



Ethno-botanical survey of some anticancer medicinal plants from Garhwal Himalaya (Uttarakhand) India

Antima Sharma^{1*}, L.R Dangwal¹, Upvan Bhushan², Pratima Bhushan³, C.S Rana¹

¹*Herbarium and Plant Systematic Laboratory, Department of Botany, H.N.B. Garhwal Central University, S.R.T. Campus Badshahi Thaul, Tehri Garhwal (Uttarakhand), India*

²*Department of Botany, University of Jammu, India*

³*CMJ University, Meghalaya, India*

Received: 22 November 2012

Revised: 08 December 2012

Accepted: 09 December 2012

Keywords: Ethno-botany, cancer, medicinal plants, traditional healers, Garhwal Himalaya.

Abstract

Ethno-botanical survey of the plants used in the management of cancer was carried out in Garhwal Himalaya, Uttarakhand, India. Herbalists, herb sellers and traditionalists living within the study area were interviewed by the administration of questionnaires. This article considers 20 medicinal plants belong to 16 families, and their different parts (root, stem, bark, bulb, leaf, fruit and seed) or the whole plants/herbs are used. The extracts or decoctions of these are generally used in the anticancer recipes. A need for further scientific research based on the findings of this survey is indeed very necessary and recommended so that adequate records of indigenous methods for the management of cancer can be kept for posterity especially in the study area. A need for analytical work on the plants identified as useful for the management of cancer is also necessary in order to determine the actual dosage applicable so that the medicinal value of these plants could be made available to humanity and hence reduce pain, cost and sudden death of the peoples.

*Corresponding Author: Antima Sharma ✉ antimasharma82@gmail.com

Introduction

Cancer has been defined as a disease in which there is uncontrolled multiplication and spread within the body of abnormal forms of the body's own cells (Rang *et al.*, 2001). All cancer types arise through a series of steps characterized by progressive loss of normal growth control. There are proteins in the cells that ensure this continuity (Brook & Thanque, 1999). Death from cancer often comes not from the primary site but from metastases. Cancer may affect people at all ages even foetus but the risk for most varieties increases with age. Thousands of herbal and traditional compounds are being screened worldwide to validate their use as anticancerous drugs Diwanay *et al.*, 2004, Liu and Akhand, 1998).

Over the past decade, herbal medicine has become a topic of global importance, making an impact on both world health and international trade. Medicinal plants continue to play a central role in the healthcare system of large proportions of the world's population. This is particularly true in developing countries, where herbal medicine has a long and uninterrupted history of use. Recognition and development of the medicinal and economic benefits of these plants are on the increase in both developing and industrialized nations (WHO, 1998). Continuous usage of herbal medicine by a large proportion of the population in the developing countries is largely due to the high cost of western pharmaceuticals and healthcare (Koduru *et al.*, 2007). In addition, herbal medicines are more acceptable in these countries from their cultural and spiritual points of view. Use of plants for medicinal remedies is an integral part of the Uttarakhand cultural life, and this is unlikely to change in the years to come (Gaur, 1999). Several studies employing methodologies of modern medicine have been conducted on a multitude of herbs of ethno-botanical importance. Ayurveda, the Traditional Indian System (TIS) of medicine, has been successful from ancient times in using natural drugs, mostly herbal preparations, in preventing or suppressing various diseases using several lines of treatment.

Despite the long history of cancer treatment using herbal remedies in the study area, the knowledge and experience of these herbalists have not been scientifically documented. Information on traditional herbal practice is passed from one generation to the other through oral tradition. Considering the rapid rate of deforestation and loss of biodiversity, there is a need for accurate scientific documentation of the knowledge and experience of these herbalists. In this paper, we report the information on plants gathered from traditional and elder rural dwellers, used in the study area for the treatment of cancer.

Material and methods

Study area

Garhwal Himalaya is the most spectacular in its natural assets, land form, water sedges, less green forest and floristic diversity. It is the part of northwest Himalaya, lies between 29°- 26' 31°- 28' North latitude and 77°-49' 80°- 6' East longitude. The Garhwal Himalaya is enriched with varied climatic as well as geographical features ranging from foothills to snow capped peaks. The altitudinal play a vital role in separating different types of vegetational zones namely; submontane (300-1500 m a.s.l), montane zone (1500-3000 m a.s.l) and alpine zones (3000- snow line).

