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THE ROLE OF COLOCASIA ESCULENTA IN CANCER PREVENTION AND TREATMENT: A SYSTEMATIC REVIEW OF EPIDEMIOLOGICAL AND EXPERIMENTAL STUDIES

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ABSTRACT

Background: Cancer remains a leading global health challenge, with conventional treatments often causing severe side effects. Plant-based bioactives are increasingly explored for safer and cost-effective alternatives. *Colocasia esculenta* (taro), a traditional food crop, has been studied for its potential anticancer properties.**Methods:** Following PRISMA guidelines, epidemiological and experimental studies (2000–2025) were systematically reviewed across PubMed, ScienceDirect, Google Scholar, and Wiley Online Library. Eligible studies included in vitro, in vivo, and clinical-relevance investigations of *C. esculenta* extracts on cancer prevention and treatment outcomes.**Results:** Twelve eligible studies demonstrated that taro extracts (corms, leaves, tarin, sulphated polysaccharides, and methanolic fractions) exerted significant cytotoxic, pro-apoptotic, anti-metastatic, and immunomodulatory effects across various cancer cell lines and animal models. Novel delivery systems such as liposomal tarin nanocapsules enhanced efficacy and reduced toxicity. Evidence suggests taro modulates multiple pathways, including COX inhibition, oxidative stress regulation, and immune activation.**Conclusion:** *Colocasia esculenta* exhibits broad-spectrum anticancer potential with low toxicity, nutritional benefits, and affordability, positioning it as a promising candidate for integrative oncology and public health interventions. While preclinical evidence is compelling, standardized formulations and clinical trials are essential to validate its therapeutic role.

INTRODUCTION:

The word "cancer" refers to a group of diseases with the common characteristic of uncontrollable growth of abnormal cells that invade local tissues or spread to distant body sites. Cancer, neoplasm, and malignant tumour are synonyms for cancer. Cancer is the second leading cause of death in the world. The leading cancers in men include lung, prostate, colorectal, stomach, and liver cancers, and in women, breast, colorectal, lung, cervical, and thyroid cancers. (1)Most of the deaths caused by cancer are believed to have been caused due to the spread of the tumor cells to distant locations from the initial tumor site, a process which is called the metastatic cascade. (2) In most cases, cancer treatments, such as radiation therapy, chemotherapy, and surgery, target both cancerous and healthy cells, resulting in adverse side effects. Recent research has shown that certain botanical chemicals extracted from food or natural herbal remedies have both in vitro and in vivo anticancer potential. (3) These substances have been demonstrated to enhance chemotherapy, inhibit angiogenesis, limit proliferation, trigger apoptosis, and postpone metastases. (4) Despite their anticancer properties, they hardly damage healthy tissues.Chemopreventive medications can stop, reverse, or postpone the carcinogenesis process. Daily use of these drugs is a promising way to prevent or slow the development of cancer. Phytochemicals, which are bioactive non-nutrient plant compounds, are used to treat several diseases. (5) They protect the plants against harsh conditions like insects and microbes, as well as from extremes of heat or cold and stress. It has been demonstrated that various phytochemicals obtained from dietary plants can stop specific phases of carcinogenesis by preventing the development, growth, and spread of cancers. (6) Research on food-derived

