


A Clinical Evaluation of *Guduchi* (*Tinospora cordifolia*) and *Yashtimadhu* (*Glycyrrhiza glabra*) as Chemopreventive Agent in Cancer Treatment

Vijay Kumar Beriwal¹  Bhavna Singh¹ Sanandan Thapliyal² Shalini Thapliyal³

¹PG Department of Dravya Guna Uttarakhand Ayurvedic College, Dehradun, Uttarakhand, India

²Department of Kaya Chikitsa, Uttarakhand Ayurvedic College, Dehradun, Uttarakhand, India

³PG Department of Swasthavritta, Uttarakhand Ayurvedic College, Dehradun, Uttarakhand, India

Address for correspondence Vijay Kumar Beriwal, MD, PG Department of Dravyaguna, Uttarakhand Ayurvedic College and Hospital, Uttarakhand Ayurved University, Old Mussoorie Road, Dehradun 248001, Uttarakhand, India (e-mail: drvkberawal@gmail.com).

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Abstract

Introduction *Guduchi* (*Tinospora cordifolia* (Willd.) Miers ex Hook.f. and Thomas) and *Yashtimadhu* (*Glycyrrhiza glabra* Linn.) are the medicinal plants traditionally used for various properties such as *rasayana*, *ayushprada*, *vayah-sthapana*, *cakshuya*, *varnya*, *keshya*, *vatapittajit*, *raktaprasadana*, *varnahar*, *shothhar*, *vishghan*, and *chhardighan* in Ayurveda. Modern studies also have explicitly revealed a wide range of pharmacological effects of both drugs such as antioxidant, immunomodulator, brain tonic and memory enhancer, gastroprotective, anti-inflammatory, antiulcer and wound healing, and antibacterial properties. On the other hand, cancer and various side effects of its treatment with chemotherapy/radiotherapy have emerged as a major public health concern all over the world including India.

Aim The main objective of this study was to observe the clinical efficacy of *guduchi* and *yashtimadhu* against the adverse effects of chemotherapy.

Study Design A clinical research, prospective in style, wherein a hypothesis was based on previous study on the various effects of *T. cordifolia* and *G. glabra*, was made to assess its effects on side effects of chemotherapy in cancer patient.

Materials and Methods Randomly selected ($n = 38$) cancer patients, receiving chemotherapy and divided into four groups as A, B, C, D, were administered trial drugs as 1 g *guduchi ghan tablet* to group B, 1 g *yashtimadhu ghan wati* to group C and 1 g of *guduchi* and *yashtimadhu ghan tablet* both were given to group D thrice a day with water for 90 days. Group A was control group and no drug was given. A follow-up was done on every 15 days for 3 months. Clinical assessment of the study was based on before therapy (BT) and after therapy (AT) effects of *guduchi yashtimadhu* in all adjuvant groups on the parameters namely subjective parameters, that is, side effects of chemotherapy and objective on hemoglobin (Hb) gm%, total leucocytes count (TLC), platelet count (PC), B. urea and S. creatinine level. For statistical analysis in both parameters paired *t*-test was used, and for comparison between all groups ANOVA test was used with corresponding *p*-values.

Results The overall outcome shows, except alopecia (*khalitya*) in all other adverse symptoms of chemotherapy, *p*-value was either <0.05 or <0.001 that was considered to be highly significant. *Guduchi* and *yashtimadhu* were used as combined adjuvant

Keywords

- ▶ *Tinospora cordifolia*
- ▶ *Glycyrrhiza glabra*
- ▶ cancer
- ▶ chemotherapy

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therapy in group D, and the result was highly significant. In objective parameters, the outcome of *p*-values (i.e., $p \leq 0.05$ – 0.01) showed the effects of *guduchi yashtimadhu* on Hb, TLC, PC, which was found to be significant.

Conclusion The findings suggest that there is a marked difference between BT and AT effect of *guduchi yashtimadhu* on the symptoms of chemotherapy and on Hb, TLC, PC level. Integration of Ayurveda in all adjuvant therapy groups showed significant results at 1% level of significance, against the side effects of chemotherapy in cancer patients.

