

Full Length Research Paper

Ethnomedicinal survey of medicinal plants used for the management of HIV/AIDS infection among local communities of Nkonkobe Municipality, Eastern Cape, South Africa

B. E. Omoruyi, G. Bradley and A. J. Afolayan*

School of Biological Sciences, University of Fort Hare, Alice 5700, South Africa.

Accepted 6 April, 2012

An ethnomedicinal survey was conducted on medicinal plants used for the management of HIV/AIDS infection in the local communities of Nkonkobe Municipality, Eastern Cape Province. Information was obtained through a well-structured questionnaire and interviews administered to traditional healers and herbalists in various regions. The survey revealed 18 species belonging to 12 families. The members of Asphodelaceae (22.2%), Apocynaceae (16.7%), Asteraceae (11.1%), Mesembryanthemaceae (5.6%) and Hypoxidaceae (5.6%) were frequently mentioned by the traditional healers and rural dwellers of the regions. The decoction of *Aloe ferox*, *Bulbine asphodeloides* and *Carpobrotus edulis* roots and leaves are commonly administered for the management of HIV/AIDS infection. Other opportunistic diseases treated using the roots of these plants include tuberculosis, diabetes mellitus, sores, high blood pressure, intestinal worms and constipation. Most of the extracts of these plants are administered orally for a very long period of time, depending on the age and physical well-being of the patients. Generally, children are given half the dosage for the adults depending on the severity of the illness.

Key words: Medicinal plants, HIV/AIDS infection, traditional knowledge.

INTRODUCTION

South Africa is known to have the largest antiretroviral therapy (ART) on the planet, with about 1.3-million people currently receiving treatment (Richard, 2011). With over 42 million people living with HIV/AIDS, expanding access to antiretroviral treatment for those who urgently need it, is one of the most pressing challenges in international health care centres (Richard, 2011). In a population aforementioned, only 13.7% have access to medical insurance. Many cannot afford ART as a result of the high cost and poverty (UNAIDS/UNICEF, 2010; Motsoaledi, 2011).

Eastern Cape Province happened to be the third largest burden of HIV and AIDS in South Africa with an estimates of six million, seven hundred and forty-three thousand eight hundred (6, 743 800) people living with

the virus in 2010 (Shisana et al., 2009). It is the poorest provinces with the highest infant mortality rate facing majority of the population (Shisana et al., 2009). Many people living with this ailment in this province are also vulnerable to other diseases associated with HIV infection, such as tuberculosis, diabetes mellitus, high blood pressure, intestinal worms and constipation that result from immunosuppression (Statistics South Africa, 2008). It is clear that approximately 80% are unemployed, and household income is derived through the informal sector and social grants (Statistics South Africa, 2008).

Due to several constraints of receiving antiretroviral therapy treatment as aforementioned, most HIV-infected persons still use ethnomedicines to manage AIDS-related opportunistic infections (Wilfred et al., 2011). In majority of African countries including South Africa, traditional healers play a crucial role in providing primary health care including taking care of people living with meningitis, pneumonia, endocarditis and diabetes mellitus

*Corresponding author. E-mail: aafolayan@ufh.ac.za; Fax: +27866282295

(Matsushita, 2000; Eron, 2009; Nakanjako et al., 2009; Moszynski, 2009). Plant medication is believed to be an important healthcare system, which mainly involves the use of locally available medicinal herbs (Yadava and Jithendra, 2008). Promising results have been achieved through the evaluation of plant derived compounds against several opportunistic infections (Yadava and Jithendra, 2008). In Nkonkobe Municipality, the percentage (1.77%) of infected people that have access to antiretroviral therapy from this locality is reasonable high (Yadava and Jithendra, 2008). Herbal medicine still remains the main resource of management of diseases related to HIV/AIDS infected people living in the local communities. The wide spread use of traditional medicine among these communities could be attributed to cultural acceptability, economic affordability and efficacy against certain type of diseases as compared to modern medicines.

Local communities have indigenous experience in various medicinal herbs where they use their perceptions and experience to categorize plants part to be used when dealing with different ailments (Erasto et al., 2005; Wyk et al., 2008). Moreover, the use of plants as medication over the past period of years has taken a huge opportunity for local communities' development and livelihood improvement (Wyk et al., 2008). However, documentation of these plants and their various uses is scanty in literature. The present study reports the local and scientific names of the plants used for the management of HIV/AIDS in the local areas (Figure 1), as well as the parts of the plants used and the various methods of preparation and administration.