bioactive components for cancer prevention and treatment is growing due to their enhanced bioavailability and relatively low or undetectable toxicity. (7)Colocasia esculenta (Liliatae, Araceae), another name for taro, is a monocotyledonous tuberous plant that thrives in humid subtropical and tropical climates. (8) The cocoyam [Colocasia esculenta Linn (Araceae)], a tropical perennial starchy plant native to southern China, the Indian subcontinent, Indochina, and Sumatra, is extensively distributed in tropical latitudes. (9) Taro is also known as Cheppankilangu in Tamil. Due to its historical significance, taro is one of the world's oldest crops of cultivation. (10) It is primarily grown as a root vegetable, close to the surface, for its edible, starchy corm and is transformed into several food products, such as bars, pasta, flour, and canned foods. The rhizome bears leaves up to 40 by 25 centimeters in size. (11) They are pale green beneath and dark green above. The leaves are frequently called "elephant head" because they are usually big and elongated. The apex is mucronate, triangular-ovate, and sub-rounded, with rounded or sub-rounded tips on the basal lobes.Taro has a significant nutritional value since its edible parts like corm, stem, and leaves can be utilized in various culinary recipes. Fresh edible leaves of C. esculenta are a rich source of protein, dietary fiber, ascorbic acid, and other vital minerals(12). Additionally, snake bites, scorpion stings, plant-based food poisoning, etc., can be treated using the plant's leaf juice. From ancient times, it has been used for its therapeutic properties and to treat various ailments, such as internal bleeding, diarrhea, arthritis, asthma, and skin and neurological disorders. (13) Analgesic, antibacterial, antifungal, anti-diabetic, antihemorrhagic, anti-inflammatory, antihelmintic, and anticancer capabilities are only a few biological actions that C. esculenta exhibits(14). Aside from the use of taro corms for managing metabolic dysfunction and immune system activation, they contain

significant amounts of therapeutic bioactive compounds that are active against the risk factors associated with cancer, such as carcinogenic agents and biological effectors, as well as other pathological conditions such as inflammation and oxidative stress. (15) This systematic review aims to consolidate. The clinical applications of Colocasia esculenta for the treatment and prevention of cancer.

MATERIALS AND METHODS:

Sources of information:

In accordance with PRISMA guidelines, we searched the following electronic databases between 2000 and 2025 in PubMed, Elsevier ScienceDirect, Google Scholar, and Wiley Online Library.

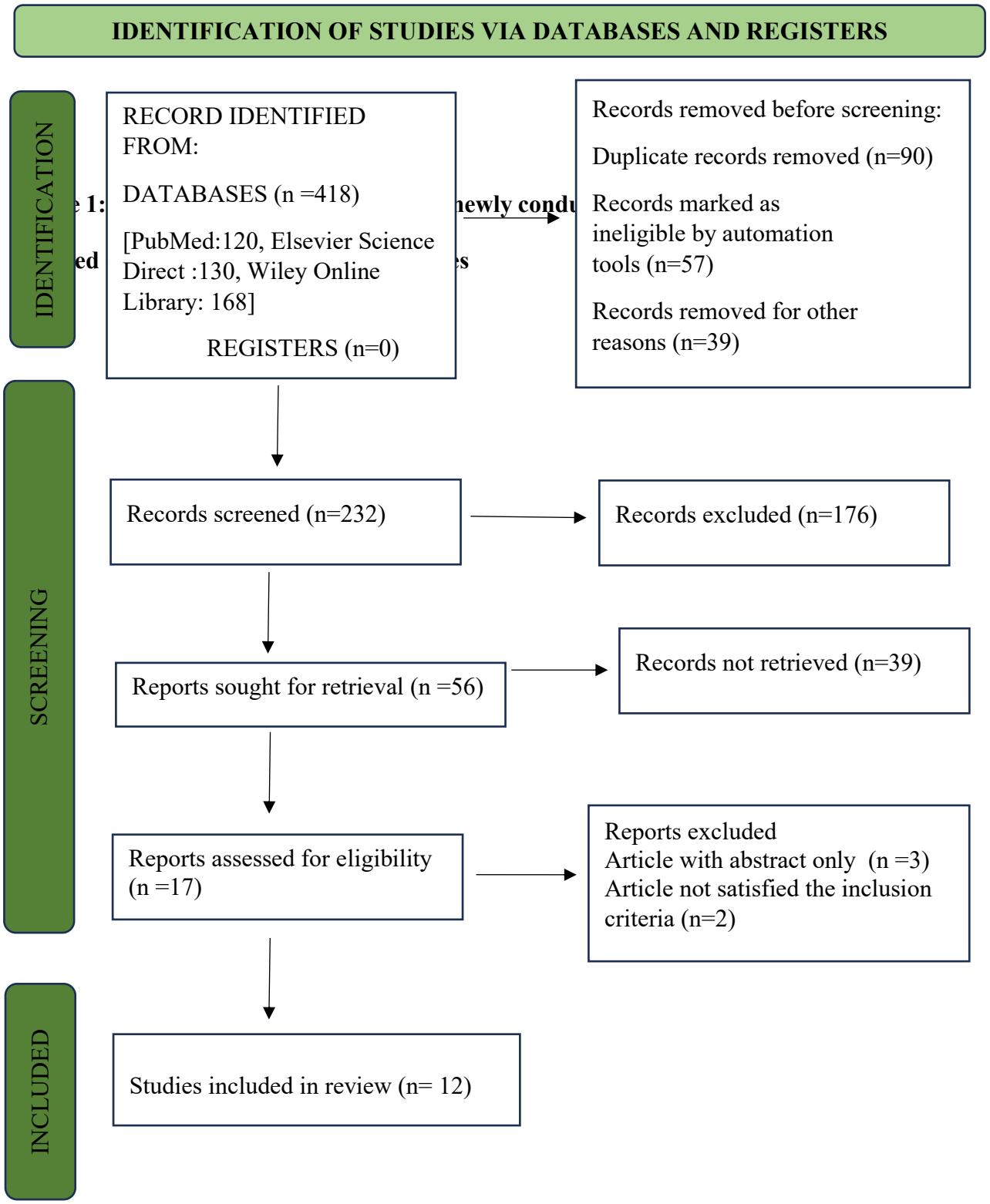
Search category:

