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Original Article

Development and Evaluation of Vinca Extract Based Herbal Syrup with Anti-Cancerous Properties

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ABSTRACT

Objective: *The objective of the present research project was to develop and evaluate an herbal syrup of vinca extract with anti-cancerous properties. The major chemical constituents of Vinca are Vincristine and vinblastine which are widely used in the treatment of several cancers, including lymphoblastic leukemia, breast cancer, skin cancer, and Hodgkin's disease. Uncontrolled cell division, which has the potential to spread to other body parts, is the hallmark of the genetic disease known as cancer. Nevertheless, no known syrup made from the vinca plant or its extract has been created as of yet. Since cancer is a debilitating illness, the formulation and assessment of a herbal syrup made of alcoholic vinca extract may help patients comply with treatment while they are in a weakened state and find it easier to take the syrup orally.*

Material and methods: *The Vinca extract syrup was formulated using alcoholic extract of Vinca. The Vinca extract Syrups are easy to formulate (F1, F2, F3) and help overcome many disease states and are patient compliant. This paper deals with the formulation of laboratory scale vinca syrup.*

Result: *Various parameters were evaluated such as PH (F1-7.00, F2-7.10, F3-7.00), Specific gravity (F1-1.131g/ml, F2-1.124g/ml, F3-1.121g/ml), Viscosity (F1-3.70cp, F2-3.66cp, F3-3.60cp), Density (F1-1.170g/ml, F2-1.163g/ml, F3-1.160g/ml), stability testing.*

Conclusion: *The syrup was found to be stable and ready for technology transfer. It has potential to be used as a potent supplement in the treatment strategies of cancer. However, further research is required before its clinical application.*

Keywords: *Herbal medicine; Cancer; Vinca; Soxhlet extraction; Herbal syrup, Vincristine; Vinblastine.*

Introduction

Cancer is the uncontrolled growth of abnormal cells anywhere in the body. These abnormal cells are called cancer cells, malignant cells, or tumour cells. These cells can infiltrate normal body tissues. Many cancers and abnormal cells that form cancer tissue are identified by the name of the tissue from which the abnormal cells originated (for example, breast cancer, lung cancer, and colorectal cancer). When damaged or

unrepaired cells do not die and become cancer cells and show uncontrolled division and growth – a group of cancer cells develops. Often, cancer cells can break off from this original group of cells, travel through the blood and lymphatic systems, and move to other organs where they can again repeat the uncontrolled growth cycle. This process of cancer cells leaving one area and growing in another body area is called metastatic spread or metastasis. For example, if breast cancer cells spread to the bone, it means that the person has metastatic breast cancer in the bone [1].

Herbal medicines are plant-based medicines made from a combination of different parts of a plant. For example, leaves, flowers and roots. Each part may have different medicinal uses and a wide variety of chemical components require different extraction methods. Both fresh and dried plants are used depending on the herb. Herbal medicines which formed the basis of health care around the world from the earliest days of mankind are still widely used and have considerable importance in international trade. Recognition of their clinical, medicinal and pharmaceutical economic value is still growing, although it varies widely between countries [2].

Medicinal plants can be defined as plants that are commonly used in the treatment and prevention of specific illnesses and diseases and that are generally considered to be harmless to humans. Medicinal plants have provided mankind with a wide range of potent medicines to cure or alleviate suffering from infections and diseases. Despite advances in synthetic medicines, certain drugs derived from plants still retain their importance and relevance. The use of plant-based medicines is increasing worldwide.

Through recent research on herbal plants or medicines, great progress has been made in the medicinal evaluation of various plants used in traditional medicine systems. As a result, plants can be described as a major source of medicines, not only in the form of isolated active principles to be delivered in standardized dosage forms, but also as crude drugs that can be used by the population [1].

India is the birthplace of indigenous systems of medicine such as Siddha, Ayurveda and Unani where many herbs have been used for the treatment of human ailments. According to the World Health Organization (WHO), about 80% of developing countries depend on traditional medicines for their primary health care needs [3].

Medicinal plants play a vital role in the development of potent therapeutic agents. Herbal medicines, referred to as plant materials or herbals, involve the use of whole plants or parts of plants to treat injuries or diseases. Herbal medicines are the use of therapeutic herbs to prevent and treat diseases and illnesses or to support health and healing. Herbal medicines are the oldest form of health care known to mankind. The World Health Organization (WHO) defines herbal medicines as complete, labelled medicinal products that contain the vital essences, aerial or secret parts of a plant or other plant materials or combinations [4].