MATERIALS AND METHODS

Description of the study area

Nkonkobe Municipality is an area in South Africa that 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 (Masika and Afolayan, 2003). The major ethnic group is Xhosa speaking people with farming as their main occupation. People of the region use herbal medications either alone or in combination with anti-retroviral medicines for the treatment of viral diseases. Majority of them in the area are traditional healers and rural dwellers, hence the use of plants for the treatment of common diseases, such as HIV/AIDS is very common.

Survey on the use of medicinal plants

The ethnobotanical survey of this study was collected from May to September 2011 using a structured questionnaire and interviews. Prior to the administration of the questionnaire, a conversation with the informants in the survey was identified by the regional HIV/AIDS coordinator and the chairperson of the local traditional healers. He persuaded the association representative to elaborate the objective of the research and seeking their consent about the medicinal plants for diagnosing HIV/AIDS, name of the plants, methods of

preparation, duration of treatment and adverse effects. The age of respondents ranged from 10 to 60 years with average and low education qualifications. Traditional healers were paid some substantial amount of money before they agree to be used as guides during field trips to collect plant specimen. Voucher name of the reported anti-HIV plant was later identified by Prof D. S. Grierison of Botany Department, University of Fort Hare. Specimens were deposited (Omo 2011/1 to Omo 2011/19) at the Giffen Herbarium.

RESULTS AND DISCUSSION

The traditional healers and rural dwellers employed in this study claimed to diagnose HIV/AIDS infection in their patients by observing common symptoms such as chronic diarrhoea, persistent cough, progressive weight loss, and skin infection. Extracts from medicinal plant are taken orally for a long period of time, depending on the severity of the ailment. Thus the effect of medicinal plants treatment on the patients following administration according to the traditional healers can help to boost the immune system against viral attack in the human body. In recent past, a number of studies have explored immunostimulatory properties of plant extracts having antiviral properties (Supinya et al., 2006; Pascal et al., 2004; Webster et al., 2006).

Our survey revealed 18 important plant species documented by herbalists, traditional healers and local people from different communities in Nkonkobe Municipality for the management of HIV/AIDS infection (Table 1).

The survey plants revealed 18 species belonging to 12 families. The members of Asphodelaceae (22.2%), Apocynaceae (16.7%), Asteraceae (11.1%), Mesembryanthemaceae (5.6%) and Hypoxidaceae (5.6%) were frequently mentioned by the traditional healers and rural dwellers of the regions. But the decoction of *Aloe ferox*, *Bulbine asphodeloides* and *Carpobrotus edulis* roots and leaves are commonly administered for the management of HIV/AIDS infection. Other opportunistic diseases treated using the roots of these plants include tuberculosis, diabetes mellitus, sores, high blood pressure, intestinal worms and constipation. However, the active chemical compounds and their modes of action of the surveyed plants were unknown, but it is possible that these plants may contain some bioactive secondary metabolites that work against viral related infections. Hypoxidaceae are the most predominant plants that are used by the sangoma's in Dhlawu and Ngcabasa for boosting the patient immune system, cleansing the blood vessels and improving the appetite. Previous studies have reported that the Apiaceae and Hypoxidaceae are rich in sterols, sterolins, tannins, triterpenes, and flavonoids that help treat HIV related diseases, such as acute diarrhoea, dermal ulcers, general skin eruptions, coughs, colds, influenza, fever, headache and abdominal pains (Ernst and Coon, 2001; Singh et al., 2005; Kisangau, 2007). *Helichrysum*