The search strategies for the following keyword pairs were based on Boolean operators: "Colocasia and cancer," "taro and cancer," "poi extract," "cancer prevention," "cancer reduction," "animal models," "cell lines," and "tumour prevention."

Eligibility criteria:

This review included epidemiological and experimental studies (in vitro, in vivo, clinical trials) examining the role of *Colocasia esculenta* in cancer prevention or treatment. Eligible studies focused on taro's anticancer effects, such as tumor suppression, apoptosis, or antioxidant activity, and were published in English and had full-text access.This analysis did not consider reviews, editorials, commentaries, and abstracts with limited data. Likewise, studies that were not pertinent to Colocasia esculenta, were not cancer related, did not provide relevant results orwerenot in the English language were no t considered in the review as well.

All of the research articles fulfilling the pre-established eligibility criteria were categorized systematically. Data collected included the citation (author/year), geographic region where the research was performed, number and type of samples obtained, interventions performed, methods of measurements and techniques used,the results and conclusions drawn in each study. Quality appraisal was performed using the Office of Health Assessment and Translation (OHAT) Scale.


IDENTIFICATION OF STUDIES VIA DATABASES AND REGISTERS
IDENTIFICATION
RECORD IDENTIFIED FROM:
DATABASES (n =418)
[PubMed:120, Elsevier Science Direct :130, Wiley Online Library: 168]
REGISTERS (n=0)
Records removed before screening:
Duplicate records removed (n=90)
Records marked as ineligible by automation tools (n=57)
Records removed for other reasons (n=39)
SCREENING
Records screened (n=232)
Records excluded (n=176)
Reports sought for retrieval (n =56)
Records not retrieved (n=39)
Reports assessed for eligibility (n =17)
Reports excluded
Article with abstract only (n =3)
Article not satisfied the inclusion criteria (n=2)
INCLUDED
Studies included in review (n= 12)

Results:

