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INAA Determination Of The Active Elements That Promote Sexual Arousal In Some Herbs Used By Northern Nigeria Women As Aphrodisiacs

Haruna Rakiya,
Physics Department Federal College of Education, Zaria. Physics Department Ahmadu Bello University, Zaria. Centre for Energy Research Ahmadu Bello University, Zaria. Biological science Department Ahmadu Bello University, Zaria.

Abstract: *Several plants are used for the purpose of causing sexual arousal, inducing venereal desire or increasing sexual pleasure and performance. The effect produced by this herbs could be associated to their composition of certain mineral elements that where known to have aphrodisiac effect such as: Fe, I,Mg, Mn, Se and Zn.The main purpose of this study is to determine the essential elements, which the elements of interest for this study belongs to and non-essential elements.One of the major problems that may be associated with the use of herbal remedies is the presence of potentially toxic mineral elements in the herbs.Instrumental neutron activation analysis was used in the determination of the active elements that promote sexual arousal in the herbs:(Euphorbi ahirta,Abrus precatorius(seeds),Abrus precatorius(leaves),Desmodium velutinum,Leptadania hastatae,Evolvulus alsinoides,Schwenki aamericanaPentadon pentondrus, Crotalaria lachnesoma, and Crotalaria mucronata) All the studied herbs were found to be very good source of essentially nutritional elements. Some of the active elements, in aphrodisiacs were also determined by this work they include (Fe, Mg , Mn and Zn,,) with the concentration of Fe ranging from 10660±181mg/g in Schwenkiaamericana to 289±11mg/g in crotalaria lanchnesoma, and that of Mg ranges from 41785±148mg/g in Abrusprecatorius (seeds) to 1782±219mg/g in crotalaria lanchnesoma ,the concentration of Mn ranges from 527±1mg/g in Crotalaria mucronata to 24.3±0.2mg/g in Euphobiahirta.Potassium and calcium where found to have the highest concentration in all the studied herbs except abrusprecatorius seed with magnesium having the highest concentration. The concentration of potassium ranges from 24220±388mg/g in Euphobiahirta to 9281±501mg/g in crotalaria mucronata.and that of calcium ranges from 22220±756mg/g in leptadeniahastatae to 3878±283mg/g in crotalaria lanchnesoma.*

I. Introduction

Herbs have been used for centuries by millions of people around the world to treat various ailments. They provide a balance within our bodies that we some time fail to achieve naturally. There are herbal remedies available for just about any ailment including lack of sexual derives. The right combination of herbs can create a very powerful aphrodisiac. An aphrodisiac is define as any food or drug that arouse the sexual instinct, induces venereal desire and increases pleasure and performance. This word is derived from 'aprodite' the Greek goddess of love and these substances are derived from plants, animals or minerals yakubu et al.,(2007).Aphrodisiacs have been used for thousands of years, by every culture, to enhance sexual activity. Almost every culture has used various `substances' of herbal origin to intensify their love lives or attempt to cure impotent. These herbal preparations used as aphrodisiacs have been found to range from the useless to the extremely dangerous, even being seriously toxic.

It has been reported that whatever is taken as food could cause metabolic disturbance subject to the allowed upper and lower limits of trace metals Prasad,(1976). Both the deficiency and excess of essential micronutrients and trace of toxic metals may cause serious effects on human health. Underwood, (1997) and Reilly (1980).

The use of medicinal plants in therapeutics or as dietary supplements goes back beyond recorded history,woods (1999). How-ever, the safety of their use has been questioned due to the reports of illness and fatalities Stewart et al.,(1999). WHO recommends that medicinal plants which form the raw materials for the finished products may be checked for the presence of heavy metals, further it regulates maximum permissible limits of toxic metals like arsenic, cadmium and lead, which amount to 1.0, 0.3 and 10 ppm, respectively (WHO 1998). Medicinal herbs are easily contaminated during growth, development and processing. The heavy metals confined in plants finally enter the human body and may disturb the normal functions of central nervous system, liver, lungs, heart, kidney and brain, leading to hypertension, abdominal pain, skin eruptions, intestinal ulcer and different types of cancers.

This study has examined the elemental composition of frequently used plants by northern Nigerian women for aphrodisiac purposes. It is hoped that the study will provide baseline data that will help define the dose rates of these plants for their safe use. Also, elemental characterization of these plants will serve as quality assurance for traditional health care.

II. Materials and Method

Collection of herbs for the study

Selection Methodology

Literature search and consultation of the traditional health providers were carried out to find out which plants are used as aphrodisiacs by the northern Nigerian women. Based on this, 10 different samples belonging to 6 families were selected for this study.