Folklore survey

Information was compiled through scientifically guided questionnaires, interviews and general conversations. Although informants were not scientifically literate, they were born in the region and had lived there for most of their lives. Relevant information regarding the plant species, recipes, their local names, modes of administration and dosage were also collected to enhance permanent record (Fig. 1-4).

Plant collection and specimen preparation

Plant specimens indicated in the recipes were collected, pressed and dried, mounted and identified in accordance with taxonomic practice. The plants were initially identified by their vernacular names through consultations with the local people. Proper

scientific identification of the plants and their uses in other communities were collected from the literature (Jain & Rao, 1977, Singh & Subramaniyam, 2008). Voucher specimens were prepared and deposited in

H.N.B. Garhwal Central University, S.R.T. Campus Herbarium.

Table 1. Some Medicinal Plants Used by Treatment of Cancer.

Botanical Name \ Family	Local name	Plant parts used	Modes of administration
<i>Allium cepa</i> L. (Liliaceae)	Pyaz	Leaves	Crushed leaves are administered orally every day until the patient is cured.
<i>Allium sativum</i> L. (Liliaceae)	Lahsun	Bulbs	Decoctions are made from bulbs, warmed gently and taken orally till the signs of relief are obvious.
<i>Aloe vera</i> L. (Liliaceae)	Patanguar	Leaves	Leaves should be ground together when dried and taken with honey or milk.
<i>Alstonia scholaris</i> (L.) R.B. (Apocynaceae)	Satni	Bark and leaves	Sun dried bark and leaves are powdered and infused in water or milk and taken orally everyday till signs of relief are obvious.
<i>Andrographis paniculata</i> L. (Acanthaceae)	Kalmegh	Whole plant	Whole plants are freeze for 1 week and make a decoction. It is administered orally till signs of relief are obvious
<i>Artemisia nilagirica</i> (C.B) Clarke (Asteraceae)	Kunjaa	Flowers, Leaves & Seeds	Leaves, flowers and seeds are stamped and boiled in water to make a decoction. It is administered orally till signs of relief are obvious.
<i>Azadirachta indica</i> A.H.L. Juss. (Meliaceae)	Neem	Flowers	Sun dried flowers are freeze for 1 week and make a decoction. It is administered orally till signs of relief are obvious.
<i>Barleria prionitis</i> L. (Acanthaceae)	Peela Bansa	oil	The oil prepared with whole plant is indicated for external application during acute stages of cyst in blood vessels.
<i>Cannabis sativa</i> L. (Cannabaceae)	Bhanglu	Leaves	Crushed leaves are administered orally every day until the patient is cured.
<i>Catharanthus roseus</i> (L.) G. Don (Apocynaceae)	Sadabhar	Leaves, seeds & fruit	The fruit extract of <i>Solanum nigrum</i> , seed of <i>Triticum aestivum</i> and leaves of <i>Catharanthus roseus</i> should be ground together when dried and taken with honey.
<i>Curcuma domestica</i> Valetton (Zingiberaceae)	Haldi	Whole plant	Powder of <i>Curcuma domestica</i> in combination with <i>Symplocos racemosa</i> , <i>Soymida febrifuga</i> , is mixed with honey and this is used as an external remedy
<i>Oroxylum indicum</i> (L.) Ventenat (Bignoniaceae)	Tantia	Fruit and seeds	Take 1 gm powder of its fruit and seeds and give with 1 teaspoonful of honey or ginger extract.
<i>Plumbago zeylanica</i> L. (Plumbaginaceae)	Chitrak	Root	Root should be rinsed and boiled in one 4 liters of fermented corn water for 6 hours.
<i>Raphanus sativus</i> L. (Brassicaceae)	Muli	Seed	Local application of <i>Raphanus sativus</i> powder paste with the radish ash was considered effective against tumour.
<i>Rubia cordifolia</i> L. (Rubiaceae)	Manjeet	Plant extract	Plant extract boiled in water to make a decoction. It is administered orally till signs of relief are obvious.
<i>Taxus brevifolia</i> L. (Taxaceae)	Birmi	Bark	Take 1 gm powder of its bark and give with 1 teaspoonful of honey.
<i>Terminalia arjuna</i> (Roxb.ex DC)Wight & Arn (Combretaceae)	Arjuna	Bark	Grape juice and Bark of <i>Terminalia arjuna</i> are mixed with the sugar cane juice and taken it orally in the morning and evening.
<i>Triticum aestivum</i> L. (Poaceae)	Atta	Fruit & Seed leaves	The fruit extract of <i>Solanum nigrum</i> , seed of <i>Triticum aestivum</i> and leaves of <i>Catharanthus roseus</i> should be ground together when dried and taken with honey.

