Ethnobotanical study of medicinal plants used as anti-obesity remedies in Nkonkobe Municipality of South Africa.

Afolayan A J¹ and Mbaebie B O²

¹Phytomedicine Research Centre, Botany Department, University of Fort Hare, Alice 5700, South Africa. E mail: aafolayan@ufh.ac.za
²Department of Biological Sciences, Michael Okpara University of Agriculture Umudike, Nigeria. E mail: blessing.mbabie@gmail.com

* Corresponding author: Prof. AJ Afolayan. Fax: +27866282295. E mail: aafolayan@ufh.ac.za

ABSTRACT

Introduction
Obesity is one of the world's leading preventable causes of death, diabetes, cardiovascular diseases and cancer. In South Africa, the number of people suffering from excess body weight is believed to be rising steadily. An ethnobotanical study of medicinal plants used for body weight reduction was carried out in the Nkonkobe Municipality of the Eastern Cape of South Africa.

Method
Structured questionnaire was administered to the informants.

Results
A total of 20 plants belonging to 18 families were identified for the management of obesity in the area.

Discussion/Conclusion
Three medicinal plants namely, Cissaempelos capensis, Curtisia dentata and Schotia latifolia were repeatedly mentioned by the traditional healers and the local dwellers to have weight-reducing properties. Roots, leaves, whole plant and barks are the common parts of the plants used while decoctions and infusions are the main methods of preparation. There was a general belief on the efficacy of the prepared extracts; though there is still the need for further phytochemical and pharmacological investigations to validate the uses of the plants for the treatment of obesity.

Keywords: obesity, herbal remedies, plant survey, medicinal plants

INTRODUCTION

Obesity is the sixth most important public health problems in both developed and developing countries. About 1.6 billion adults and 10% of children are now classified as overweight or obese.¹,² Individuals with a body-mass-index (BMI) of equal or greater than 25.0kg/ m² are classified as overweight and when the BMI is greater than 30.0kg/ m²; the individual is obese. The fundamental cause of this condition is the chronic energy imbalance in the excess energy intakes which is more than expenditure.³ This is traceable to increased high fat and sugar intakes, reduced physical exercise, genetic susceptibility, hormonal abnormalities and socio-cultural factors.² Generally, this it is due to easy access to palatable diet, increased reliance on cars, and mechanized manufacturing.⁴ Obesity is characterised by metabolic syndrome which usually manifests in insulin resistance, hypertension, dyslipidaemia, type-2 diabetes and cardiovascular risk factors that cluster within the
Ethnobotanical study of medicinal plants used as anti-obesity remedies

individuals. It could even lead to death. Recently, it has been observed that the risk of various diseases increases from a BMI of 21.0kg/m² and decreases life expectancy by seven years at the age of 40 years.\textsuperscript{[5]}

In South Africa, at least, 25% of the adult population of all races are overweight and about 20% of men and women aged 20–30 are obese, a figure which increases to more than 50% in age 50–60. In recent times, the number has increased progressively such that obesity in South Africa is highly prevalent in all sectors\textsuperscript{[6]}, especially among children and urbanised black women. Interestingly however, overweight body type has positive connotations within the black South African community; symbolising happiness, beauty, affluence, health and negative HIV/AIDS status.\textsuperscript{[6-7]} Unfortunately, obesity and its burden of diseases negatively affect the life of many South Africans, promote poverty and contribute to the increasing cost of health care.\textsuperscript{[8]}

Recently, there has been a renewed interest in the search for herbal remedies for weight reduction.\textsuperscript{[9]} Medicinal plants continue to play a role as abundant reservoir of bioactive compounds that could have beneficial effects on weight loss. This is consequent upon the fact that drug treatment of obesity, despite short-term benefits, is often associated with rebound weight gain with side effects after the cessation of drug use.\textsuperscript{[10]} Preventative efforts at the societal and individual levels to address excessive caloric intake are currently not been met. Worse still, surgical interventions used in some cases to treat obesity are not appropriate.\textsuperscript{[11]} There is the need to continue the search for medicinal plants for possible discovery of novel drugs for the management of obesity and related complications. The present study therefore, is a documentation of plants and plant parts that posses anti-obesity potential which are used by traditional healers in the Nkonkobe Municipality.

MATERIALS AND METHODS

Study area

Nkonkobe Municipality in the Eastern Cape Province of South Africa is situated between 32° 47' S and 26° 50' E. The area is bounded by the sea in the east and drier Karroo in the west. The altitude is approximately 1300 m above sea level and the vegetation is veld type 7.\textsuperscript{[12]} The people of the region use herbal medications either alone or in combination with orthodox medicines for the treatment of several diseases. Majority of the people in the area are rural dwellers and use plants for the treatment of obesity, especially secondary complications of obesity such as diabetes, hypertension, heart problems and arthritis. They do not however, consider overweight or obese body mass as health risk.

