
**INTERNATIONAL JOURNAL OF ADVANCES IN PHARMACY,
BIOLOGY AND CHEMISTRY****Research Article**

Toxicity Evaluation for Herbal Products used for Enhancing Male Sexual Desire and Penile Enlargement in Dar Es Salaam City, Tanzania.

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ABSTRACT

The toxicity of sex enhancing herbal preparations by Traditional Health Practitioners in Dar es Salaam city was evaluated. Brine Shrimp Test protocol using *Artemia salina* Leach was used. Of all 23 herbal products tested for toxicity, 86.96% had mild and/or no toxicity. Another 43.48% showed moderate lethality in the range of $LC_{50} = 50 - 200\mu\text{g/ml}$. The remaining 13.04% of the samples tested were toxic ($LC_{50} < 24\mu\text{g/ml}$) against brine shrimp larvae with 100% mortality rate up to minimum concentration. Most herbal preparations were either in mixtures or supplemented with honey for moderated toxicity and boosted activity. Adulteration with potent conventional drugs was reported. The toxic fraction though in lower percentage is alarming and consequently necessitates chronic and acute toxicity evaluation *in-vivo* for wider safety determination.

Keywords: Toxicity, Erectile dysfunction, penile enlargement, Herbal products, Dar es Salaam.

INTRODUCTION

Impotence also known as Erectile Dysfunction (ED) is the inability to achieve or sustain an erection for sexual activity to take place¹. It has a number of causes including physical health, psychological, lifestyle, hormonal imbalance and side effect of some medicines. Often, the incidence of ED increases as one grows older. Fewer than one percent of the male adult population under three decades of age is affected, 3% below 45 years, 7% between 45 and 55 years, 25% at age 65, and ascend to 75% of males 80 years old (Joe, 1990, HTB, 2013). Modern day research across the world have decisively confirmed that psychological impotence - also known as sexual performance anxiety appears like it's increasing as a result of the social perceptions associated to men's sexuality, as well as the oft-related emotions of frustration, inadequacy, anxiety and depression².

To some young males, impotence problem is coupled with the worry on their penile sizes. This has been prompted by mailbags that cause anxiety to internet readers. According to Pankaj (2011), "you're at office, you open your mailbox to check your mails and you are flooded with about 500 mails that try to convince to use their products for penile enlargement, if there is a problem in penile enlargement.

The increasing incidence of ED is necessitating more peoples to search for both synthetic and herbal products with aphrodisiac potentials. Generally, synthetic medications like antidepressants, tranquilizers, hypnotics, antiandrogens, antihypertensive agents also lead to the downfall of the sexual functions^{5,6}. Thus the common side effect of the use of synthetic drugs such as Tadalafil and Sildenafil are headache, indigestion, back pain,

muscle aches, flushing, and stuffy or runny nose⁷. Herbal products e.g. Vimax Pills, VigRx, Prosolution pills and many more available are advertised with lots of claims that they increase sexual desire and the size and girth of penis (Pankaj, 2009). More studies have showed that *yohimbine*, a chemical found in the bark of an African tree *Corynanthe yohimbe*, can improve erections. And a small trial showed that Korean red ginseng *Panax ginseng* increased sexual desire and successful erections and intercourse compared with a placebo⁸. Many of these advertised herbal products also causes some side effects and they mainly work because of excess blood flow to various organs or due to the “blood stealing effects” from the heart⁴.

In recent years, Dar es Salaam city in Tanzania abound with billboards advocating solution to ED and enhanced penile sizes to the size of client’s own favorites. These are also alleged to bring about rocky erections, frequent penetrations, delayed ejaculation and increase ejaculation volume.

There is a general conception that herbal medicines are natural products and free from undesirable side effects regardless of the quantity taken. According to conventional medicine view point, if a drug is to be effective, it will inevitably have side effects⁹. The medical establishment considers herbal medicines as drugs, and as such, they must either have side effects - or ergo be ineffective (*ibid*). Although there is a spectrum of viewpoints in western herbal medicine, most herbalists reject the view that plant medicines are naturally occurring analogues of the pharmaceuticals used in orthodox clinical medicine i.e. drugs¹⁰.

The main objective of this study was to determine through *in-vitro* tests the safety of herbal plants used by Traditional Health Practitioners for management of impotence and penile size enhancement in Dar es Salaam city, and then communicate research results for informed decisions on public health education and rectification of health policy by the Traditional and Alternative Medicine Council in Tanzania.

METHODOLOGY

The semi-structured questionnaires were used to generate Ethnomedicinal information from the Traditional Health Practitioners (THPs) and volunteered patients after filling in consent forms. Consent forms were engaged for protection of information provided against publication and identification of herbal ingredients. THPs were asked to show some patients who successfully got cured from their regimen. This was to get the quality impression of the ED remedies. Herbal materials were purchased for Brine Shrimp Test (BST) from

THPs vendors in Temeke, Ilala and Kinondoni districts in Dar es Salaam city between March and April in 2013. The city of Dar es Salaam was selected as study area due to large number of advertisements symptomatic of relative dominance in the use of sex enhancing herbal products.