The table 1 represents summary of anti-cancer effects of colocasia esculenta extracts across various study. Table 2 represents Mechanistic Insights and Therapeutic Outcomes of Colocasia esculenta Extracts in Cancer Studies. The Table 3 represents OHAT bias assessment table offers a comprehensive framework for evaluating the methodological quality of research studies by identifying various types of potential bias. The biases identified are selection bias (with elements of randomization and allocation concealment), performance and detection bias (regarding blinding of participants, personnel, and outcome assessors), attrition bias (handling of incomplete data), reporting bias (selective reporting of outcomes), confounding bias (issues with study design and analytical approach), and others like conflicts of interest and ethical violations. Among studies under consideration, research studies by Park et al. (2012) and Wu et al. (2021) invariably showed low risk of bias in all the factors under consideration, with the highest ratings ("++") indicating their high compliance with high-level research ethics like sufficient randomization, sufficient blinding, and proper reporting along with documented ethical clearancefactors which greatly enhance the reliability and credibility of results obtained. Another set of studies, such as those of Brown et al. (2005), Kundu et al. (2012 and 2021), Pereira et al. (2018), Jyothi R. et al. (2021), and Amira M. et al. (2021), were classified under the moderate risk category, with strengths and weaknesses. While they were competent in some aspects, such as randomization and ethics compliance, these studies were weak in others, such as blinding approach and missing outcome data management; this means that, despite their findings still being useful, they must be interpreted with greater caution. On the other hand, three studies by Correa et al. (2019), Chomlamay et al. (2022), and

Esposito et al. (2024) were assigned a high risk of bias, which was characterized by a chain of serious problems, such as poor randomization, poor blinding procedures, poor control of confounding variables, and poor reporting regarding ethics clearance or potential conflicts of interest factors that significantly lower their validity and generalisability.

TABLE 1: SUMMARY OF ANTI-CANCER EFFECTS OF COLOCASIA ESCULENTA EXTRACTS ACROSS VARIOUS STUDY MODELS:

S.No	Author name and year	Study type	Cancer type/ Cell line	Extract used/ Forms used	Outcome
1.	Brown et al (2005) [18]	In-vitro	Rat YYT colon cancer cell line	Soluble extracts of poi	When a 25% concentration was applied, the growth of YYT colon cancer was most suppressed
2.	Park et al (2012)[19]	In-vivo	Lung cancer in mice	50µg of Purified compound (Taro-4-I) from Colocasia esculenta.	The group treated with 50µg/mouse Taro-4-I showed remarkable preventive activity

3.	Kundu et al (2012)[20]	In-vivo and In-vitro	Breast cancer in murine models Murine and human breast and prostate cancer cell lines	Water soluble extract of uncooked taro corm	In two experiments, tumor colonies were detected in 4/5 and 5/9 control mice, whereas none (0/5) and only 1/10 Taro extract treated mice showed heart involvement.Taro extract significantly inhibited lung colonization, cyclooxygenase pathway and tumor cell migration in a dose dependent manner.
4.	Pereira et al (2018) [21]	In-vivo and In-vitro	A murine model with spleen and bone marrow cells and immunocompromised mice	200mg-300mg of Tarin extract of Colocasia Esculenta	Both in vivo and in vitro investigations suggest that tarin has significant immunomodulatory and antitumoral

					properties, showing potential for therapeutic applications in enhancing immune responses and inhibiting tumor progression.
5.	Correa et al (2019)[22]	In-vitro	Healthy mice cells	Liposomal tarin nanocapsules prepared by an extrusion technique	Liposomal tarin nanocapsules exhibited no toxicity to healthy mice bone marrow and L929 cells and inhibited the proliferation of MDA-MB-231 and, to a higher extent, U-87 MG cell lines, indicating an improvement of the pharmacological ability of encapsulated tarin

					compared to its free form
6.	Jyothi et al (2020)[23]	In-vitro	Five different cancer cell lines such as Human lung cancer (A549), ovarian cancer (Pa-1), prostate cancer (PC3), colon cancer (HCT 116), and acute leukemia (K562)	Colocasia esculenta leaves extract	It was found that Pa-1, A549, HCT116, K562, and PC-3 have inhibitory concentrations (IC50) of 93.2 µg/mL, 133.6 µg/mL, 172.87 µg/mL, 217.54 µg/mL, and 223.08 µg/mL, respectively.
7.	Wu et al (2021)[24]	In-vitro	Cancer cell lines	200 g extract of tap water cooked Colocasia esculenta Schott	Proximity extension assays identified biomarkers and signaling pathways altered by the extracts, providing insights into their