Introduction

As human being constantly struggles against the changing environmental conditions to maintain optimum health and vigor throughout their life and with the increase in life expectancy and erratic way of dietary and lifestyle habits, we are witnessing an ever-growing menace of various lifestyle disorder and cancer is one of them. Cancer has emerged as a major public health concern not only in India but all over the world. Risk of developing cancer before the age of 75 years is 9.81% in males and 9.42% in females,¹ and death from cancer cases in India is 784,821 in 2017.² According to the World Health Organization, cancer is a second leading cause of death worldwide and accounted for 7.6 million deaths (around 13% of all deaths) in 2008.³ The modern observations indicate now that most cancers are not of hereditary origin but environmental and lifestyle factors, such as dietary habits, smoking, alcohol consumption, infections, and pollution have a profound influence on the development of cancer.⁴ The contribution of genetic factors and environmental factors toward cancer risk is 5 to 10% and 90 to 95%, respectively, according to a research.⁵

Modern medicine is used to treat cancer with chemotherapy, radiotherapy, surgery, etc. In the last few years, after vigorous researches regarding safety, the efficacy profiles of radiotherapy and chemotherapy have been improved significantly. However, these therapies still produce severe undesired adverse effects such as anorexia–cachexia syndrome, fatigue, alopecia, loss of appetite and weight, diarrhea, nausea, vomiting, and mucositis, and other metabolic, hormonal disturbances. These adverse effects force the patients to discontinue the treatment and make their life miserable and pitiful. In a report, cancer patients (~20%) treated annually with chemotherapy and radiotherapy are cured and an additional 20% may experience significant prolongation of life, while the remaining 60% have minimal or no benefit from these modes of treatment and suffer from its early and delayed toxic adverse effects.⁶

In Ayurveda, considering the various symptoms, cancerous type of growths and pathogenesis of cancer can be correlated and described under various types of *arbuda* (tumor), *granthi* (nodule) and *asadhya* (incurable), or *sannipataj* (when all the tridosha—*vata*, *pitta*, *kapha*—are involved) condition of various diseases. According to *Acharya Sushruta* when the *doshas* vitiate any part of the body and afflict the *mamsa* (muscle), *med* (fatty tissue) and *twaka* (skin), swelling is produced, which is *vrittam* (circular), *sthiram* (fixed), *mand ruja* (slightly painful),

mahantama (big in size), *analpmulam* (broad based in situ), *chiravruddhi* (slowly growing), and *achaya* (does not suppurate) is called *arbuda*.⁷ Various types of herbs, various procedure of surgery, *agnikarma*, *kshar-karma*, and lifestyle modification are to be mentioned and conducted for the treatment of *arbuda*⁸ in Ayurveda, since *samhita kala* (1500–500 BC). The properties of chemotherapy drugs are very much similar with the 10 *guna* (properties) of *visha* (toxin) and *agni pradhan dravya* (herbs with quick and acute action) as mentioned in Ayurveda texts.⁹ So both can be correlated strongly.

Owing to the rise in awareness about the cancer, its treatments, and undesirable possible adverse effects of chemotherapy, more and more people are opting for a safe and cost-effective treatment options. In the past few years, there is a growing interest in Ayurveda and herbal sectors worldwide. In the present era, practicing ayurvedic system along with allopathic system of medicine can act as complementary to each other and following the concept of integrative oncology Ayurveda can help in improving and augmenting the quality of life of cancer patients treated with chemotherapy. *Guduchi* and *yashtimadhu* both drugs were used for integrated clinically study because of its *balya* and *rasayana*^{10–12} (rejuvenative), *pandu kamlā har*^{10,13} (improve anemia and jaundice) *ayushprada*¹¹ (promotes life), *vayah-sthapana*^{10,11,13} (antiaging), *raktpittaghana*¹⁴ and *vishaghan*¹⁰ (blood and body detoxification) and *varnropana and shothhar*^{12,15} (wound healing, anti-inflammation), *medhya*^{16,17} (brain tonic) and *keshya*^{10,15} (improve hair health) properties. Modern study has also revealed some useful pharmacological effects of *guduchi* such as it is anti-inflammatory,¹⁸ it improves learning and memory,¹⁹ it acts as radioprotector and cyto-protector,^{20,21} it increases life span (a study by Jamnagar-based Gujarat Ayurved University was conducted on the consumption of *Guduchi* [heart-leaved moonseed] that increased the lifespan of the common fruit fly [*Drosophila melanogaster*]), it is an antioxidant and has gastro-protective effects.²² *Yashtimadhu* has healing, antiulcer and regenerative properties,²³ immunostimulatory,²⁴ anti-infective, antiviral,²⁵ antioxidant,²⁶ anti-anxiolytic activity,²⁷ etc. All above properties of *guduchi* and *yashtimadhu* were very useful for this study.