<i>Zingiber officinale</i> Roscoe (Zingiberaceae)	Adrak	Rhizome & Bark	Take 1 gm powder of its bark and give with 1 teaspoonful of honey or ginger extract.
<i>Vitis vinifera</i> L. (Vinaceae)	Angoor	Juice	Grape juice and leaves of <i>Terminalia chebula</i> are mixed with the sugar cane juice and taken it orally in the morning and evening.

Table 2. Scientific evidence on herbs used in Ayurveda proven to have anticancer property.

Botanical name	Active compounds	Reference
<i>Allium cepa</i> L.	Organosulphur compounds	Sengupta <i>et al.</i> , 2004
<i>Allium sativum</i> L.	Organosulphur compounds	Sengupta <i>et al.</i> , 2004
<i>Aloe vera</i> L.	Aloe-emodin and acemannan	Lissoni <i>et al.</i> , 1998
<i>Alstonia scholaris</i> (L.) R.B.	Alstonine, Echitamine	Dung <i>et al.</i> , 2001
<i>Andrographis paniculata</i>	Andrographolide	Kumar <i>et al.</i> , 2004; Kumaran <i>et al.</i> , 2003
<i>Artemisia nilagirica</i> (C.B Clarke) Pamp	Flavonoids, steroids, terpenoid,	Devmurari <i>et al.</i> , 2010
<i>Azadirachta indica</i> A.H.L. Juss.	Tannin and phenolic compounds	Pandey and Madhuri, 2010
<i>Barleria prionitis</i> L.	Oil	Kinjavadekara <i>et al.</i> , 1998
<i>Cannabis sativa</i> L.	Cannabitriol	Madhuri and Pandey, 2009
<i>Catharanthus roseus</i> (L.) G. Don	Vinblastin and vincristine	Mouli <i>et al.</i> , 2009, Huang <i>et al.</i> , 2004
<i>Curcuma domestica</i> Valetton	Curcumin	Duvoix <i>et al.</i> , 2005
<i>Oroxylum indicum</i> (L.) Ventenat	Sulphate and glucuronide.	Bhishagratha, 1991
<i>Plumbago zeylanica</i> L.	Plumbagin	Hsu <i>et al.</i> , 2006
<i>Raphanus sativus</i> L.	Olomucine	Cragg <i>et al.</i> , 2005
<i>Rubia cordifolia</i> L.	Rubiadin , rubierythrinic acid	Tripathi <i>et al.</i> , 1997
<i>Taxus brevifolia</i> L.	Taxol	Luck and Roche, 2002; Ghamande <i>et al.</i> , 2003; Sunwoo <i>et al.</i> , 2001
<i>Terminalia arjuna</i> (Roxb.ex DC)Wight & Arn	Casuarinin	Kuo <i>et al.</i> , 2005
<i>Triticum aestivum</i> L.	Acemannan	Foster and Duke, 1990
<i>Vitis vinifera</i> L.	Resveratrol	Jang <i>et al.</i> , 1997
<i>Zingiber officinale</i> Roscoe	Organosulphur compounds	Sengupta <i>et al.</i> , 2004

For the systematic enumeration, plant names have been arranged alphabetical order. The correct botanical name is followed by family with in parentheses, local name, and part use with their medicinal use (Table 1).

Results and discussion

In orthodox medicine cancer can be treated with drugs and radiotherapy if detected early. Otherwise surgical operation is used at some stage after which it can become very difficult and hopeless. However, nature has some remedy for cancer patients. Some substances have been found to be anti-carcinogenic (Table 2). Also, a lot of research has been and is still being done on the effectiveness of *Aloe vera* (L.) Burm.f. *Azadirachta indica* A.H.L. Juss., *Catharanthus rosesus* (L.) G. Don., for treating

cancer. Literature has revealed that most of the synthetic drugs that have been used in the past have negative effects that were of grave consequence in some cases, especially when taken by patients on self prescription after an initial visit to the physician. For this reason, it is imperative for ethno-botanists and pharmacognosists to do more analysis on the 20 wonderful plants mentioned in this paper. Our medical health practitioners should also focus attention on more intense research on ethno-medicinal plants which can save the life of peoples without side effects.