The World Health Organization has set precise guidelines for evaluating the safety, efficacy and quality of herbal medicines. Herbal medicine is a major component in traditional medicine and is a common component in Ayurvedic, homeopathic, naturopathic and other systems of medicine. Herbs are generally considered safe because they belong to natural sources. The use of herbal medicines due to the toxicity and side effects of allopathic medicines has led to a rapid increase in the number of herbal medicine manufacturers [2].

Probably the use of vinca has been known since B.C. 50 in European countries as antidysentric, antihaemorrhagic, diuretic and wound healing. This plant was used in the form of 'tea' for treatment of diabetes in Jamaica and in Brazil for toothache. This plant was first scientifically investigated by Canadian workers Noble, Beer and Cutts. During these studies, it was found that it does not have any oral hypoglycemic principle but contains alkaloid possessing antileukemic principle and the alkaloid was named as vincaleucoblastine. Because of such activity, the plant was thoroughly investigated at M/s Eli Lilly by Svoboda and his colleagues, and they reported four dimeric indole alkaloids, viz. vinca-leucoblastine, leurosine, leurosidine and leurocristine. All these compounds exhibited anticancer activities. Some changes were later reported for the names of these compounds such as vincaleucoblastine to vinblastine and leurosine, leurosidine and leurocristine to vinleurosine, vinrosidine and vincristine respectively. The aim of the present study is to formulate and evaluate the syrup of vinca roseus syrup for potential application as anti-cancer supplement [5].

Material and Methods

Preparation of vinca extract

Vinca plant was collected from the herbal garden of Nibha Institute of Pharmaceutical Sciences. The plant was further confirmed by Ms. Jyoti Mala Sinha, HOD, Department of Pharmacognosy and Phytochemistry, Nibha Institute of Pharmaceutical Sciences, Rajgir. The leaves and flower of the collected vinca plants were further sun dried. Further, the dried leaves and

flowers were grinded and prepared in a powdered form. 30 g of vinca powder was viewed and packed in a filter paper. Further, Soxhlet extraction was conducted using 150ml of methanol at 60ºC for 6-8 hours. Final extract was evaporated by heating on a hot plate at 40-60ºC to obtain 50 ml of alcohol free residual extract of vinca roseus which was collected in an amber coloured bottle for further studies [6,7].

Vinca extract: It used as various herbal and ayurvedic treatment of cancer. The Soxhlet extracted alcoholic extract was obtained which was further filtered and used.

Honey: It used as flow property, sweetening agent, and act as preservative.

Propylene glycol: It used as small quantity act as preservative.

Cinnamon oil: It consist of plant Cinnamomum verum or Cinnamomum zeylanicum. It contains not less than 2.5% of essential oil.

Beet root juice: It used as coloring agent and bactericidal in small quantity.

Figure 1: On going process of extraction in a Soxhlet apparatus.

Table 1: Formulation table.

S. No.	Ingredients	F1	F2	F3
1	Vinca extract	7.5 ml	7.5ml	7.5ml
2	Honey	10 ml	8ml	6ml
3	Propylene glycol	5.5 ml	4.5ml	3.5ml
4	Cinnamon oil	2 ml	2ml	2ml
5	Beet root juice	q. s	q. s	q. s

To prepare final herbal syrup 7.5ml of Vinca extract and 2ml of cinnamon oil and 5.5ml of propylene glycol was added to 10ml Honey and q.s beet root juice, were mixed slowly by through the edge with subsequent stirring. The final herbal syrup was prepared and then subjected for evaluation. Herbal syrup was prepared, and solubility was checked by observing clarity of solution visually and passing it after filtration through proper medium [8]. The syrup was lustrous and clear. Similarly, F2 and F3 were prepared.

Evaluation parameter

The prepared medicated herbal syrup was evaluated for different parameters [9].

Density

It was evaluated by Formula as given below,

Formula for density:

Density of liquid under test (syrup) =

weight of liquid under test/volume of liquid under test = wL/vL

Specific gravity

Specific Gravity was evaluated by the formula as given below,

Specific gravity of liquid under test (syrup)=

weight of liquid under test/weight of water = wL/wW.

Viscosity

Viscosity was determined using the following formula.

Viscosity =

Density of test liquid ×Time required to flow test liquid / Density of water × Time required to flow water = Viscosity of water

pH: pH was determined on pH meter and pH paper.

Stability testing

Stability Testing of the prepared herbal syrup was performed on keeping the sample at accelerated temperature conditions. Nine portions of the final herbal syrup were taken kept thawed at accelerated temperature. The sample were tested for all the physicochemical parameters, turbidity, sand homogeneity at the interval of 24hr 48hr and 72hr to observe any change [10].

Result

Organoleptic Characters: The result of the particular evaluation is tabulated in the below table.