Materials and Methods

Authentication and Source of the Drugs

The plant material, *guduchi* (*Tinospora cordifolia*) stem and *yashtimadhu* (*Glycyrrhiza glabra* Linn.) root (rhizome) used

in the clinical study was procured from a reliable source of Dehradun market consisting of the chopped pieces of the stem of *guduchi* and roots of *yashtimadhu*. Its authenticity was validated in the PG Department of Dravyaguna, Uttaranchal Ayurvedic College, Dehradun, Uttarakhand.

Preparation of Drugs for Clinical Trial

Five kilograms of the raw material of both the drugs was sent to a reputed pharma company to prepare *ghan wati* (concentrated form of tablets) tablets of *guduchi* and *yashtimadhu* separately of 500 mg each tablet. So we got *guduchi ghan* tablets (GGT) and *yashtimadhu ghan* tablets (YGT) for drug trial.

Dosage

A dosage of 1 g (2 tablets) of GGT and 1 g (2 tablets) of YGT thrice daily to be taken with lukewarm water after meal was prescribed.

Number of Patients and Grouping

A total of 56 patients were selected for the study, out of which 38 completed the clinical trial and were registered at Uttaranchal Ayurvedic Hospital, Rajpur Road, Dehradun. Out of the 38 patients, some patients were outsourced from Gaudham Cancer Treatment and Research Centre, New Delhi. All patients were randomly selected in four groups as following

1. Group A: Control group receiving chemotherapy with no trial drug
2. Group B: Patients receiving chemotherapy + *guduchi ghan* tablet (CT+GGT)
3. Group C: Patients receiving chemotherapy + *yashtimadhu ghan* tablet (CT+YGT)
4. Group D: Patients receiving chemotherapy + *guduchi* and *yashtimadhu ghan* tablet, combined therapy (CT+GGT+YGT).

Duration of Treatment

Total duration of the adjuvant therapy was for 3 months.

Follow-up

After the start of clinical trial, first follow-up was done after 1 month than in every 15 days interval for 2 months; last follow-up was after 1 month to ascertain the effectiveness of adjuvant therapy in reducing the adverse effects of chemotherapy for total 3 months.

Selection of Patient

Inclusion Criteria

- Diagnosed cases of cancer of any type at stage 1 or stage 2 being submitted for chemotherapy irrespective of sex, cast, religion, economic status.
- Patients complaining of acute or chronic short-term adverse effects of chemotherapy.
- Patients between the age group of 20 to 60 years.

Exclusion Criteria

- Patients in the stage 3 and stage 4 having chronic long-term local adverse effects were excluded from the study.
- Patients having multiple opportunistic infections with severe complications.
- Patients between the age group below 20 years and above 60 year.
- Patients with associated complication such as chronic renal failure and hepatic disorders and mental confusion
- Patients with long-term sequelae of chemotherapy and radiotherapy like esophagus stricture, urinary, and stool incontinence will be excluded from the study.

Assessment Criteria

Subjective Assessment

Subjective assessment of the effect of therapy was performed on the basis of the improvements and examination of adverse effects (toxicity) of chemotherapy, as per the guidelines and performance-based grading system by the National Cancer Institute, Oncology Group²⁸ on following symptoms: nausea and vomiting, mucositis, fatigue, alopecia, xerostomia, tastelessness, and skin reaction.

