

Potential of Tapak Dara (*Catharanthus roseus* L.) as an Alternative Cancer Treatment

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Abstract

Cancer is a condition characterized by abnormal and uncontrolled cell growth, is aggressive, and can cause death. In Indonesia, the number of cancer cases continues to increase every year. The latest data states that there are around 400 thousand new cases with the death rate reaching 240 thousand cases. Cancer treatments such as chemotherapy, radiotherapy, and surgery are commonly used as modern treatment therapies in cancer patients, but can cause various side effects. The Tapak Dara plant (*Catharanthus roseus* L.) is one of the popular cancer treatment alternatives, especially the content of alkaloid-derived compounds namely vinblastine and vincristine which have potential as anticancer agents. This review aims to review the benefits and effectiveness of tapak dara as a cancer treatment. Based on the literature review, tapak dara is proven to be effective in treating cancer as the compounds vinblastine and vincristine exhibit anticancer activity through the mechanism of inhibiting cell division. Thus, tapak dara (*Catharanthus roseus* L.) can be an effective alternative cancer treatment, but needs to be used under close supervision.

Keywords: Cancer, *Catharanthus roseus* L., effectiveness, herbal plants

INTRODUCTION

Disease cancer is condition characterized by abnormal and uncontrolled cell growth, which can spread to other parts of the body and cause tissue damage. Cancer is a malignant tumor that can originate from various types of cells in the body, and the growth of these cancer cells is aggressive which can damage surrounding tissues and spread to other parts of the body through the process of metastasis and can cause death if not treated properly.

Types of cancer according to Dipiro that are commonly found, especially in Indonesia, include.

- **Breast Cancer (Carcinoma mammae)**

A malignant tumor that originates in the breast tissue, especially the epithelium of the ducts and lobules. It is characterized by irregular cell division, forming a tumor lump that can spread to other organs. Breast cancer is the most common cancer in women and has several stages based on tumor size, lymph node involvement, and the presence of metastases.

- **Limfoma Non-Hodgkin (LNH)**

A group of cancerous diseases that originate from B lymphocytes, T lymphocytes, or natural killer cells in lymph nodes and other lymphoid tissues. LNH is characterized by uncontrolled growth of lymphocyte cells forming tumors. It is one of the most common and fast-growing cancers in Indonesia.

- **Lung Cancer**

It is one of the leading causes of death in the world, including in Indonesia, with a high rate of new cases. Lung cancer is also the most common type of cancer found in men.

- **Colorectal Cancer**

Cancers that affect the colon and rectum are also among those with a high incidence in Indonesia.

Epidemiologically, cancer is a leading cause of death with millions of new cases and deaths each year worldwide. By 2024, WHO reports an estimated 20 million new cancer cases in the world with 9.7 million cancer deaths. The most prevalent cancer types globally are lung (12.4%), breast (11.6%), colorectal (9.6%), prostate (7.3%), and stomach cancer (4.9%). Lung cancer is the leading cause of cancer death especially in men, which is strongly associated with high cigarette use, especially in Asia. Many countries do not yet provide adequate cancer services within universal health coverage, so the risk of death remains high (WHO, 2024).¹¹

The number of cancer cases in Indonesia continues to increase and is predicted to jump to more than 70 percent by 2050 if prevention and early detection measures are not strengthened. Currently, around 400,000 new cases of cancer are detected each year, with the death rate reaching 240,000 cases. Without effective intervention, the burden of cancer will be even greater, both in terms of public health and the economy (Rokom, 2024).⁷

In addition, cancer in children based on data from the *World Health Organization* (WHO) in 2025, approximately 400,000 children and adolescents aged 0- 19 have cancer every year. In Indonesia, according to data from the *Global Cancer Observatory* (Globocan) in 2020, there are around 11,156 new pediatric cancer patients each year. Of these, leukemia took the first place with 3,880 patients (34.8%), lymph cancer around 640 patients (5.7%), and brain cancer 637 patients (5.7%). Meanwhile, the cure rate of pediatric cancer in Indonesia is less than 30% of cases. This is generally caused by late diagnosis because early symptoms of childhood cancer are not recognized, so the treatment is not optimal (Siti Solehat, 2025).⁹

Prevention of early detection and appropriate treatment are very important to reduce the mortality rate and disease burden of cancer, both in the world and in Indonesia. Cancer treatment is highly dependent on the type, stage, and characteristics of the tumor, with methods such as chemotherapy, radiotherapy, and surgery tailored to the patient's condition, but the side effects caused by chemotherapy patients vary depending on the chemotherapy compound given which causes nausea, vomiting, stomatitis, diarrhea, susceptibility to infection, thrombocytopenia, neuropathy, alopecia (hair loss) and myalgia (Suraduhita, 2024).¹⁰

Because there are so many side effects caused by chemical treatment (modern) against cancer, it is necessary to conduct research on natural ingredients that are expected to not cause side effects. Alternative treatment with plants turned out to help many sufferers, so efforts were made research in field botany As well as its pharmacology, some plants are used. Indonesia has abundant natural resources such as plants in the forest and around our environment can be used as medicines this is believed to be hereditary.