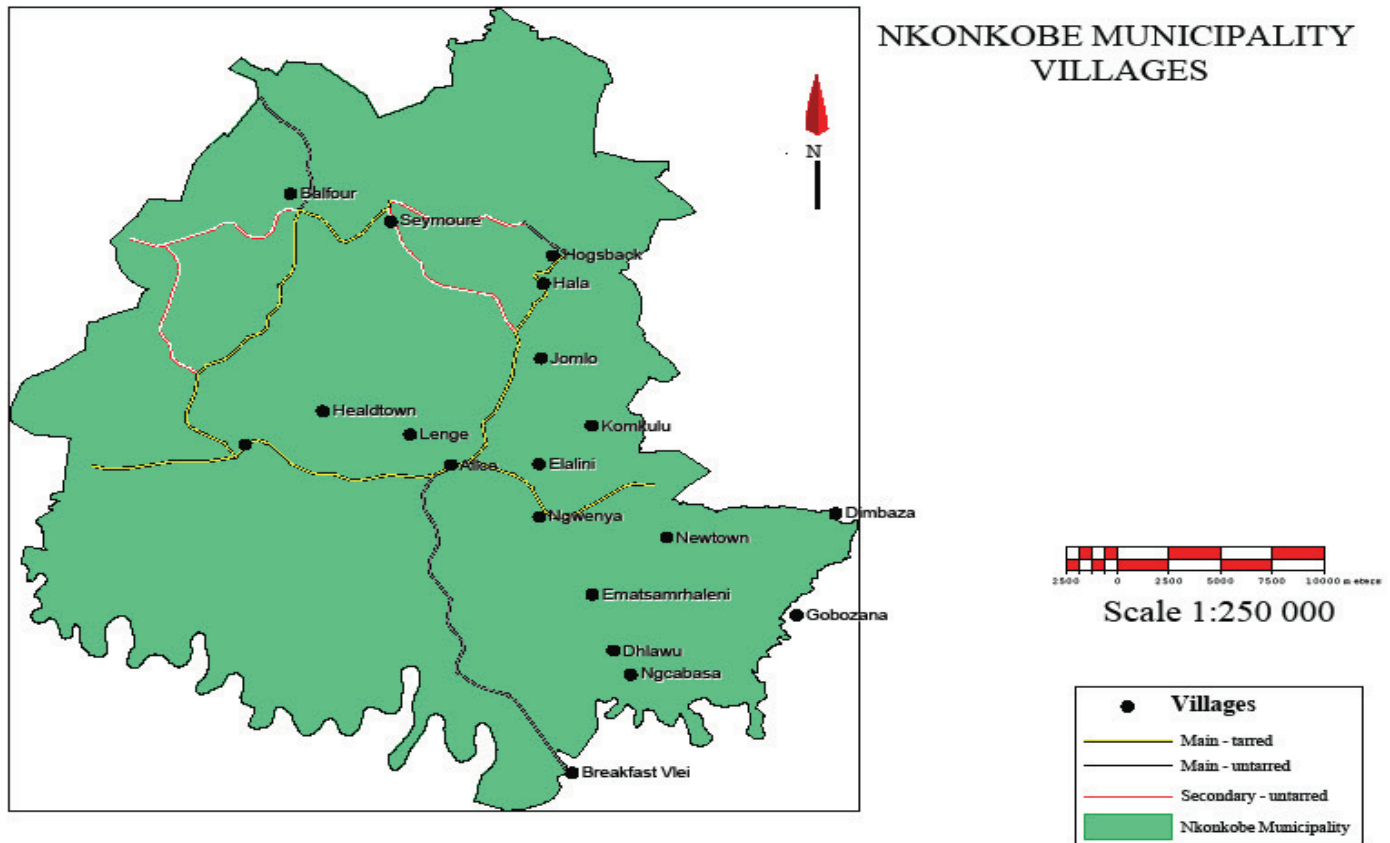


Figure 1. Map of Nkonkobe Municipality, Eastern Cape Province, South Africa.

cymosum belonging to a family of Asteraceae species is mainly used for the treatment of skin infection and kidney infection. In Tanzania, Asteraceae, Lamiaceae, Rubiaceae and Rutaceae are predominantly used by traditional healers to manage HIV/AIDS infections; including rheumatism, urinary tract, wounds, kidney infection and stomach ache. They were also reported to contain terpenoids. Terpenoids are biological compounds that can enhance and maintain the body immunity (Wagner et al., 2003; Thring and Weitz, 2005; Kisangau et al., 2007).

In this survey, different parts of plants were used by the local traditional healers. Among the different parts, roots were most frequently used, followed by the leaves, stems, and bulbs which are in accordance with studies conducted in Ethiopia, on herbal preparation for HIV/AIDS infections treatment (Abebe, 2001).