Grading and scoring for above symptoms were carried from 0 to 4 as increase in the score indicates worseness of the symptoms. Score of 0 shows normal or absence of adverse symptoms. So decreasing or increasing pattern of grading showed the significance and insignificance of adjuvant therapy, respectively.

Objective Assessment

Hemoglobin (Hb), total leucocytes count (TLC), platelet count, blood urea, and serum creatinine levels in all groups were assessed.

Overall Assessment

Overall assessment was done between all groups, on the basis of overall subjective and objective effectiveness of therapy with correspondence of their *p*-values and total percentage which are as follows:

Highly significant: 60–100%, $p \leq 0.01$ to ≤ 0.001 ,

Significant: 41–59%, $p \leq 0.05$,

Mild significant: 21–40%, $p \leq 0.05$,

Insignificant (worse): 0–20%, $p > 0.05$.

Statistical Analysis

In subjective and objective parameters, paired *t*-test was performed to evaluate the clinical effect of *guduchi* and *yashtimadhu* on the various side effects of chemotherapy in different cancer patient under study. The significance and insignificance effect of the adjuvant therapy upon the patient response, at 0.05 level of significance, was observed, along with their corresponding *p*-values as shown in ► **Table 1**. ANOVA test was used to compare overall effects between all groups.

Table 1 Clinical and comparative effect of trial drugs on all subjective parameters in all groups

Group	Symptoms	Mean (X)		SE±	%	p-Value
		BT	AT			
A (CT+C)	Nausea and vomiting	4.2	4.4	0.92	↓24.3	>0.05
	Mucositis	4.6	5.1	0.65	↓16.6	>0.05
	Fatigue	3.4	4	0.38	↓12.5	>0.05
	Alopecia	4.8	5	0.73	↓14	>0.05
	Xerostomia	2.5	3.2	0.56	↓17.5	>0.05
	Skin reaction	4.3	4.8	0.42	↓21.2	>0.05
	Tastelessness	3.8	4.2	0.84	↓25	>0.05
B (CT+GGT)	Nausea and vomiting	4.2	3.1	0.42	68.1	≤0.05
	Mucositis	4	2.4	0.25	62.4	≤0.05
	Fatigue	3.7	2	0.31	78.8	≤0.01
	Alopecia	4.5	4	0.46	28.7	≤0.05
	Xerostomia	2.8	1.6	0.24	71.5	≤0.01
	Skin reaction	4.5	3.2	0.42	70.4	≤0.01
	Tastelessness	3.6	2.8	0.38	76	≤0.05
C (CT+YGT)	Nausea and vomiting	4	2	0.46	73.2	≤0.01
	Mucositis	4.2	3.9	0.15	70.4	≤0.05
	Fatigue	4.6	4	0.26	76.4	≤0.01
	Alopecia	3.6	3.1	0.3	36.5	≤0.05
	Xerostomia	4.1	2.8	0.44	73.8	≤0.01
	Skin reaction	3.2	2.4	0.3	74.1	≤0.01
	Tastelessness	4.8	3.5	0.35	82	≤0.001
D (CT+GGT+YGT)	Nausea and vomiting	4.3	1.4	0.42	89.42	≤0.001
	Mucositis	4.1	1.8	0.51	82.34	≤0.001
	Fatigue	3.5	2.2	0.62	96.78	≤0.001
	Alopecia	4	1.2	0.34	48.8	≤0.05
	Xerostomia	5	3.2	0.26	78.4	≤0.001
	Skin reaction	4.6	2.5	0.37	89.7	≤0.001
	Tastelessness	4.4	2.1	0.4	86	≤0.001

Abbreviations: AT, after therapy; BT, before therapy; CT, chemotherapy; GGT, *guduchi ghan* tablets; SE, standard error; YGT, *yasthimadhu ghan* tablets.

Pathyapathya (Diet and Lifestyle Guidelines)

Following diet plan was advised to all patients.