One of the ingredients that has potential as an anticancer is tapak dara (*Catharanthus roseus* L.). This plant is generally used as an ornamental plant and can live in various places with different climates and is found up to 800 meters above sea level. The use of tapak dara (*Catharanthus roseus* L.) plants

has currently been used to treat various diseases, some of which include hypertension, diabetes, and leukemia.

Tapak dara leaf (*Catharanthus roseus* L.), which is claimed to have anticancer activity due to its chemical content such as vinblastine and vincristine found in its leaves, is the main component of modern cancer drugs today (Indrayani, 2006). Therefore, this study aims to find out more about the properties of tapak dara leaves that have opportunities as anticancer activity.

METHODS

This research was conducted using a *literature review* approach that aims to collect, analyze, and synthesize information from various scientific sources related to the potential of compounds from *Catharanthus roseus* L. plants as anticancer drug candidates. Data sources were obtained from relevant national and international scientific journals, through electronic databases such as ScienceDirect, PubMed, and Google Scholar with search keywords namely, "Anticancer herbal medicine", "*Catharanthus roseus* L.", and "Tapak dara as anticancer".

RESULTS

The results of the literature study conducted obtained as many as 8 research journals on the potential of tapak dara plants for anticancer. Based on the results of the review of eight scientific journals, Tapak dara is known to contain active compounds such as vincristine and vinblastine which have been widely studied for their cytotoxic activity against cancer cells, these results can be seen in **Table 1**.

Table 1. Research Results of Tapak Dara Plant

Author	Journal Title	Research Results
Nur Amalia, I., et al., 2024	Tapak Dara Leaf Extract (<i>Catharanthus roseus</i> L.) as a Potential Anti-Mouth Cancer Ingredient	Tapak dara has potential as a cancer therapy, including oral cancer. Vinblastine and vincristine compounds from tapak dara showed anticancer activity via mechanism of inhibition cell division.
Yusransyah et al., 2016	In Silico Study of Alkaloid Compounds from Tapak Dara Flower (<i>Catharanthus roseus</i> (L.) G. Don) on the	Alkaloid compounds from tapak dara flower (<i>Catharanthus roseus</i> L.) have potential as breast anticancer through interaction with estrogen receptor beta.

Faisal & Fendy, 2024	Estrogen Receptor Beta as a Breast Anticancer Update on Pharmacological Activity of Treads Dara (<i>Catharanthus Roseus</i> L.)	Vincristine showed a Pa value of 0.988, indicating great potential as a cytostatic agent. Vincristine works by inhibiting cell division and is known as an effective anticancer compound.
Haiyul, F., et al., 2024	Bioactivity and Drug Formulation of Tapak Dara Plant (<i>Catharanthus roseus</i>)	Periwinkle has strong bioactive activities, including antioxidant, antibacterial, hepatoprotector, anti-inflammatory, and a variety of other pharmacological activities.
Vera Dewi et al., 2022	Toxicity Test of Tapak Dara Leaf Extract (<i>Catharanthus roseus</i> L.) Using the BSLT Method with Variations of Extraction Solvent Differences	The ethanol extract of tapak dara leaves has a toxicity level of 154.886 ppm in shrimp larvae with the BSLT method, and the n-hexane extract of tapak Leaves has a toxicity level of 66.949 ppm
Sasongko, et al., 2025	In Silico Analysis of Tapak Dara (<i>Catharanthus Roseus</i> L.) Compounds on Checkpoint Kinase 1 receptor as Anticancer	Serpentine from periwinkle has the highest affinity to2R0U protein, exceeding doxorubicin, but does not meet Lipinski's rule and is classified as toxic. In contrast, lochnericin fulfills Lipinski's rule and is classified as non-toxic, so these two compounds need to be studied further as an anticancer drug candidate
Suraduhita& Ayu., 2017	Cytotoxicity of Ethanol Extract of Tapak Dara Leaf (<i>Catharanthus roseus</i> (L.) G. Don.) Against Cervical Cancer Cell Line (HeLa) and Breast Cancer Cell Line (MCF-7)	The ethanol extract of tapak dara leaves showed potential as an anticancer agent, especially at 70% concentration, with the best inhibition value on HeLa cells.
Afandi, 2016	Cytotoxicity Test of Tapak Dara Leaf Extract (<i>Catharanthus roseus</i> [L.] G. Don) Against Raji Cells (In Vitro Study)	Tapak dara leaf extract (<i>Catharanthus roseus</i> [L.] G. Don) showed potential cytotoxic activity with an IC50 value of 52.08 µg/ml against Raji cancer cells

SUMMARY

Cancer is a serious global problem and the leading cause of death worldwide. Therefore, research on plants as an alternative cancer treatment is very important. From the *review of* several journals that we have done, the potential of the Tapak Dara plant (*Catharanthus roseus* L.) shows that it has potential as an anticancer activity through the mechanism of inhibiting cell division. This could be an opportunity

for the development of anticancer drugs to provide safer, more effective, and affordable cancer therapy, while reducing the side effects of conventional treatments.

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