					anti-cancer mechanisms.
8.	Kundu et al (2021)[25]	In-vitro and In-vivo	Murine and human breast and ovarian cancer cell lines and Two syngeneic murine models of Triple-Negative Breast Cancer (TNBC)	Two taro-derived extracts	The extract of Colocasia esculenta (taro) significantly inhibited metastatic and cancer stem cells through tumor cell-autonomous effects and enhanced anti-tumor immune responses, indicating its potential as a cancer therapy.
9.	Jyothi R. et al (2021)[26]	In-vitro	Pa-1 ovarian cancer cell lines.	300 g leaf powder was Soxhlet-extracted with 900 ml ethanol (1:3).	The ethanolic extract of Colocasia esculenta leaves significantly reduced the viability of PA-1 ovarian cancer cells and induced

					apoptosis, suggesting its potential as an anti-cancer agent.
10.	Amira M.et al (2021)[27]	In-vitro	Human breast MCF-7 carcinoma cells (IC50 27.73 µg/mL),	An extract of C. esculenta corm sulphated polysaccharide (SCE) was made.	SCE is a potent tumor anti-initiation agent by inhibiting cytochrome P450-1A and increasing glutathione and the carcinogen detoxification enzyme glutathione S-transferase, according to the modification of carcinogen metabolism and radical scavenging affinity.

11.	Chomlamay et al (2022)[28]	In-vitro	Cervical cancer HeLa cells	Extract of Colocasia esculenta var. Aquatilis Hassk, elephant ear (CF-EE)	The MAPK/AKT signaling pathway and ROS-driven ER stress linked to apoptotic cell death were both increased by CF-EE extract.
12.	Esposito et al (2024)[29]	In-vitro	Gastric Adenocarcinoma cells	Methanolic extracts prepared from the corms and leaves of Colocasia.	Taro extract and some of its fractions induced the activation of apoptosis markers and affected the phosphorylation status of proteins that play crucial roles in cell proliferation and tumor progression.

TABLE 2: MECHANISTIC INSIGHTS AND THERAPEUTIC OUTCOMES OF COLOCASIA ESCULENTA EXTRACTS IN CANCER STUDIES:

S.NO	AUTHOR NAME AND YEAR	INTERVENTION	RESULT
1.	Brown et al (2005) [18]	This study investigates the anti-cancer effects of poi, made from Colocasia esculenta (taro), on colonic adenocarcinoma cells in vitro. The researchers evaluated the cytotoxic activity of poi extracts and assessed their impact on cancer cell proliferation and apoptosis.	The study found that poi from Colocasia esculenta significantly reduced the viability of colonic adenocarcinoma cells in vitro, induced apoptosis, and inhibited cell proliferation.
2.	Park et al (2012)[19]	The study investigates the anti-metastatic effects of polysaccharides extracted from Colocasia esculenta (taro). The researchers administered the polysaccharide extract to cancer models to evaluate its impact on tumor metastasis. The intervention involved analyzing immune	Significant reduction in metastatic spread of cancer cells in treated subjects compared to control groups.

		response activation, including the stimulation of immune cells such as macrophages and T-cells.	
3.	Kundu et al (2012)[20]	The study investigates the anti-metastatic activity of polysaccharides isolated from Colocasia esculenta (taro). The polysaccharide extract was administered to cancer models, enhancing immune response and significantly reducing metastatic spread.	This study demonstrated that a water-soluble extract of uncooked taro corm has potent anti-metastatic activity in a murine model of metastatic breast cancer and TE modestly inhibited the proliferation of some murine and human breast and prostate cancer cell lines.
4.	Pereira et al (2018)[21]	This study investigates tarin, a lectin extracted from Colocasia esculenta (taro), focusing on its potential as an immunomodulator and COX-inhibitor. Researchers evaluated tarin's effects on immune cell activity and its ability to inhibit cyclooxygenase (COX) enzymes.	Tarin demonstrated significant promise as an immunomodulator and COX-inhibitor with potential therapeutic applications against inflammation and cancer.