The decoction of the roots of *Bulbine asphodeloides* (Itswele), *Xysmalobium undulatum* (Itshongwe), *Aloe ferox*, *Aloe tenuior*, (Umhlaba), *Aloe (generic)* (Ikhala) and *Hypoxis hemerocallidea* also known as inongwe were frequently mentioned by the traditional healers and herbalists for the treatment of other opportunistic diseases including tuberculosis, diabetes, sores, high blood pressure, intestinal worms and constipation. *H. hemerocallidea* leaves are widely used as incense to

invoke the goodwill of their ancestors; the smoke is sedative and helpful for insomnia. Elderly men and women leaving in rural villages in Nkonkobe inhale it as protective cleanser of the lungs. Information from other literature revealed that these plants were used for the treatment of many other diseases besides HIV/AIDS infection (Van Wyk et al., 1997). The leaves extract are used to treat stomach-ache and mouth antiseptic (Van Wyk et al., 1997). The management of these herbal species as drugs are currently recommended by the South African Ministry of Health for HIV management (Ernst and Coon, 2001).

Carpobrotus edulis (Igukuma) roots and leaves boiled with water or alcohol are described as a popular remedy used orally for treating tuberculosis, dysentery, diabetic mellitus, stomach cramps, laryngitis, sore throat and mouth infections, The leave extract is used as a soothing lotion for burns, scrapes, bruises, cuts, sunburn, ringworm, eczema, dermatitis, herpes, nappy rash, thrush, cold sores and cracked lips. In other part of Africa, the infusion of fruits is used as a very powerful remedy for constipation, a mixture of the leave extract, honey and olive oil in water is a remedy for tuberculosis (Smith et al., 1998). It also has significant medicinal uses in pregnant women during pregnancy to ensure strong, healthy baby and an easy birth control. In the Eastern

Table 1. Medicinal plants used for the management of HIV/AIDS infection in the local communities of Nkonkobe Municipality, Eastern Cape Province, South Africa.

Plant species	Local names	Therapeutic indications	Parts used	Preparation
<i>Alepidea amatymbica</i> Eckl. and Zeyh., (Apiaceae)	Inkatazo	Diarrhoea, clean-up blood vessels and improves patients appetite	Root and bark	Root and bark are boiled. Two-three tea spoons of the infusion are administered to children, while half a cup is given to an adult once a day.
<i>Aloe ferox</i> , Mill., (Asphodelaceae)	Umhlaba	Dysentery, skin infections sores, and cough	Root	Decoctions are made from roots and half a cup is three times a day.
<i>Aloe tenuior</i> , Haw., (Asphodelaceae)	Umhlaba	Boost immune system, diarrhoea, heal sores caused by skin infections	Root	Decoctions are made from roots and half a cup is three times a day.
<i>Aloe</i> (generic), <i>A. africana</i> Mill., A (Xanthorrhoeaceae)	Ikhala	Cures tuberculosis, cleans the blood vessels and help boost appetite	Root	Root decoction (full tea spoon) taken orally till the patient gets better.
<i>Aloe arborescence</i> Mill., (Asphodelaceae)	Ingcelwane	Immune system booster, diabetes and high blood pressure	Leaves	Leaves are boiled in water and a full cup is administered orally till the patient immune system improves.
<i>Bulbine asphodeloides</i> (L.) Willd., B. (Asphodelaceae)	Itswele	Cures tuberculosis, cleans the blood vessels and help boost appetite	Root and leaves	Decoction of the roots and leaves (full tea spoon) are administered three times a day till the patient is healed.
<i>Carpobrotus edulis</i> (L.) Bolus (Mesembryanthemaceae)	Igcukuma	Skin infection as a result of fungal infection, gastrointestinal complaints sores, remove shingles from HIV patient, boost immune system	Leaves and root	Leaves and roots are crushed in boiled water and half a cup is administered under standardized conditions.
<i>Citrus limon</i> L W4. (Rutaceae)	Ulamula	High blood pressure and diabetes mellitus	Fruits	Fruits are mixed with boiled water and half a cup is administered orally.
<i>Helichrysum cymosum</i> L W5. (Asteraceae)	Imphepho	Diarrhoea, improves appetite, boost immunity and removing of evil spirit from patients	Fruits and leaves	Fruits and leaves are mixed with boiled water and half a cup is administered orally.
<i>Hydnora Africana</i> , Thunb., (Hydnoraceae)	Umavumbuka	Cardiovascular diseases and Diarrhoea	Leaves	Leaves are boiled in water and 2 tea spoons are administered to little children and half a cup for an adult 2 times a day.
<i>Hypoxis hemerocallidea</i> Fisch and C.A., (Hypoxidaceae)	Inongwe	Cleans the blood vessels, remove sores, improves appetite and immune booster	Root	Half a cup of root decoction is taken orally till the patient gets better

Table 1. Contd.