Formulation of the dosages of extracts from the recipes must be strictly adhered to for maximum efficacy and also the avoidance of over dosage which may lead to other complications in patients. One

major advantage of traditional medicine is that, it is cheaper than orthodox medicine. While drugs alone are not the only means of providing health care, they do play an important role in protecting, maintaining, and restoring the health of people. Total information gathered from the herbalist's shows that increasing number of people is turning to the use of anti-cancer which shows that they are effective and efficient in the treatment of cancer. Traditional medicine has higher benefits than any other health care system as it is cheaper, readily available and could cure permanently. Apart from this, it has no side effect and is capable of saving for the nation, huge foreign exchange which can be used for other development programme. The vulnerability of medicinal plants to over exploitation and extinction needs to be dealt with seriously. Issues relating to the conservation of these medicinal plants should be addressed by the Government and Non-governmental Organizations. Conservation methods such as *in-situ* and *ex-situ* should also be adopted to protect our natural biodiversity.



Fig. 1. Interviewing and interaction with local villagers in village Khari.

Recently, a greater emphasis has been given towards the researches on complementary and alternative medicine that deals with cancer management. These days it became more than the rule for scientists in search of a particular medicinal properties to

manipulate a synthetic compound rather than to search the folk literature or to explore known cures among indigenous peoples. Unfortunately, this approach has often served only to delay the application of many potential remedies. Nature is still humankind's greatest chemist, and many compounds that remain undiscovered in plants are beyond the imagination of even our best researchers. Existing remedies from folk medicine should be rigorously examined for potential relevance in the treatment of disease, especially in societies and third world countries where modern medicine is scarce, or expensive to buy or unavailable for various reasons.



Fig. 2. A traditional /road-side healer sharing his perspective on traditional remedies with the investigator in village Pali.



Fig. 3-4. Priest preparing medicine from the Garhwal Himalaya and pills prepared from medicinal plants.

Promotion of folk medicine is not to advocate a return to domestic medicine but only where shown efficacious and valid should it be retained and where

proved invalid discarded. Indeed, traditional medicine ought to compliment rather than substitute for modern medicine. Developing nations need to utilize the best available from both traditional and modern medicine if in the foreseeable future adequate health is to be enjoyed by their people. Biomedical researchers should be able to augment traditional herbal medicine by their unique discoveries.

Acknowledgement

The authors are thankful to the peoples of Garhwal Himalaya for providing us ethno-medicinal plants information's and valuable suggestion.

References

- Bhishagratha KL.** 1991. Sushruta Samhita. Varanasi: Choukhamba Orientalia.
- Brook G, La Thanque NB.** 1999. Drug discovery and the cell cycle, The promise and the Hope, Drug Discovery Today **4**, 455-464.
- Cragg GM, Newman DJ.** 2005. Plants as source of anticancer agents, Journal of Ethnopharmacology **100 (1-2)**, 72-79.
- Devmurari VP, Jivani NP.** 2010. Anticancer Evaluation of *Artemisia nilagirica*, International Journal of Pharm. Tech Research **2(2)**, 1603-1608.
- Diwanay S, Chitre D, Patwardhan B,** 2004. Immunoprotection by botanical drugs in cancer chemotherapy, Journal of Ethno-pharmacology **90(1)**, 49-55.
- Dung NX, Ngoc PH, Rang DD, Nhan NT, Klinkb N, Leclercq P.** 2001. Chemical composition of the volatile concentrate from the flowers of Vietnamese *Alstonia scholaris* (L.) R.Br. Apocynaceae. Journal Essential Oil Research, **13 (6)**, 424-426.
- Duvoix A, Blasius R, Delhalle S, Schnekenburger M, Morceau F, Henry E, Dicato M, Diederich M.** 2005. Chemopreventive and therapeutic effects of curcumin. Laboratoire de Biologie Moleculaire et Cellulaire du Cancer. Cancer Lett. **223(2)**, 81-190.
- Foster S, Duke JA.** 1990. A Field Guide to Medicinal Plants. New York: Houghton Mifflin. 46.
- Gaur RD.** 1999. Flora of the District Garhwal: North West Himalaya (with ethnobotanical notes) Transmedia, Srinagar Garhwal.
- Ghamande S, Lele S, Marchetti D, Baker T, Odunsi K.** 2003. Weekly paclitaxel: in patients with recurrent or persistent advanced ovarian cancer. Int. J Gynecol Cancer, **13**, 142-147.
- Hsu YL, Cho CY, Kuo PL, Huang YT, Lin CC.** 2006. Plumbagin (5-Hydroxy-2-methyl-1,4-naphthoquinone) induces apoptosis and cell cycle arrest in A549 cells through p53 accumulation via c-jun NH2-terminal kinase-mediated phosphorylation at serine 15 *in vitro* and *in vivo*. JPET **318**, 484-494.
- Huang Y, Fang Y, Wu J, Dziadyk JM, Zhu X, Sui M and Fan W.** 2004. Regulation of *Vinca* alkaloid-induced apoptosis by NF-kB/IkB pathway in human tumor cells. *Mol Cancer Ther*, **3**, 271-277.
- Jain SK, Rao RR.** 1977. Field and Herbarium Methods. Today and Tomorrow Printers and Publishers, New Delhi.
- Jang M, Cai L, Udeani GO, Beecher CWW, Fong HHS, Farnsworth NR.** 1997. Cancer chemopreventive activity of Resveratrol, a natural product derived from Grapes. Science **275**, 218-20.
- Kinjavadekara RS.** Astanga sangraha. New Delhi: Uppal Publishing House. 1998.
- Koduru S, Grierson DS & Afolayan AJ,** 2007. Ethno-botanical information of medicinal plants used for treatment of cancer in the Eastern Cape