Samples Collection

The herbs of interest in this research were collected and identify by the herbarium of the Department of biological science Ahmadu Bello University, Zaria. All the herbs were obtained from and around Zaria local government area, Kaduna state, Nigeria

NAA methodology

Comparative method (relative method)

Comparative method was used to determine the concentration of the elements in the studied herbs.This involves the irradiation of the unknown sample and a standard containing a known amount of the element of interest under the same conditions. The equation used to calculate the mass of an element in the unknown sample relative to the comparator standard is:

- $C_{sam} = C_{std}m_{std}A_{sam}/m_{sam}A_{std}$ 1.00

where A = activity of a sample (sam) and standard (std)
m = mass of the element in sample (sam) and standard (std)
C = concentration of the element

Materials

- Nigerian research reactor 1(NIRR-1)
- high purity germanium detector (HPGe)
- Agate mortar and pestle
- Acetone
- Analytical weigh balance
- Standard reference material
- Vial
- Polythene bag
- Spatula and forceps

Sample preparation

The samples were sundried and then crushed into powder using agate mortar and pestle. The weights of the samples were taken using analytical balance. After weighing, the samples were sealed in a polythene bag for log and short irradiation. The samples for long irradiation were identified with even numbers and those for short irradiation with odd numbers.

Irradiation and counting procedures

a. Short irradiation

The samples were irradiated for 5min. the first count was carried out immediately after irradiation and the second count after 1hour.

b. Long Irradiation

The samples were irradiated for 6 hours. The first count was carried out after 3 days and second count after 7 days.

The concentration level of the elements where calculated by the comparative method of INAA, Quality control was carried out using certified pitch leave (SRM 1547)

III. Results And Discussion

Instrumental neutron activation analysis was used in the determination of active elements in some aphrodisiac herbs found in and around zaria local government area of Kaduna state Nigeria and twenty eight elements(Mg, Al, Cl, Ca, V, Cu, Se, Mn, Sr, Na, K, As, La, Sm, U, Sc, Cr, Fe, Co, Zn, Br, Rb, Sb, Ba, Eu, Yb, Lu, Th) where determined. Table 1.1 shows results for sample A,B,C and D , Table 1.2 shows results for sample E,F,G , and Table 1.3 shows results for sample I and J. Among the essential elements detected five (Fe, Mg, Mn, Se, Zn) belongs to the active elements in aphrodisiacs. The concentration of all the elements were found to be in trace amount in all the samples except Mg, Al, Cl, Ca, Mn, Na, K and Fe. Ca and K were found to have the highest concentration in the entire samples except sample B which has Mg having the highest concentration.

TABLE 1.1 :INAA Results For Sample A,B,C and D

ELEMENTS	SAMPLE A (mg/g)	SAMPLE B (mg/g)	SAMPLE C (mg/g)	SAMPLE D (mg/g)
Mg	2490± 192	41785 ± 145	3863 ± 332	2909 ± 248
Al	1507± 17	82 ± 3	877 ± 21	924 ± 18
Cl	3464± 42	229 ± 12	1976 ± 36	334 ± 16
Ca	15090 ± 483	2082 ± 154	8734 ± 402	14620 ± 482
V	3.900± 0.5	BDL	6± 1	BDL
Cu	BDL	BDL	BDL	BDL
Se	BDL	NA	BDL	BDL
Mn	24.3 00 ± 0.200	109 ± 0.3	526± 1	460.7 ± 0.9
Sr	79 ± 7	BDL	BDL	BDL
Na	130 ± 2	47.48 ± 1.14	66 ± 2	78 ± 17
K	24220 ±388	12270 ± 270	16520 ±330	18760 ± 356
As	BDL	NA	BDL	BDL
La	4.250 ± 0.060	26 ± 2	7.89 ± 7.11	8.2 ± 0.7
Sm	1.015 ±0.014	568 ± 58	2.41 ± 0.02	1.890 ± 0.019
U	0.004 ± 0.001	BDL	0.0032 ± 0.001	BDL
Sc	0.244 ± 0.013	BDL	0.14 ± 0.01	17 ± 1
Cr	1.284 ± 0.140	BDL	8.42 ± 0.23	15± 0.27
Fe	1186 ± 81	BDL	1180 ±84	1515 ± 85
Co	0.04 0± 0.010	BDL	0.32 ± 0.03	31.1 ± 2.3
Zn	32 ± 4	18 ± 3	49.9 ± 3.7	45.4 ± 3
Br	3.15 0± 0.360	43 ± 4	1.76 ± 0.35	4.3 ± 0.4
Rb	39 ± 3	33 ± 3	49.9 ± 3.5	100 ± 4
Sb	BDL	BDL	BDL	BDL
Ba	16.9 00± 3.3	11.2 ± 3.2	36.9 ± 4.1	50± 5
Eu	0.230 ± 0.05	BDL	0.19 ± 0.5	0.24 ± 0.05
Yb	BDL	BDL	0.14 ± 0.03	BDL
Lu	0.24 0± 0.007	BDL	0.024 ± 0.007	0.027± 0.001
Th	0.500 ± 0.030	BDL	0.67 ± 0.03	0.16 7± 0.025