<i>Leonotis leonurus</i> , (L.) R.Br., (Lamiaceae)	Utywala	Intestinal worm infections, and constipation	Bulb	Bulb infusions are taken orally.
<i>Nerine filifolia</i> Baker (Amaryllidaceae)	Itswele	Treatment of vaginal infection (candidacies) and sores from fungal infection	Root	Grated roots are boiled in water and taken orally, until patient is completely cured.
<i>Olearia moschata</i> , (Asteraceae)	Incense	Diarrhoea, abdominal cramps, improves appetite, boost immunity and removing of evil spirit from patients	Bark	Bark is boiled and half a cup is taken orally.
<i>Pachycarpus concolor</i> E.Mey., (Apocynaceae)	Itshongwe	Treatment of tuberculosis, high blood pressure and immune boosting	Leaves	Leaves are boiled in water and half a cup is administered orally till the patient immune system is boosted.
<i>Strychnos henningsii</i> Gilg. MW6 (Loganiaceae)	Umnonono	Gastrointestinal disorder, help boost immune systems, diarrhoea and easy menstrual pain	Leaves	Leaves are boiled in water and half a cup is administered three times a day.
<i>Xysmalobium orbiculare</i> (E.Mey.) D. Dietr., (Apocynaceae)	Itshongwe	Treatment of tuberculosis, cough, high blood pressure and immune boosting	Root	Fresh root boiled in water and the decoction is taken orally.
<i>Xysmalobium undulatum</i> (L.) W. T. Aiton, (Apocynaceae)	Itshongwe	Cancer, and help enhance the immune defence	Root	Decoctions are made from roots and half a cup is taken orally till the patient gets better.

Cape it is also used to fight fatigue, vaginal thrush, toothache, earache, and spiritual purposes (Smith et al., 1998; Van Wyk et al., 1997).

Preparation and dosage administered to individual patients

Plants are collected at anytime of the year, depending on their seasonal availability, preferably in the morning. The observed methods of preparation involved the use either water or alcohol of only a single plant part. Decoctions and infusions were the main methods of preparation. Most of the extracts of these plants are

administered orally for a very long period of time, depending on the age and physical well-being of the patients. Generally, children are given half the dosage than for the adults depending on the severity of the illness.

Conclusion

This survey has revealed 18 medicinal plants for the management of HIV/AIDS infection and their current use in the treatment of other related diseases. However, we have decided to work with *C. edulis* and *B. asphodeloides*. The fact that these plants are used in the management of

HIV/AIDS infection, calls for the investigation of their antimicrobial activities, anti-tuberculosis activities, anti-diabetes activities and HIV/AIDS causing enzymes such as HIV protease, DNA integrase and reverse transcriptase and other related bacteria. Phytochemical, antioxidant and toxicity studies of these plants will be carried out, to enable identification of active chemical constituents and cautions to be issued of dangerous practices or its toxic effects.

ACKNOWLEDGEMENTS

We are grateful to the traditional healers and rural

dwellers for sharing their knowledge on medicinal plants with us.