Province, South Africa. *Current Science* **92** (7), 906-908.

Kuo PL, Hsu YL, Lin TC, Lin LT, Chang JK, Lin CC. 2005. Casuarinin from the bark of *Terminalia arjuna* induces apoptosis and cell cycle arrest in human breast adenocarcinoma MCF-7 cells. *Planta Med.* **71**(3), 237-43.

Kumar RA, Sridevi K, Kumar NV, Nanduri S and Rajagopal S. 2004. Anticancer and immunostimulatory compounds from *Andrographis paniculata*. *J. Eth. Pharmacol.* **92**(2-3), 291-295.

Kumaran KS, Thirugnanasambantham P, Viswanathan S, Ramamurthy MS. 2003. An HPLC method for the estimation of andrographolide in rabbit serum, *Ind J Pharmacol*, **35**(2), 109-112.

Lissoni P, Giani L, Zerbini S, Trabattoni P, Rovelli F. 1998. Biotherapy with the pineal immunomodulating hormone melatonin versus melatonin plus *Aloe vera* in Untreatable advanced solid neoplasm, *Nat Immun.* **16**, 27-33.

Liu W, Kato M, Akhand A. 1998. The herbal medicine Sho-saiko-to inhibits the growth of malignant melanoma cells by up-regulating Fasmediated apoptosis and arresting cell cycle through down regulation of cyclin dependent kinases, *International Journal of Oncology* **12**, 1321-1326.

Luck HJ, Roche H. 2002. Weekly paclitaxel: an effective and well-tolerated treatment in patients with advanced breast cancer. *Crit Rev Oncol Hematol.* **44**, 15-30.

Madhuri S & Pandey G. 2009. Some anticancer medicinal plants of foreign origin, *Current Science* **96**(6), 779-783.

Mouli KC, Vijaya T, Rao SD. 2009. Phytoresources as potential therapeutic agents for cancer treatment and prevention, *Journal of Global Pharma Technology* **1**(1), 4-18.

Pandey G, Madhuri S. 2010. Some medicinal plants as natural anticancer agents. *Phcog, Rev* **3**(6), 259-263.

Rang HP, Dale MM, Ritter JM. 2001. *Pharmacology*, 4th edition Churchill living stone, London, 830.

Sengupta A, Ghosh S, and Bhattacharjee S. 2004. Allium vegetables in cancer prevention: an overview. *Asian Pac. J Cancer. Prev.* **5**(3), 237-245.

Singh HB, Subramaniyam. 2008. *Field manual of Herbarium Techniques NISCAIR (CSIR)*, New Delhi.

Sunwoo JB, Herscher LL, Kroog GS. 2001. Concurrent paclitaxel and radiation in the treatment of locally advanced head and neck cancer. *J Clin Oncol.* **19**, 800-11.

Tripathi YB, Sharma M and Manickam M. Rubiadin. 1997. A new antioxidant from *Rubia cordifolia*. *Ind. J. Biochem. Biophys.* **34**(3), 302-306.

WHO. 1998. *Regulatory situation of herbal medicines. A worldwide review*, Geneva Switzerland, 1-5.