Do's (Pathya): Light and easy to digest food, barley, wheat, *shali* rice, flesh broth of gallinaceous birds, pigeon pea, Bengal gram, *petha*, *moong daal*, red lentil, pointed gourd, *amla*, Aloe vera, wheat grass juices, raisins, black nightshade, fresh fruits, vegetable salad, *Asparagus racemosus (shatavar)*, cow milk, and pure cow ghee. Yoga, meditation, morning walk in park, light exercises, as per the capacity of patients. Should live in peace and clam area.

Don'ts (Apathya): *Katu rasa* (pungent), food which causes heating effect and is heavy to digest, fried, spicy (*katu*), sour (*amal*) and salty (*lavan*) food items, curd and its products, black gram, horse gram, tea, coffee, alcohol, tobacco, smoking, and beans. Diurnal sleep (*diwaswap*), sun bathing (*aatap-sewan*), excessive exercise, work, and over indulgence in sexual activities. Excessive anger, anxiety, and sorrow were advised as avoidable.

Observations

It was observed that out of total patients in the present study, maximum patients (35.71, 24.99, and 17.85%) were found in the age group of 51 to 60, 41 to 50, and 61 to 70 years, respectively. The predominance of cancer was 58.91% in males than in female patients (41.05%). Majority of the patients were from urban area (i.e., 66.07%) in compared to the rural area (i.e., 33.92%). About 21.42% patients reported to have a positive family history of cancer, while the remaining 78.57% reported negative family history. About 69.65% patients were reported addiction with alcohol, smoking, and Tobacco chewing, while 30.35% of patients were nonaddicted. Maximum 25.09% patients were suffering from head and neck cancer followed by liver cancer in 19.64% than breast cancer in 16.07%; 14.28% of patients were suffering from bladder/prostate and cervix/uterus. Symptoms such as nausea and vomiting (*chhardi/vamana*) were observed in 76.78% of patients, mucositis in 62.5%, fatigue (*daihiik duarblya*) in 82.14% of patients, and alopecia (*khalitya*) in 28.57% patients.

Xerostomia (dryness in mouth) was present in 62.5% of the patients followed by excessive salivation in 35.71%, skin reaction in 30.35%, and tastelessness was found in 33.92% patients. Most of the patients (66.84%) were suffering from irregular bowel habit, that is, either diarrhea or constipation, indigestion, and acidity problems. In objective findings, most of the patients, that is, 55.35%, were between 7 and 10 gm% of hemoglobin level, 35.71% of patients had TLC below 5000/cu.mm, and 41.07% of patients had platelet counts between 1 and 1.5 lack/cu.mm. Blood urea and serum creatinine level were found normal in most of the patients; only 22% of patients were with increased level of blood urea and 32.14% of patients were with serum creatinine level above 1.5 mg/dL.

Results

The outcome showed that out of seven subjective assessment symptoms, group D showed maximum relief, that is, 96.78% in fatigue with p -value ≤ 0.001 that was highly significant, while 78.8% relief in group B (CT+G) with p -value ≤ 0.01 , and in group C this was 76.4% with p -value ≤ 0.01 in fatigue symptoms. Rest of the symptoms, that is, nausea and vomiting, mucositis, xerostomia, skin reaction, tastelessness, also showed significant to highly significant results, that is, 78 to 89% with p -value ≤ 0.05 to ≤ 0.01 (►Table 1). It was alopecia that showed moderate effect in 58.8% of patients in group D, while it was mild significance as 35.7 and 46.5% in group B and group C. In control group A (CT+C) where no drug was

given, 75% patients get worsen their all symptoms with p -value > 0.05 that was insignificant and rest of patients in this group remain unchanged or mildly improve. In objective assessment, most of the patients, that is, up to 78% in group D get improved their pathological parameters, while adjuvant therapy with *guduchi* and *yashtimadhu* was up to 68 and 64%, respectively. Hb, TLC, and platelet levels are significantly improved than blood urea and creatinine levels (►Table 2).