Preparation and extraction of Herbal medicine

All herbal preparations were purchased and coded without revealing the individual plant species according to the agreements with the THPs. Samples were extracted by soaking in Ethanol (80%) for 24 hours and the extracts were dried under *vacuo* using rotary evaporator and the extract stored at -20⁰ C until testing.

Brine shrimp test

Brine Shrimp Test according to Mayer et al¹¹, and OECD, 2000¹² was used to predict toxicity of the extract. The Brine Shrimp eggs were purchased from Aquaculture innovations (Grahamstown 6140, South Africa) and sea salt was prepared locally by evaporating water collected from the Indian Ocean along the Dar es Salaam coast. Swiss albino mice were reared at the Institute animal house of the Muhimbili University of Health and Allied Sciences whereas Dimethyl sulfoxide (DMSO) was from Sigma® (Poole, Dorset, UK). Ethanol (absolute) from Fluka Chemie GmbH (Sigma-Aldrich®, Zwijndrecht, Netherlands) and Carboxyl methyl cellulose (CMC) were used. The stock solutions (40 mg/mL) of all herbal extracts were prepared by dissolving them in DMSO. The concentrations of 240, 120, 80, 40 and 24 µg/mL were prepared by drawing different volumes from the stock solutions and then added into vials, each containing ten brine shrimps larvae. The volume was then adjusted to 5 mL with artificial sea water prepared by dissolving 3.8g of sea salt in 1 L of distilled water. Each level of concentration was tested in duplicate. The negative control contained brine shrimp, artificial sea water and DMSO (0.6%) only. The vials were incubated under light for 24 h. The dead larvae were counted and mean was subjected to analysis using Fig-P computer program.

RESULTS AND DISCUSSION

Total of 30 Traditional Practitioners were selected randomly and interviewed both on their own practices and on their patients. There were scant voluntary respondents as the case of impotence according to studied respondents is sensitive and secretive. One respondent acknowledged to have been managed by THPs but was not ready to talk on his aftermaths. Sexual impotence and ED in men in

Tanzania is considered a secret affair and the suffering persons keep quite or seek medical help in privacy. In parallel, some women with impotent spouses breach their marriage vows to satisfy their sexual passions. This has a sad social implication as extramarital relations expose couples to the risk of Sexual Transmitted Diseases or broken marriages. In Uganda for example, impotent men were deprived of leadership responsibilities. Socially these men were marginalized and hushed in social gatherings¹³.

Most THPs interviewed in Dar es Salaam acknowledged mounting attendance to their services. The average monthly attendance is 23 ± 7.2 compared to less than 10 in late 1990s. According to THPs, some of the origins of ED were diabetes (5% THPs), processed food (63%), industrial cooking oils (76%), obesity (32%), inactivity (45%), less food intake (52%), multiple partners (1%) and pre-mature involvement in sexual act (9%) (the percentages of each entry was computed exclusively and not cumulatively). The problem was reported for men of all ages but mainly between 30s and 50s. Nineteen (82.6%) THPs argued that their herbal preparations were active with permanent effect. This could be egotistic argument requiring clinical validation taking into account that ED has diverse courses. Seven (30.4%) of THPs acknowledged that their preparations could only induce temporary effect that last after every single or few ejaculations. The sufferer must stick to a repeated use all his active sex life. There was no register of the feedback from served patients.

From the discussions with THPs in Dar es Salaam, the potency mechanism varies with herbal preparations depending on the effect and response of the body. Some herbal products eliminate abdominal gases that interfere with sexual desire. Mixture of honey and nuts were reported to increase seminal fluid and consequently libido. There is also wide published appreciation of aphrodisiac herbs worldwide. For instance, some products stimulate nerves for the successful sexual activity i.e. *Cola acuminata* fruits contain about 2% catechine-coffeine¹⁴. The *Zingiber officinalis* (ginger) volatile oils from the rhizome are used for stimulating the nerves and making them sensitive (*ibid*). *Capsicum frutescens* in many African cultures is a known powerful stimulant and carminative¹⁵. The proved herbal therapeutic values of *Prunus africana* have indirect activity by managing hypertrophy in male genitalia. Hypotrophy confines sexual activity¹⁶.

With regards to penile enlargement, six (26%) of THPs mentioned fruit of *Kigelia africana* that are popularly believed to increase penile size and girth through incision. There is no clinical proof on the

fruit of *K. africana* to affect penile size. Only one traditional healer acknowledged possessing herbal preparation for penile enlargement. He allowed researchers to publicly report the preparation as roots of sisal. Through jerking, the treatment is applied twice a day for four weeks.

When asked if they are willing to determine toxicity levels of their products, over 70% of THPs disputed that their remedies are free from side effects. The other 25% accepted the toxicity evaluation but demonstrated alarm of bio-piracy. The remaining 5% admitted to have presented their preparations to the chief government chemist and were affirmed non toxic. Majority of herbal products collected had bitter test and were mostly served with honey. Honey was added for preservation, improved flavor, reduced toxicity and to boost herbal potency.

Two THPs accused some colleagues for adulteration of their herbal products. Conventional stimulants such as Viagra are allegedly added in herbal materials for the essence to compel belief to users that administered herbal preparations are potent against ED.

