol. 6:691-695.

Huang WY, Cai YZ, Zhang Y (2010). Natural phenolic compounds from medicinal herbs and dietary plants: potential use for cancer prevention. Nutr. Cancer 62(1):1-20.

Just MJ, Recio MC, Giner RM, Cueller MU, Manez S, Billia AR, Rios JL (1998). Anti-inflammatory activity of unusual lupine saponins from *Bupleurum fruticescens*. 64:404-407.

Man S, Gao W, Zhang Y, Huang L, Liu C (2010). Chemical study and medical application of saponins as anti-cancer agents. Fitoterapia 81(7):703-714.

Mancini T, Casanueva FF, Giustina LA (2008). Hyperprolactinemia and prolactinomia. Endocrinol. Metab. Clin. North America 37:67-99.

Melmed S, Casanueva FF, Hoffman AR, Kleinberg DL, Montori VM, Schlecte JA, Wass JAH (2011). Diagnosis and Treatment of Hyperprolactinemia: An Endocrine Society Clinical Practice Guideline. J. Clin. Endocrinol. Metabol. 96:2273-2288.

Narender T, Khaliq T, Purib A, Chanderb R (2006). Antidyslipidemic activity of furano-flavonoids isolated from *Indigofera tinctoria.* Bioorg. Med. Chem. Lett. 16: 3411-3414.

Nijveldt RJ, Nood EC, Hoorn PG, Norren K, Leeuwen PAM (2001). Flavonoids: a review of probable mechanisms of action and potential applications. Am. J. Clin. Nutr. 74:418-425.

Obadoni BO, Ochuko PO (2002). Phytochemical Studies and Comparative Efficacy of the Crude Extracts of Some Haemostatic Plants In Edo and Delta States of Nigeria. Global J. Pure Appl. Sci. 8(2):203-208.

Oyedemi SO, Afolayan AJ (2011). Antibacterial and antioxidant activities of hydro-alcoholic stem bark extract of *Schotia latifolia* Jacq. Asian Pac J Trop Med. 4(12):952-8.

Oyedemi SO, Oyedemi BO, Arowosegbe S, Afolayan AJ (2012). Phytochemical analysis and medicinal potentials of hydro-alcoholic extract from *Curtisia dentate* stem bark. Int. J. Mol. Sci. 13:6189-6203.

Prelevic GM, Wurzburger MI, Preric LJA (1987). Acute effects of L-dopa and bromocriptine on serim PRL, LH and FSH levels in patients with hyperprolactinemic and normoprolactinemic polycystic ovary syndrome. J. Endocrinol. Invest. 10:389-395.

Robin D (2001). *Nymphaea odorata*: White pond lily. Medical Herbalism. Material Med. Pharm. 11:231-233.

Serri O, Chik C, Ur E, Ezzat S (2003). Diagnosis and management of hypreprolactinemia. CMAJ 169(6):575-581.

Siddhanta AK, Moody KH, Ramavat BK, Chauhan VD, Garg, HS, Goel, AK, Doss MJ, Srivastava MN, Patnaik GK, Kamboj VP (1997). Bioactivity of marine organisms: VIII- Screening of some marine flora of western coast of India. Indian J. Exp. Biol. 36:638-643.

Sofowora A (1993). Medicinal plants and traditional medicine in Africa (2nd Edition). Spectrum Books Limited, Ibadan, Nigeria.

Thorner MO, Marcello DB (2007). Hyperprolactinemia. J. Endocrinol. Metab. 25:1-15.

Torre LD, Falorni M (2007). Pharmacological causes of hyperprolactinemia. Ther. Clin. Manag. 31(5):929-951.

Yamada K, Kanba S, Yagi G, Asai M (1997). Effectiveness of herbal medicine (shakuyaku-kanzo-to) in the treatment of neuroleptic-induced hyperprolactinemia. J. Clin. Psychopharmacol. 17:234-235.

Yamada K, Yagi G, Asai M (1999). Herbal medicine (shakuyaku-kanzo-to) in the treatment of reperidone-induced amenorrhea. J. Clin. Psychopharmacol. 19:380-381.

Yuah HN, Wang CW, Sze Y, Tan QR (2008). A randomized, crossover comparison of herbal medicine and bromocriptine against risperidone-induced hyperprolactinemia in patients with schizophrenia. J. Clin. Psychopharmacol. 28:264-270.

Zovko KM, Kremer D, Karlović K, Kosalec I (2008). Evaluation of antioxidant activities and phenolic content of *Berberis vulgaris* L. and *Berberis croatica* Horvat. Food Chem Toxicol. 48(8-9):2176-80.