Color: All the formulations were visually examined and found to be reddish brown.

Odor: All the formulations were odor examined and found to be pungent.

Taste: All the formulations were taste examined and found to be astringent.

Appearance: All the formulations were visually examined and found to be cloudy.

Table 2: Organoleptic characters of Anti-cancer syrup.

S. No	Formulation(F)	Organoleptic Characters			
		Color	Odor	Taste	Appearance
1	F1	Reddish brown	Pungent	Astringent	Cloudy
2	F2	Reddish brown	Pungent	Astringent	Cloudy
3	F3	Reddish brown	Pungent	Astringent	Cloudy

Table 3: Density of Anti-cancer syrup.

S. No	Formulation(F)	Density (ρ)
1	F1	1.170g/ml
2	F2	1.163g/ml
3	F3	1.160g/ml

The test results reveal that the density of anti-cancer syrup was three formulations (F1, F2, and F3), which is oral syrup within the usual range (1.1-1.4gm/ml) of USP. This research shows the syrup's quality, stability, and bioavailability. In addition to the correct density, the syrup's formulation, storage conditions, and bioavailability should all be correct.

Table 4: Specific gravity of Anti-cancer syrup.

S. No	Formulation(F)	Specific gravity
1	F1	1.131g/ml
2	F2	1.124g/ml
3	F3	1.121g/ml

The test results reveal that the specific gravity of anti-cancer syrup was three formulations (F1, F2, and F3), which is oral syrup within the usual range (1.1-1.5gm/ml) of USP. This research shows the syrup's

quality, stability, and bioavailability. In addition to the correct specific gravity, the syrup's formulation, storage conditions, and bioavailability should all be correct.

pH: pH is one of the most important factors involved in the formulation. The pH was measured in each of the syrup of using calibrated digital pH meter at 25°C and pH paper.

The result of the particular evaluation is tabulated in the below table.

Table 5: pH Determination of Anti-cancer syrup.

S. No	Formulation(F)	pH Determination	
		pH meter	pH paper
1	F1	7	Neutral
2	F2	7.1	Neutral
3	F3	7	Neutral

The test results reveal that the pH meter and pH paper of anti-cancer syrup was three formulations (F1, F2, and F3), which is oral syrup within the usual range (pH 5.5-7.5) of USP. This research shows the syrup's quality, stability, and bioavailability should all be correct.

Viscosity

Viscosity is the measure of a fluid's resistance to flow or its "thickness." It describes the fluid's ability to withstand shear stress and strain. Dynamic Viscosity (μ): measures the fluid's resistance to shear stress. μ: measured in Poise (P) or CentiPoise(cP).

Table 6: Viscosity of Anti-cancer syrup

S. No	Formulation (F)	Viscosity
1	F1	3.70 cp
2	F2	3.66 cp
3	F3	3.60 cp

The test results reveal that the Viscosity of anti-cancer syrup was three formulations (F1, F2, and F3), which is oral syrup within the usual range of herbal syrup. This research shows the syrup's dosage, quality, stability, shelf life and bioavailability. In addition to the correct Viscosity, the syrup's formulation, storage conditions, and bioavailability should all be correct.

Stability testing: The stability testing was observed for different physicochemical parameters and all the developed formulations was found to be stable under accelerated conditions for a period of 3 months.

Conclusion

The traditional Indian medical system known as Ayurveda places a great importance on the medicinal properties of plants. Catharanthus roseus is one such plant that is employed in Ayurvedic treatment. Catharanthus roseus (L.) G. Don, a member of the Apocynaceae family, is a widely dispersed plant in India, originating on the island of Madagascar. Both as a garden plant and for use in herbal medicine, this species has been cultivated. There are numerous alkaloidal components in it. This plant has a long history of being used for its anti-tumor, anti-diabetic, antibacterial, antioxidant, and antimutagenic properties. Catharanthus roseus produces over 130 alkaloids, such as vinblastine and vincristine. Vinca has anticancer property. Vinca alkaloid like vincristine and vinblastine shows anticancer effect. It inhibits microtubule formulation formation in mitotic spindle, resulting in an arrest of dividing cells at metaphase stage. Vinca alkaloid extracted by using Soxhlet apparatus. Identification test for vinca alkaloid was performed. Based on of plant biofactory for the production of highly potent anticancer compound in pharmaceutical industries. The Herbal formulation (F1, F2, F3) was prepared and can be formulated on large scale. We evaluated this syrup which was equal to the normal range of anticancer oral syrup as per USP. Hence, considering the initial laboratory testing of this syrup we hereby recommend that further research is required before its clinical applications.

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Conflict of Interest

None declared.

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