REFERENCES

- Abebe D (2001). The role of medicinal plants in healthcare coverage of Ethiopia, the possible benefits of integration. *Inst. Biodivers. Conserv. Res.*, pp. 6-21.
- Erasto P, Adebola PO, Grierson D, Afolayan AJ (2005). An ethnobotanical study of plant used for the treatment of diabetes in the Eastern Cape Province of South Africa. *Afr. J. Biotechnol.*, 4: 1458-1460.
- Ernst E, Coon TJ (2001). Heavy metals in traditional Chinese medicines: a systematic review. *Clin. Pharm. Ther.*, 70: 497-504.
- Eron J, Andrade R, Zajdenverg C, Workman D, Cooper B, Young X, Xu BY, Nguyen R, Leavitt, Sklar P (2009). Switching from stable lopinavir/ritonavir-based to raltegravir-based combination ART resulted in a superior lipid profile at week 12 but did not demonstrate non-inferior virologic efficacy at week 24, 16th Conference on Retroviruses and Opportunistic Infections (CROI), pp. 8-11.
- Kisangau DP, Lyaruu HVM, Hosea KM, Joseph CC (2007). Use of traditional medicines in the management of HIV/AIDS opportunistic infections in Tanzania: a case in the Bukoba rural district. *J. Ethnobiol. Ethnomed.*, 10(29): 1746-4269.
- Masika PJ, Afolayan AJ (2003). An ethnobotanical study of plants used for the treatment used for the treatment of livestock diseases in the Eastern Cape Province, South Africa. *Afr. Pharm. Biol.*, 41: 16-21.
- Matsushita S (2000). Current status and future issues in the treatment of HIV-1 infection. *Int. J. Hematol.*, 72: 20-27.
- Motsoaledi A (2011). 'How we're re-engineering the health system - Health Budget Vote Policy Speech presented at the National Assembly' politicsweb.co.za.
- Moszynski P (2009). New HIV drug patent pool "offers hope to millions". *BMJ*, 339: b5557.
- Nakanjako D, Colebunders R, Coutinho AG, Kanya MR (2009). Strategies to optimize HIV treatment outcomes in resource-limited settings. *AIDS Rev.*, 11: 179-189.
- Pascal OB, Chikwelu LO, Eunice I, Marie-Line A, Simon L (2004). *In vitro* activity of three selected South African medicinal plants against human immunodeficiency virus type 1 reverse transcriptase. *Afr. J. Biotechnol.*, 3: 555-559.
- Richard D (2011). HIV rate outpacing prevention, says motlanthe. Cape Town, South Africa, pp. 16-32
- Statistics South Africa (2008). Mortality and causes of death in South Africa, 2006: Findings from death notification.
- Singh IP, Bharate SB, Bhutani KK (2005). Anti-HIV natural products. *Curr. Sci.*, 89: 269-289.
- Smith GF, Chesselet P, Van Jaarsveld EJ, Hartmann H, Hammer S, Van Wyk B, Burgoyne P, Klak Kurzweil CH (1998). *Mesembs of the world*. Briza Publications, Pretoria.
- Supinya T, Arunporn I, Pranee R (2006). Anti-HIV-1 protease- and HIV-1 integrase activities of Thai medicinal plants known as Hua-Khao-Yen. *J. Ethnopharmacol.*, 105: 312-315.
- Shisana O, Rehle T, Simbayi L, Zuma K, Jooste S, Pillay-Van Wyk V, Mbelle N, Van Zyl J, Parker W, Zungu N, Pezi S, the SABSSM III Implementation Team (2009). South African national HIV prevalence, incidence, behaviour and communication survey 2008: A turning tide among teenagers? Cape Town: HSRC Press.
- Thring TSA, Weitz FM (2005). Medicinal plant use in the Bredasdorp/Elim region of the Southern Overberg in the Western Cape Province of South Africa. *J. Ethnopharmacol.*, 103: 261-275.
- Van Wyk BE, Van Oudtshoorn B, Gericke N (1997). Medicinal plants of South Africa. Briza publications, Pretoria, ISBN No. 1-875093-09-5. 1-304.
- Wagner S, Taschereau P, Belland RJ, Sand C, Rennie RP (2003). Influence of willow bark extract on cyclooxygenase activity and on TNF alpha or interleukin 1 beta release *in vitro* and *in vivo*. *Clin. Pharmacol. Ther.*, 73: 272-4.
- Webster D, Taschereau P, Lee TD, Jurgens T (2006). Immunostimulant properties of *Heracleum maximum* Bartr. *J. Ethnopharmacol.*, 106: 360-363.
- UNAIDS/UNICEF (2010). Towards Universal Access: Scaling up priority HIV/AIDS interventions in the health sector. Available at <http://www.unaidsrstes.org/progress>.
- Wilfred MO, Donald SG, Roland NN (2011). The Effect of the Acetone Extract of *Arctotis arctotooides* (Asteraceae) on the Growth and Ultrastructure of Some Opportunistic Fungi Associated with HIV/AIDS. *Int. J. Mol. Sci.*, 12: 9226-9235.
- Yadava RN, Jithendra J (2008). New antibacterial triterpenoid saponin from *Lactuca scariola*. *Fitoterapia*, 79: 245-249.