TABLE 1.2: INAA Results For Sample E,F,G and H

ELEMENTS	**SAMPLE E (mg/g)**	**SAMPLE F (mg/g)**	**SAMPLE *G* (mg/g)**	**SAMPLE H (mg/g)**
Mg	4658 ± 536	2750 ± 272	*2769 ± 327*	2707 ± 322
Al	879 ± 67	2629 ± 42	3383 ± 34	3694 ± 52
Cl	23630 ± 118	2012 ± 32	1235 ± 26	2098 ± 34
Ca	22220 ± 756	7223 ± 383	9430 ± 405	8069 ± 404
V	BDL	10 ± 1	52 ± 1	11 ± 1
Cu	BDL	BDL	BDL	BDL
Se	BDL	BDL	BDL	BDL
Mn	465 ± 0.9	102.3 ± 0.3	263 ± 0.5	140.1 ± 0.4
Sr	BDL	BDL	BDL	46 ± 11
Na	94 ± 2	239 ± 4	52 ± 2	170 ± 4
K	22490 ± 405	14080 ± 479	12340 ± 481	19190 ± 653
As	BDL	0.009 ± 0.001	181 ± 1	BDL
La	9.38 ± 0.08	1.88 ± 0.05	1.74 ± 0.04	12.17 ± 0.11
Sm	2.726 ± 0.025	0.63 ± 0.01	0.59 ± 0.01	2.84 ± 0.02
U	BDL	0.005 ± 0.001	0.009 ± 0.001	0.018 ± 0.002
Sc	14.7 ± 1.4	0.64 ± 0.02	0.82 ± 0.02	0.54 ± 0.02
Cr	2.35 ± 0.18	0.69 ± 0.14	4.3 ± 0.2	0.51 ± 0.14
Fe	1146 ± 87	2531 ± 116	10660 ± 181	1904 ± 103
Co	0.12 ± 0.02	0.36 ± 0.03	0.28 ± 0.03	0.29 ± 0.04
Zn	45.4 ± 3.7	40 ± 4	BDL	33 ± 3
Br	21.97 ± 0.79	BDL	6.89± 0.76	6.4 ± 1.1
Rb	167 ± 6	31 ± 3	67 ± 5	76 ± 5
Sb	BDL	0.016 ± 0.004	BDL	BDL
Ba	129 ± 6	BDL	BDL	70 ± 6
Eu	0.35 ± 0.05	0.17 ± 0.04	0.17 ± 0.04	0.19 ± 0.04
Yb	0.18 ± 0.04	BDL	BDL	0.32 ± 0.06
Lu	0.0301 ± 0.007	BDL	0.04 ± 0.01	0.064 ± 0.009
Th	0.105 ±0.022	0.26 ± 0.02	0.59 ± 0.03	1.37 ± 0.03

TABLE 1.3 :INAA Results For Sample I and J

ELEMENTS	SAMPLE I (mg/g)	SAMPLE J (mg/g)
Mg	2911 ± 486	1782 ± 219
Al	707 ± 26	3522 ±35
Cl	707 ± 23	865 ±23
Ca	3878 ± 283	8914 ± 401
V	BDL	10.2 ± 0.9
Cu	BDL	BDL
Se	BDL	BDL
Mn	527 ± 1	128.5 ± 0.39
Sr	BDL	BDL
Na	83 ± 3	567 ± 6
K	9281 ± 501	10750 ± 548
As	BDL	BDL
La	7.23 ± 0.09	3.62 ± 0.07
Sm	2.58 ± 0.02	1.44 ± 0.02
U	BDL	BDL
Sc	0.100 ± 0.12	0.76 ±0.02
Cr	13.10 ± 0.26	9.79 ± 0.24
Fe	1406 ± 91	289 ± 11
Co	0.062 ± 0.009	0.32 ± 0.02
Zn	48 ± 4	33 ± 3
Br	3.45 ± 0.04	24 ± 1
Rb	97 ± 4	22 ± 3
Sb	BDL	BDL
Ba	68 ± 5	46 ± 6
Eu	0.28 ± 0.05	0.20 ± 0.05
Yb	0.22 ± 0.06	0.1762 ± 0.041
Lu	0.034 ± 0.007	0.023 ± 0.006
Th	0.45 ± 0.02	0.41 ±0.02