In control group, 75% patients showed worsened results in all symptoms (►Fig. 1). Adjuvant therapy with *guduchi* showed 60% (►Fig. 2), while adjuvant therapy with *yashtimadhu* showed 64% overall effectiveness (►Fig. 3). Integrated adjuvant therapy with *guduchi* and *yashtimadhu* showed highest improvements, that is, 77% patients got relieved. Rest patients showed mild-to- moderate significance in adjuvant therapy groups as shown in ►Fig. 4. Study showed highly significance results on objective parameters especially in group D as compared with group B and C. Group A showed insignificant results.

Discussion

The overall outcome in both subjective and objective parameters, significance to highly significance difference, was found between before therapy and after therapy, with integrated adjuvant therapy of *guduchi* and *yashtimadhu*, especially in group D as compared with group B, C, and group A. There was marked improvement in fatigue (*daihk dourbalta*) symptom

Table 2 Effect of adjuvant therapy on objective parameters in all four groups

Group	Symptoms	Mean		SE±	%	p-Value
		BT	AT			
A (CT+C)	Hb%	3.6	4.4	0.92	43.3	>0.05
	TLC	4	5.1	0.65	33	>0.05
	PC	3.1	4	0.38	22.22	>0.05
	Urea	3.4	5	0.73	20	>0.05
	Creatinine	2.8	4.2	0.63	16.66	>0.05
B (CT+GGW)	Hb%	4	2.1	0.92	66.6	≤ 0.01
	TLC	4.2	2.5	0.65	52.2	≤ 0.05
	PC	3.4	1.2	0.38	68	≤ 0.01
	Urea	4.5	3.6	0.73	29.9	≤ 0.05
	Creatinine	3.5	2.4	0.53	24.3	≤ 0.05
C (CT+YGW)	Hb%	4.2	3.1	0.92	65	≤ 0.01
	TLC	4.7	2.3	0.65	49	≤ 0.05
	PC	2.6	1.8	0.38	47	≤ 0.05
	Urea	2.9	2.4	0.73	34.4	≤ 0.05
	Creatinine	3.2	2	0.51	25	≤ 0.05
D (CT+GGW+YGW)	Hb%	2	0.8	0.92	76	≤ 0.001
	TLC	3.7	2.1	0.65	78.4	≤ 0.001
	PC	3.4	1.2	0.38	79.7	≤ 0.001
	Urea	2.8	1.8	0.73	48	≤ 0.05
	Creatinine	2.2	1.6	0.55	45.55	≤ 0.05

Abbreviations: AT, after therapy; BT, before therapy; Hb, hemoglobin; PC, platelet count; SE, standard error; TLC, total leucocytes count.

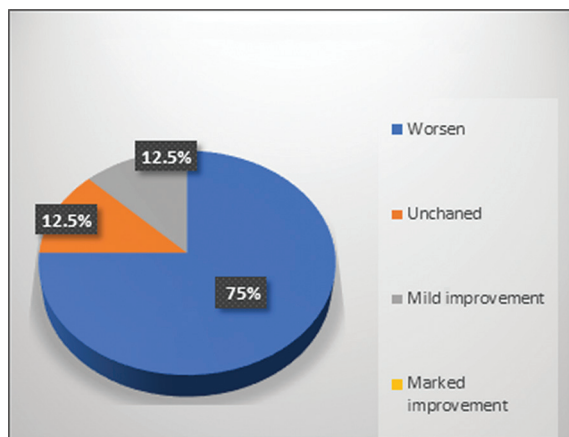


Fig. 1 Overall observation in control group A.

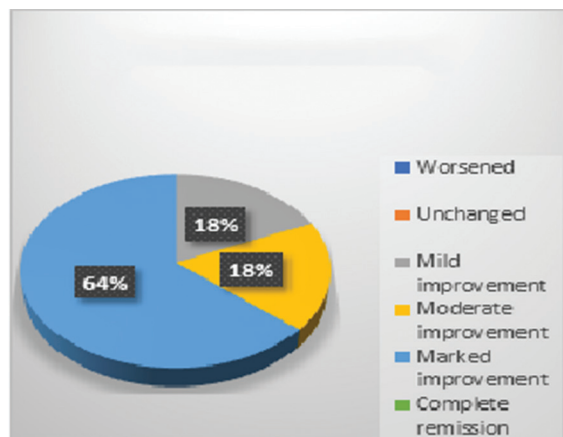


Fig. 3 Overall observation in group C, adjuvant with *yashtimadhu* (*Glycyrrhiza glabra*).