Methodology

This study was carried out in March 2010 using a well structured questionnaire, interviews and general conversations with the herbalists and rural dwellers. A total of 15 informants were selected for the interview and four among them were women. Prior to the administration of the questionnaire, conversations were held with the assistance of a local interpreter to facilitate communication on the objective of the study and to build trust that the common goal was to document and preserve the knowledge on medicinal plants. The set questions contained the diagnosis of obesity, the names of plants used to treat the condition, methods of preparation, duration of treatment, adverse effects (if any) and the method of administration of the plant materials. Traditional healers and herbalists interviewed consisted of women and men between 40 and 60 years of age. Generally, they have low education qualification. Identification of the plants collected was done using relevant literature.\textsuperscript{[13]} The vouchers of the plants were deposited at the Giffen Herbarium of the Botany Department, University of Fort Hare.

RESULTS AND DISCUSSION

The results of this study revealed 20 plant species belonging to 18 families that are frequently used for treatment of obesity by herbalists, traditional healers and people of the study area (Table 1). This appears to be the first mention of the plants for the treatment of obesity except \textit{Rosmarinus officinalis} which is packaged and sold as a \textit{slimtea} for weight management.\textsuperscript{[14]} It was observed that, some of the plants are not taken solely, rather in mixture of vinegar, camphor, methylated spirit, salt and cayenne pepper as in \textit{Agathosma apiculata} and \textit{Cissampelos capensis}. Infusion from crushed \textit{Kedrostis africana} and \textit{Vernonia mespilifolia} is also taken for its synergistic effect. Most of the plants mentioned are also employed in the treatment of other related diseases such as diabetes\textsuperscript{[15,16]} hypertension, arthritis, body weakness and stomach ache, constipation.\textsuperscript{[16-17]} Patients who reported such disease conditions were mostly with clinical signs of obesity such as excessive body mass with unflattering appearance, visceral fat and discomfort in the stomach, aching and swollen legs, psychological complications, unhappiness, dizziness and disordered eating. The plant extracts are usually orally administered for a long period of time, depending on the severity of the ailment.
<table>
<thead>
<tr>
<th>Plant name</th>
<th>Family</th>
<th>Local/English name</th>
<th>Part used</th>
<th>Purpose of use</th>
<th>Preparation/administration</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Agathosma apiculata</em></td>
<td>Rutaceae</td>
<td>Ibuchu/ Buchu</td>
<td>Roots</td>
<td>Used to reduce body weight and fluid retention</td>
<td>A mixture of powdered root, vinegar and camphor is taken ½ glass cup twice daily. The powder root is soaked in water and infusion taken orally twice daily.</td>
</tr>
<tr>
<td><em>Alepidea amatymbica</em></td>
<td>Apiaceae</td>
<td>Igwili / Umvuthuza/ Larger tinsel flower</td>
<td>Roots</td>
<td>Used for weight loss, stomach pain and wound healing</td>
<td>The powder root is soaked in water and infusion taken orally twice daily.</td>
</tr>
<tr>
<td><em>Aloe ferox</em> Mill</td>
<td>Aloaceae</td>
<td>Ikhala- lasekoloni/Bitter aloe</td>
<td>Leaves</td>
<td>Used for weight loss and as anti-diabetic. It enhances body healthiness, and treats arthritis and constipation</td>
<td>The liquid from the boiled leaves is taken ½ glass cup daily.</td>
</tr>
<tr>
<td><em>Asparagus africana</em></td>
<td>Asparagaceae</td>
<td>Umthunzi/Climbing asparagus</td>
<td>Leaves</td>
<td>Used to reduce body weight, to increase urination and to treat diabetes</td>
<td>The leaves are crushed and soaked in water. ½ glass cup of the extract is taken twice daily.</td>
</tr>
<tr>
<td><em>Bulbine alooides</em></td>
<td>Asphodelaceae</td>
<td>Irooiwater</td>
<td>Roots</td>
<td>Used for weight loss, as anti-hypertensive, treats heart problems, and skin burns</td>
<td>2 litres of boiled root infusion is taken ½ glass cup twice daily for 2 weeks.</td>
</tr>
<tr>
<td><em>Cannabis sativa</em></td>
<td>Cannabaceae</td>
<td>Isangu/Marijuana</td>
<td>Leaves</td>
<td>It is used for weight loss, as psychoactive and stimulates energy.</td>