IV. Discussion

A mineral element plays a vital role in human life. The most important pathway of minerals to transport into human is from soil to plants and from plants to human. Some elements such as Ca, Mg, Na, K, P, Cl, S, Fe, Zn, Mn, Cu, I, Co, Ni, F, Cr, Mo, Se, Sn, and Si have been reported to be essential for human health. Whereas others such as Al,antimony,As, Ba, Be, Cd, Cr^{6+}, Pb, Hg, Os, Ti, V, Po, Th, Ra, and U. have been identify as toxic. The rest of the elements are not toxic to human health unless they are present in very high concentration.the present study provide the baseline data for the concentration of (Mg, Al, Cl, Ca, V, Cu, Se, Mn, Sr, Na, K, As, La, Sm, U, Sc, Cr, Fe, Co, Zn, Br, Rb, Sb, Ba, Eu, Yb, Lu, Th).in some aphrodisiac herbs used by northern Nigerian women.

Potassium and calcium where not reported to be among the active elements in aphrodisiacs however, they play an indirect role in sexual arousal by causing muscle contraction and relaxation. A study by giuliano et al documented that genital arousal is a neurovascular event that is characterised by increase in genital blood flow and smooth muscle relaxation munarriz et al., (2003) The concentration of potassium range from 24220 ± 388 mg/g, to 9281 ± 501 mg/g in Euphobiahirta and Crotalaria mucronata and that of calscium ranges from 22220 ± 7 56 ppm in leptadaniahastatae to 3878 ± 283ppm in crotalaria mucronata. The recommended dietry intake of calcium and potassium were 1000mg/day and 3500mg/day Lentech(2014)

Magnesium is considered a multi-functioning mineral that makes large contribution to health and nutrition. Balanced levels of magnesium also contribute to muscle relaxation which is very vital for sexual arousal. It is alsoimportant in the production of sex hormones, such as androgen and oestrogen and neurotransmitters that modulate the sex drive. Raymond (2010). The concentration of magnesium ranges from 4658 ± 536 ppm in leptadania hastate to 1782 ± 219 ppm in crotalaria lachnosema. The recommended daily intake of magnesium was reported to be 350mg/day Lentech(2014)

Manganese has been reported to help the body use Vitamin C effectively and Vitamin C acts as an antioxidant, it is required for the synthesis of collagen (structured component of blood vessels, tendons and bones) and norepinephrine (a neurotransmitter) and is also known to increase positive response to stress. It participates in the synthesis of the critical hormones that are involved in sex and fertility namely - androgen, estrogen and progesterone. Vitamin C might improve the production of nitric oxide which aids in the increase of blood flow and makes blood vessels stronger.Raymond E. (2010). In women, manganese is particularly important in the production of breast milk and in both males and females, aides in the production of certain sex hormones foodpyramid (2013). The concentration of manganese ranges from 572 ± 1 in cotalariamucronata to 24.3 ± 0.2 in euphobiahirta. The recommended daily intake of manganese was reported to be 350mg/day.Lentech(2014)

The concentration of iron ranges from 10660 ± 181ppm in *pentadonpentandrus* to 289 ± 11ppm in *cotalarialachnesoma* . As a trace mineral in the body, iron provides the necessary transport means for moving oxygen throughout bodily systems fluidly. Additionally Iron has a role in synthesizing the neurotransmitters which regulate sex drive Van S (2013). Besides joint pain, fatigue, abdominal pain, irregular heartbeat and hair loss, a deficiency in this trace mineral may reduce sex drive. The recommended daily intake of iron was reported to be 15mg/day.Lentech(2014)

Zinc is required for the production of testosterone. Testosterone has a dramatic effect on sexual desire both in men and women Chandra (2012).A deficiency of zinc is associated with numerous sexual problems, including sperm abnormalities and prostate disease. Zinc not only assists testosterone production it also helps to maintain semen volume and adequate levels of testosterone which all add up to a higher sex drive price k, (2008). Some reports indicate that, impaired sexual function which is common problems of uremic patient may be improved by zinc supplements Shils and Young (1988). The concentration of zinc in the studied herbs ranges from 49.9 ± 3.7 ppm in abrusprecatarius leave to 18 ± 3 ppm in abrusprecatarius seed. the recommended daily intake of zinc was reported to be 15mg/day Lentech(2014)

V. Conclusion

The concentration of the entire toxic element detected by this work was found to be below the acceptable level of intake except the unusual concentration of arsenic in sample G (pentadonpentandrus) whiche was found to be 181 ± 1 ppm the acceptable limit of intake for Arsenic was reported to be 1.0ppm WHO (1998). All the studied herbs were found to be very good source of essentially nutritional Elements.

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