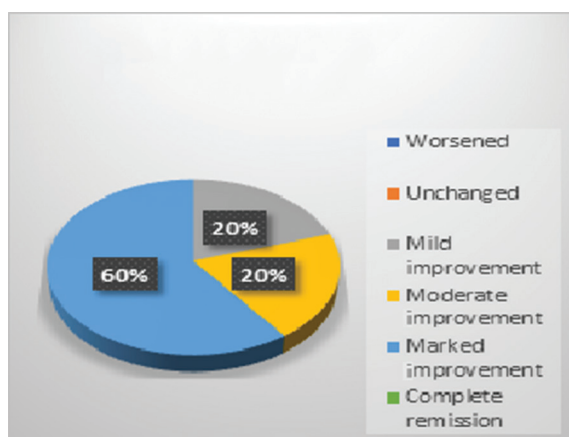


Fig. 2 Overall observation in group B, adjuvant with *guduchi* (*Tinospora cordifolia*).

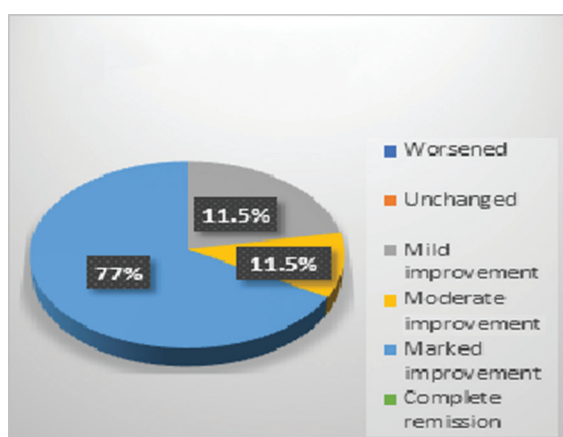


Fig. 4 Overall observation in group D, adjuvant with *guduchi* (*Tinospora cordifolia*) and *yashtimadhu* (*Glycyrrhiza glabra*).

up to 96.78%; this may be because of *madhur rasa* (sweet), *guru* and *snigdha guna* and *madhur vipaka* of *yashtimadhu* that increased the *rasadhātu* (lymphatic tissues) in body and immunomodulator and antioxidant property of *guduchi* that eventually improve tissue strength and immunity. This also justifies the *balya* (increased body strength), *rasayana* (rejuvenative) and *ayushprada* (antiaging) properties of *guduchi* as mentioned in *kaiyadeva nighantu*¹³ and *raj nighantu*.¹⁶ The nausea and vomiting (*chhardi/vaman*) were significantly improved may be because of *laghu guna*, *madhur vipaka*, and *chhardihara karma* of *guduchi* (*K.N. Aus. Vrg.1/7–10*) and *madhur rasa*, *madhur vipaka*, *amal-pittahar* (antihyperacidity) *karma* of *yashtimadhu* that relieve nausea and vomiting in 89.42% of the patients. With *agnideepana*, *pachana*, and *sangrahi karma* of *guduchi* are because of *laghu*, *tikta*, and *katu guna*, all of these act as *paachana*, *deepen*, and *laghav karma* in the body and improve symptoms such as indigestion, loss of appetite, flatulence, diarrhea, and bowel movements, which prove that these *guna* improve the functioning of liver enzymes and other digestive juices also, which enhance the patient's nutritious requirement and strength as well, but all of these symptoms were worse in control group. Similarly, xerostomia (dryness in mouth), skin reaction (*vivarnta*, *udarda*), and tastelessness