The average price for one package for various amounts are between Tsh 20000 (\$ 13) and 40000 (\$ 26). This is comparatively higher to the conventional Viagra varieties that range between Tsh 5000 (\$3) to 10000 (\$6). No comparative study was done on the number of attendees to synthetic drugs and those attended by THPs in Dar es Salaam, consequently the more favorite management category is not known. Table 1 below is a summary of herbal preparations by THPs and the BST analysis results

Of all 23 herbal products tested for toxicity (Table 1), 86.96% had mild and/or no toxicity and only 13.04% of the samples tested were toxic against brine shrimp larvae with 100% mortality rate up to minimum concentration. These toxic preparations were not mixed with honey for possible reduced toxicity. The preparations were nevertheless administered for a week and claimed to have permanent effect. No safety account can be made unless they are tested for acute and chronic toxicity. The use of toxic plants against ED is familiar elsewhere. In Uganda, *Phytolacca dodecandra* leaves and roots are pounded and smeared on ripe banana and then the ripe banana roasted before being eaten for treating erectile dysfunction. However, care has to be taken because *Phytolacca dodecandra* is poisonous. Some *Acacia* species are regarded as aphrodisiacs in Niger¹⁷. *Cassia* species have high repute as drugs and poisons. In Burkina Faso, *Cassia occidentalis* though toxic is used as a stimulant¹⁵. The *Atropa belladonna* root is treated with wine to make a powerful love drink. In

the proper dosage it is said to increase desire, but over dosage lead to death via respiratory paralysis¹⁸.

CONCLUSION AND RECOMMENDATIONS

Although there is no clinical proof that the herbal preparations against erectile dysfunction and penile enlargement by Traditional Health Practitioners in Dar es Salaam city in Tanzania are active for the said purpose, the brine shrimp lethality test results have shown that small fraction of the used herbal materials is toxic *in-vitro*. The use of these toxic preparations cannot be guaranteed unless histopathology and anatomical indications are studied through acute and chronic tests. Traditional Health Practitioners however have devised ways of reducing toxicity by concoctions or addition of honey for reduced toxicity

and improved potency. The health policy framework and legislations should consider that though majority of sampled herbal materials showed less or not toxicity, some herbal preparations can be used after thorough evaluation for toxicity and clinical effects. The hint on adulteration cannot be ignored and should be investigated for the public health sake.

ACKNOWLEDGEMENTS

The authors highly appreciate the financial support from small scale grant by Sida-SAREC for Research Capacity Strengthening at Muhimbili University of Health and Allied Sciences. The Traditional Health Practitioners are appreciated for their useful information.

Table 1: Herbal preparations and *in-vitro* toxicity test results of ethanolic herbal extracts.

Sample code	Methods of preparations	Age group	LC ₅₀ (µg/ml)	95% C I
Busta (KND01)	Chew 2-4 hrs prior to the sexual act. Will keep you strong for 48hrs, it gives temporary penile enlargement.	All	150.2629	125.1239-180.4526
KND02	Stem bark is boiled, 1 cupx4 for 3-5 days	All	92.7070	64.7725-132.6487
Vigo power (KND03)	Bark treats impotence, premature and volume of ejaculation. Has no side effect. Taken for 7 days	All	59.2659	42.8255-82.0175
Lequerice (KND04)	Mixture of more than two plants 1 teaspoonful in tea/porridge x 1/7	< 30	<24µg/ml	NA
KND05	Mixed with Baobab leaves	All	<24µg/ml	NA
KND06	Root/stem boil	All	>1000µg/ml	NA
KND07	Boil root	All	>1000µg/ml	NA
KND08	Mixed with honey	All	>1000µg/ml	NA
KND09-	Mixture of plants	All	>1000µg/ml	NA
KND10	Chew 30 mn prior to the act	All	128.9712	80.8262-205.7941
ILL 01	Boil	All	>1000µg/ml	NA
ILL02	You start with lime+pine aple and orange in phase one, then in phase two is Cucurbita leaves+rosemary+hamdaldasini leaves	30-50	145.4473	108.0421-179.2149
ILL03	Boil	All	56.2822	31.5124-100.5218
MP (ILL04)	Boil stem bark, add honey	All	70.2304	64.9535-75.9359
ILL05	Mixed with honey	>30	2164.0253	503.27-930.571
ILL06	Mixture of plants	>40	166.66	121.0488-229.4574
ILL07	Boil the powder	All	184.5211	115.8760-293.8313
ILL08	Bark, boil taken for 7 days	All	<24µg/ml	NA
ILL09	Boil, take 1 cup for 4 weeks	All	>1000	NA
TMK 01	Eat, mixed with honey	>30	96.1931	100.7574-922.4245
TMK 02	Boil the mixture, use daily	All	>1000µg/ml	NA
TMK 03	Mix with honey and lick 1hr before	All ages	>1000µg/ml	NA
TMK 04	Roots of Prunus africana	> 40s	>1000µg/ml	NA

NA=Not applicable; <24µg/ml=100% mortality rate up to the minimum concentration; >1000=No mortality up to the maximum concentration

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