5.	Correa et al (2019)[22]	The research focuses on evaluating the effects of these nanocapsules on cancer cell growth and their potential as a targeted therapeutic approach for treating these types of cancer.	In this study the Liposomal tarin nanocapsules inhibited breast cancer cell proliferation.
6.	Jyothi et al (2020)[23]	The article reveals that the extract from Colocasia esculenta leaves exhibits significant cytotoxic effects across five different cancer cell lines, as measured by the MTT assay, demonstrating its ability to reduce cell viability and suggesting its potential as a therapeutic candidate for cancer treatment.	According to the results, the extract from Colocasia esculenta leaves showed strong cytotoxic effects as determined by the MTT experiment, drastically lowering cell viability in all five tested cancer cell lines.
7.	Wu et al (2021)[24]	This study evaluates the anti-cancer properties of Colocasia esculenta (taro) using proximity extension assays (PEA). Researchers prepared extracts from taro and applied them to various cancer cell lines to assess their cytotoxic effects. The	The study found that extracts of Colocasia esculenta (taro) exhibit significant anti-cancer properties by demonstrating cytotoxic effects on various cancer cell lines and altering key biomarkers and signaling

		intervention focused on identifying key biomarkers and signaling pathways involved in the anti-cancer mechanisms of taro extracts.	pathways associated with cancer.
8.	Kundu et al (2021)[25]	The intervention involved administering the extract to cancer cell lines and in vivo models to evaluate its inhibitory actions through both tumor cell-autonomous mechanisms and immune-mediated responses, assessing changes in cancer cell proliferation, migration, and stem cell properties.	By preventing tumor cell migration and proliferation and boosting immune responses against the tumor, the extract of Colocasia esculenta (taro) successfully suppressed cancer stem cells and metastases, indicating its promise as a therapeutic agent in the treatment of cancer.
9.	Jyothi R. et al (2021)[26]	The study investigates the cytotoxic and apoptotic effects of ethanolic extracts from Colocasia esculenta leaves on PA-1 ovarian cancer cell lines, assessing cell viability and the underlying molecular mechanisms involved.	Colocasia esculenta leaves have the potential to be used as a medicinal agent against ovarian cancer because their ethanolic extract dramatically decreased the viability of PA-1 ovarian cancer cells and caused apoptosis.

10.	Amira M. et al (2021)[27]	The intervention involved administering the extract to cancer models to evaluate its effects on tumor initiation and progression, utilizing various assays to assess its anti-cancer mechanisms and efficacy.	Sulphated polysaccharide extract of C. esculenta corm is a potentially effective cancer chemopreventive drug for usage in the high-risk population for breast cancer as well as in the healthy food industry.
11.	Chomlamay et al (2022)[28]	The intervention involved treating the cancer cells with the extract and analyzing its impact on the endoplasmic reticulum (ER) stress response, as well as the up-regulation of c-Jun and p38 MAPK protein levels, to elucidate the underlying mechanisms of cell death.	The findings show that CF-EE extract caused nuclear condensation and apoptotic bodies in addition to suppressing HeLa cell proliferation.
12.	Esposito et al (2024)[29]	This study investigates the activity of Colocasia esculenta (taro) corms against gastric adenocarcinoma cells. The researchers conducted chemical analyses to identify bioactive compounds in the corms and	This study demonstrated the potential anti-tumor activity of Colocasia corm extract and its fractions on gastric adenocarcinoma cells.

		performed molecular characterization to evaluate their potential anti-cancer effects.	

TABLE 3: RISK OF BIAS ASSESSMENT OF INCLUDED STUDIES USING OHAT TOOL:

S.NO	AUTHOR NAME AND YEAR	RANDOMIZATION	ALLOCATION CONCEALMENT	BLINDING OF PARTICIPANTS AND PERSONNEL	BLINDING OF OUTCOME ASSESSMENT	INCOMPLETE OUTCOME DATA	SELECTIVE REPORTING	STUDY DESIGN OR ANALYSIS	FUNDING SOURCE OR CONFLICTS	ETHICAL APPROVAL AND PARTICIPANT CONSENT
1.	Brown et al (2005) [18]	++	+	+	+	++	+	+	++	+
2.	Park et al (2012)[19]	++	++	++	++	++	++	++	++	++
3.	Kundu et al (2012)[20]	+	+	-	+	+	++	+	++	++
4.	Pereira et al (2018)[21]	+	+	+	-	+	+	+	+	+