<td>Fresh leaves are crushed, soaked in water and extract is mixed with vinegar. Infusion from boiled leaves is usually taken ½ glass cup twice daily for 2 weeks.</td>
</tr>
<tr>
<td><em>Catharanthus roseus</em></td>
<td>Apocynaceae</td>
<td>Epinkie/Madagascar periwinkle</td>
<td>Leaves</td>
<td>Used for body weight loss and to treat diabetics</td>
<td>Cold Infusion of whole plant is taken ½ glass cup three times daily 2 litres of mixture called “isiwasho” is made from crushed root and vinegar, rooi pepper, cayane salt and methylated spirit. It is taken ½ glass cup daily or two spoonfuls twice daily. Powered root is boiled in water and taken ½ glass cup for a start and two spoonfuls twice daily for a period of 1½ weeks.</td>
</tr>
<tr>
<td><em>Cucumis africanus</em></td>
<td>Curcubitaceae</td>
<td>Ithangazana/Scaret guord</td>
<td>Whole plant</td>
<td>Used for body weight loss and wound healing</td>
<td></td>
</tr>
<tr>
<td><em>Cissampelos capensis</em></td>
<td>Menispermaceae</td>
<td>Umayisake/David root</td>
<td>Roots</td>
<td>Used for weight loss, stimulates body energy and arrests stomach aches.</td>
<td></td>
</tr>
<tr>
<td><em>Curtisia dentata</em></td>
<td>Cornaceae</td>
<td>Umlahleniselefile/ Capelancewood</td>
<td>Bark</td>
<td>Used to reduce body weight, as anti-diabetic, anti-hypertensive and to treat stomach ailments</td>
<td></td>
</tr>
<tr>
<td>Plant name</td>
<td>Family</td>
<td>Local/English name</td>
<td>Part used</td>
<td>Purpose of use</td>
<td>Preparation/administration</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------</td>
<td>------------------------------------</td>
<td>-----------</td>
<td>---------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><em>Exomis microphylla</em> (Thunb.) Aellen</td>
<td>Chenopodiaceae</td>
<td>Umvawenyathi/Sugarbeet</td>
<td>Leaves</td>
<td>Used for body weight loss, as anti-diabetic and for wound healing</td>
<td>Decoction is taken ½ glass cup three times daily. healing</td>
</tr>
<tr>
<td><em>Kedrostis africana</em> L.Cogn</td>
<td>Cucurbitaceae</td>
<td>Uthuvishe/Uthuvana/Baboons cucumber</td>
<td>Bulb</td>
<td>Used for body weight loss</td>
<td>Decoction from crushed fresh bulb is taken twice daily</td>
</tr>
<tr>
<td><em>Leonotis leonurus</em> L.R.Br</td>
<td>Lamiaceae</td>
<td>Umunyamunya/Wild dagga</td>
<td>Whole plant</td>
<td>Used for body weight loss, as anti-diabetic and for wound healing</td>
<td>A fresh plant is crushed, boiled in water and infusion is taken ½ glass cup twice daily.</td>
</tr>
<tr>
<td><em>Leonotis ocyrnifolia</em> Burm.f Iwarsson</td>
<td>Lamiaceae</td>
<td>Umuncwane/wild dagga</td>
<td>Whole plant</td>
<td>Used for body weight loss, and to treat stomach ache</td>
<td>A fresh plant is crushed, boiled in water and infusion is taken ½ glass cup twice daily.</td>
</tr>
<tr>
<td><em>Mimosops obovata</em> Nees ex Sond.</td>
<td>Sapotaceae</td>
<td>Umntunzi/Red milkwood</td>
<td>Bark</td>
<td>Used for body weight loss, and to treat stomach ache</td>
<td>It is crushed and soaked in water. Infusion is taken twice daily.</td>
</tr>
<tr>
<td><em>Phytolacca dioca</em> L.</td>
<td>Phytolaccaceae</td>
<td>Idolo lenkonyane/Phytolacca</td>
<td>Leaves</td>
<td>Used for body weight loss and as purgative</td>
<td>A mixture is made from boiled leaves and vinegar which is taken ½ glass cup twice daily.</td>
</tr>
<tr>
<td><em>Rosmarinus officinalis</em> L</td>
<td>Lamiaceae</td>
<td>Roosmaryn/Rosemary</td>
<td>Leaves</td>
<td>Used for weight loss, reduces body fluid, as digestive, and anti-hypertensive. It is also used for flavour</td>
<td>Decoction is made from boiled fresh leaves and taken severally</td>
</tr>
<tr>
<td><em>Rubia petiolaris</em> D.C</td>
<td>Rubiaceae</td>
<td>Impendulo/madder</td>
<td>Roots</td>
<td>Used to reduce body weight, treat stomach-ache and body weakness</td>
<td>The infusion is made from root decoction and taken ½ glass cup twice daily</td>
</tr>
<tr>
<td><em>Schotia latifolia</em> Jacq</td>
<td>Fabaceae</td>
<td>Umaphipa/Forest boer-bean</td>
<td>Bark</td>
<td>Used for body weight loss, as anti-diabetic and antihypertensive.</td>
<td>The bark is crushed to power and 2 spoonfuls of infusion is taken orally twice daily for 2weeks</td>
</tr>
<tr>
<td><em>Vernonia mesphilifolia</em> Less</td>
<td>Asteraceae</td>
<td>Uhlunguhlungu/Iron weed</td>
<td>Whole plant</td>
<td>Used for weight loss, as anti-hypertensive, and removes body liquid</td>
<td>Decoction from ground fresh plan is taken ½ glass cup twice daily</td>
</tr>
</tbody>
</table>