(partial loss of taste) produced by chemotherapy drugs, these symptoms were more relieved in adjuvant with *yashtimadhu* and combined therapy group. This effect may be because of *tridhoshhar*, immunomodulator,²⁹ and *dhatushodhak*¹⁶ properties of *guduchi* and due to *yashtimadhu* which is a potent *vat-pittashamaka* (reduce vitiated *Vat* and *Pitta* in body), *snehana* (emollient), *kanthya* (beneficial for mouth and throat), *shitapittavinashini* (cure urticaria and skin reactions), *vrishya* (aphrodisiac), *soshanashaka* (relieves cachexia, dryness in body) as mentioned in *dravyaguna hastamalaka*¹² and in *dhanwantari Nighantu*.¹¹ These *karma* also increased "Oj" (vital energy) *dhatu* in body because of *madhur rasa*, *madhur vipaka*, and *rasayana prabhava*. And further all these properties managed *vata* and *pitta prokopa*-related symptoms such as xerostomia, urticaria, skin reactions, tastelessness, cancer cachexia, and fever, as results of this study also showed.

It was quite satisfaction to notice that except for 13 patients, the Hb gm%, TLC, platelet counts, and serum urea and creatinine levels of the 25 patients showed good improvement. This fact again favors the already established *pandukamlahar*¹³ (improved Hb level and jaundice) *raktshodhak*¹⁴ (blood purifying and detoxifying) and *vishghan* (antitoxicity) properties of *guduchi* and *yashtimadhu*

that also improve platelet counts, blood urea, and serum creatinine level in most of the patients. Low confidence, sleeplessness, body pain, and anxiety that were present in every patient got highly significant results with 78.64% of patients. This was also noticed that five patients showed mild to no significance response in spite of following the prescribed dietary and lifestyle measures along with the regular intake of *guduchi* or *yashtimadhu* or both for 90 days period. This may be because of chronicity, age factor, and patients suffering from the associated diseases. There were no adverse or undesirable side effects noted in terms of clinical presentation or laboratory investigation post studies. It is also important to note that *Pathya-Apathya* plays an important role in improving the symptoms as Acharya Charka also mentioned that “*Pathya-Sevan* produce healthy results and *Apathya-Sevan* induces Unhealthy results in body so it must be follows in every condition.”³⁰ The patients, who followed the prescribed diet and lifestyle guidelines diligently, responded well and took less time to recover. The present study illustrates that the overall integrated effect of *guduchi* and *yashtimadhu*, with its *rasa* (taste), *guna* (properties), *veerya* (potency), *vipaka* (digestion), and *karma* (action), corrects the metabolism, detoxifies the blood, and heals the inflammation, eventually helping in disintegrating the pathogenesis of adverse effects of chemotherapy.

Conclusion

This study illustrates the overall effect of *guduchi* (*Tinospora cordifolia* (Willd.) Miers ex Hook.f. and Thomas) and *yashtimadhu* (*Glycyrrhiza glabra* Linn.) with its properties, potency, and specific action (*rasa guna, veerya, vipaka, karma, and prabhava*) improving the general strength of body, correcting metabolism and neutralizing the toxic effects of blood and tissues and that is why it helps in reducing the adverse symptoms of chemotherapy and improves general strength of body as well. *Vishahara* (antitoxicity), *varnropana* (healing), *raktaprasadana* (improving blood quality), and *rasayana* (anti-aging and immunomodulator) properties of both drugs helped to disintegrate the pathology of *vata-pitta prokopa* (vitiating *vata* and *kaph dosha*) and *kapha kshaya* (deficit of soft tissues), *rasa-rakta dusti* (impurities of lymph and blood) and *oja* (vital energy) and *dhatu kshaya* (deficit of tissues) produced by *visha* (toxic) and *agni pradhandravyas* (rapid acting drugs), that is, chemotherapy drugs within the body. So, with these results, we can say that it is feasible to practice ayurvedic and allopathic system of medicine that will act as complementary to each other. In this study, we conclude that *guduchi* and *yashtimadhu* both were very useful in improving and augmenting the quality of life of cancer patients treated with chemotherapy as an integrated approach.

Conflict of Interest

Dr. Sanandan Thapliyal reports nonfinancial support from Gaudham Cancer Research and Treatment Center Delhi outside the submitted work.

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