5.	Correa et al (2019)[22]	-	-	-	-	+	+	-	+	-
6.	Jyothi et al (2020)[23]	++	+	+	-	+	-	-	+	_
7.	Wu et al (2021)[24]	++	++	++	+	++	+	+	++	+
8.	Kundu et al (2021)[25]	+	+	-	+	+	++	+	+	++
9.	Jyothi R. et al (2021)[26]	++	+	+	-	+	-	-	+	+
10.	Amira M. et al (2021)[27]	+	+	-	+	+	+	+	+	+
11.	Chomlamay et al (2022)[28]	-	-	-	-	+	+	-	+	+
12.	Esposito et al (2024)[29]	--	--	--	-	+	+	-	+	+

Note:

++	Definitely Low Risk	-	Probably High Risk
+	Probably Low Risk	--	Definitely High Risk

Discussion:

The existing literature presents stro ng evidence of anticancer activity of Colocasia esculenta(Taro),a root crop with traditional consumption and pharmaceutical use in A sian cultures. In vitro, in vivo, and clinical-relevance investigations, various extracts of C. esculenta e.g., ethanolic, aqueous, and liposomal exhibited strong cytotoxicity, antimetastatic, and immunomodulatory activity against differe nt cancer cell lines.

Jyothi and Murthy (2021) evaluated the ethanolic extract of *C. esculenta* leaves on PA-1 ovarian cancer cells, showing a dose-dependent cytotoxic effect with an IC50 of 93.2 µg/mL. Flow cytometry revealed a high percentage of late apoptosis (63.63%) compared to cisplatin, indicating a promising apoptosis-inducing ability of the extract.

In a related study, Jyothi and Murthy (2020) extended their analysis to five cancer cell lines (PA-1, A549, PC3, HCT116, and K562). They found a similar trend of cytotoxicity with *C. esculenta* leaves extract across these lines, reinforcing its broad-spectrum anticancer potential. This work also emphasized the extract's effectiveness relative to cisplatin, a standard chemotherapeutic drug.

Further supporting the antitumor role of *C. esculenta*, Wu et al. (2021) conducted a human dietary intervention study using *C. esculenta Schott*. After 1-month consumption, significant alterations in 92 cancer-related plasma proteins were observed. Downregulation of CYR61, ANXA1, and VIM and upregulation of ITGB5, EPHA2, and CEACAM1 suggest molecular shifts with potential antitumor implications, especially against pancreatic and breast cancers.

Brown et al. (2005) focused on poi (fermented *C. esculenta* paste) and its effects on colon adenocarcinoma cells. The

study demonstrated significant inhibition of YYT colon cancer cell proliferation and induction of apoptosis. Moreover, the immunostimulatory effect of poi on splenocytes, particularly T-cell activation, highlighted the dual tumoricidal and immune-enhancing properties of taro.

Pereira et al. (2018) described tarin, a lectin extracted from taro, as a COX-inhibiting and immunomodulatory agent. Tarin binds specifically to glycan structures present on cancer cells and viruses, promoting selective biological activity. In murine models, tarin stimulated B lymphocyte and granulocyte proliferation, potentially enhancing host antitumor immunity.

A polysaccharide fraction named Taro-4-I was isolated and studied by Park et al. (2013). It exhibited anti-complementary activity comparable to standard polysaccharide K and promoted IL-6 and TNF-α production. Notably, Taro-4-I administration significantly inhibited lung metastasis of melanoma cells in vivo, establishing its potential as an anti-metastatic agent via immune activation.

Esposito et al. (2024) evaluated methanolic extracts and isolated phytochemical fractions of *C. esculenta* corms on gastric adenocarcinoma cells (AGS). They demonstrated modulation of critical apoptotic and proliferative markers (caspase 3, cyclin A, cdk2, ERK), indicating multi-targeted molecular effects. Interestingly, while isolated compounds showed some activity, the complete extract showed superior efficacy, suggesting synergism among bioactives.