Whole plant = root, stem and leaf.

However, the dosages and frequency of treatment are not standardized; they depend on the decision and folk experience of the herbalist. Decoctions and infusions were the most frequently used methods of preparation from roots and leaves (31.3%), whole plant (21%), bark (10.53%) and bulb (5%). There was no report on the use of seeds, fruits, and latex in any of the herbal preparations. The effect of the treatment on the patients following prolong administration of the extract, according to the traditional healers, reduces the body weakness, removes excess body fluid by increasing frequency of urination and induces purging of the stomach to reduce abdominal fat.
However, the mechanisms of action of the plant remedies are yet to be examined.

All the traditional healers reported the practice of combining two or more medicinal plants to treat obesity. In recent animal and human studies, a combination of plants or compounds has shown efficient decrease in weight gain and body fat.18 Three of the plant species namely, *Cissaempelos caenensis*, *Curtisia dentata* and *Schotia latifolia* were repeatedly mentioned by the traditional healers in the management of obesity in the area. Information from literature revealed that the plants are highly-valued and widely used by the community for the treatment of many other diseases besides obesity. For example, decoction from the root of *Cissaempelos capensis* has been used topically for the management of glandular swelling, gall stones, menstrual problems, prevention of miscarriage and difficult labour, headache, pains, diabetes, tuberculosis, purgative, stomach and skin cancers.20–22 The traditional uses of *Curtisia dentata* include the treatment of stomach ailments, diarrhoea, as a blood strenghtener and as an aphrodisiac.23 Other uses of the plant include the treatment of heartwater in cattle in the Eastern Cape24 and the treatment of pimples.25 The antifungal and antibacterial activities of the leaves of *C. dentata* showed five-fold inhibition more than the bark according to the recent studies.26 The bark of *Schotia* species has been used in tanning and the decoction is taken for heartburn and to alleviate hangover. Both the bark and root are also used to treat diarrhoea.28 *S. latifolia* has also shown growth inhibition of a number of bacterial and fungal species and it is used by rural livestock owners for the treatment of livestock diseases.27 Although, there are a number of scientific investigations documented on the plants, unfortunately none of the studies revealed their anti-obesity properties.

Interestingly, responses from the four local healers revealed that excessive weight gain is not considered a health risk; rather it is culturally acceptable to the people as a sign of good living and healthy life. Consequently, the social perception and high caloric diet habit have predisposed several people to high risk morbid obesity, diabetes, hypertension, and arthritis in the area.28

**CONCLUSION**

The results of this study again have revealed that medicinal plants still play vital role in the primary healthcare of the people of this community. Further ethnopharmacological and phytochemical investigations of these plants are in progress to explore possible novel agents in the plants.

**ACKNOWLEDGEMENT**

The authors thank Govan Mbeki Research and Development Centre of the University of Fort Hare for financial support. I also thank Sunday Oyedemi for his assistance with the survey trips.

**Intellectual property agreement**

All the elderly and the traditional healers who contributed one information or the other during our ethnobotanical survey of medicinal plants used for the management of diabetes mellitus in the Nkonkobe Municipality were adequately financially rewarded with further verbal agreement that this research shall not be for commercial purposes but to serve as an enlightenment information to the community and the entire Eastern Cape, Province on the plants use for the management of obesity.

**Compliance statement**

No part of this study in any form has been commercialized, instead it is meant to be used as a tool for information dissemination on the medicinal plants used for the management of obesity in Nkonkobe Municipality and the entire Eastern Cape Province of South Africa.

**REFERENCES**