In a groundbreaking study, Kundu et al. (2021) reported that taro extract (TE) not only inhibited breast cancer cell migration and metastasis in murine models but also significantly suppressed cancer stem cell characteristics. The extract's efficacy was dependent on T-cell-mediated immunity and not on B or NK cells. Additionally, the team developed GMP-

compliant extraction protocols for future clinical evaluation.

Corrêa et al. (2019) introduced liposomal nanocapsules encapsulating tarin and demonstrated high entrapment efficiency, sustained release, and selective toxicity against glioblastoma and breast cancer cells (U-87 MG and MDA-MB-231), without affecting normal cells. This innovation highlights tarin's potential in nanomedicine and targeted delivery systems.

Lastly, Kundu et al. (2012) isolated a 25 kDa protein fraction from taro with potent anti-metastatic activity. This fraction downregulated COX-1 and COX-2 expression and suppressed PGE2 production—critical pathways in cancer progression and inflammation. It was particularly effective in triple-negative breast cancer models, a subtype with limited treatment options.

In, Jyothi et al., 2022 study, *Colocasia esculenta* ethanolic leaf extract exhibited potent cytotoxic effects against the HT-29 human colon cancer cell line. The IC50 was reported at 91.2 µg/mL, demonstrating strong antiproliferative activity. Morphological changes like cell rounding and detachment indicated apoptosis. The authors highlighted the extract's rich polyphenolic content as a contributor to its efficacy. The results suggest that taro leaf extract can significantly inhibit colon cancer cell growth, and its activity is potentially mediated through oxidative stress and mitochondrial damage. This further validates taro's traditional use and encourages further studies into its bioactive compounds for chemoprevention or adjuvant therapy .

In Nandini et al., (2013**)** study vivo mouse model study assessed the protective role of *C. esculenta* against DMBA-induced skin carcinogenesis. Pre-treatment and post-treatment with the extract during initiation and promotion phases led to a significant reduction in tumor incidence,

burden, and volume. The extract improved biochemical parameters such as reduced lipid peroxidation and enhanced antioxidant enzyme activity (catalase, SOD, glutathione). Histopathological analysis supported these findings by showing reduced hyperplasia and inflammatory infiltration. This study provides strong evidence of both anti-initiation and antipromotion effects, indicating that taro possesses cancer-preventive properties likely mediated by its antioxidant and free-radical scavenging potential.

Public Health Significance:

The evidence for Colocasia esculenta (taro) is of major public health relevance, with a focus on cancer prevention and palliative care. With its status as a low-cost, readily available, and acceptable food crop, taro offers a potential choice for the production of plant-based, low-toxicity anticancer treatments. Its proven capacity to suppress cancer cell proliferation, metastasis, and inflammation while also possessing immune-modulating activity indicates its potential as a cancer burden reducer, especially in low- and middle-income nations with limited access to orthodox therapies. The use of taro or its bioactive compounds in foodstuffs or complementary medicine may assist in population-based interventions for cancer risk reduction. In addition, its safety and nutritional value allow for long-term application in preventive health and integrative oncology programs. The further research on taro may contribute to the growing trend of food-based public health interventions at preventing and managing chronic diseases, as well as promoting wellness.

Conclusion:

The surveyed studies altogether identify Colocasia esculenta (taro) as a potential natural anticancer drug. Leaves, corms, and isolated compounds of its extracts exhibited potent cytotoxicity, pro-apoptotic, antimetastatic, and immunomodulatory

activities towards diverse cancers such as breast, colon, ovarian, and glioblastoma. Both in vivo and in vitro findings consistently expressed tumor suppression by COX inhibition, suppression of PGE2, immune cell activation, and modulation of oxidative stress. Evolutionary formulations like liposomal tarin enhanced targeted delivery and specificity. Human nutrition trials also confirmed taro's promise with low toxicity and beneficial biomarker regulation. Generally, taro's popularity as a broad-spectrum anticancer agent, safety, and availability justify its continued investigation for cancer treatment, though requiring clinical authentication and compound standardization.

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Conflicts of Interest: None

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