

AYURVEDA FOR CHEMO-RADIOTHERAPY INDUCED SIDE EFFECTS IN CANCER PATIENTS

¹*Deepika Puri, ²Dr. Surinder Sharma, ³Dr. Rohit Johari and ⁴Dr. S. R. Shahi

¹M.D. Dravyaguna Scholar P.G Department of Dravya Guna Vigyana, Dayanand Ayurvedic College, Jalandhar (Punjab).

²Professor and H.O.D. P.G Department of Dravya Guna Vigyana, Dayanand Ayurvedic College, Jalandhar (Punjab).

³Associate Professor P.G Department of Dravya Guna Vigyana, Dayanand Ayurvedic College, Jalandhar (Punjab).

⁴Principal and H.O.D Department of Dravya Guna, Harmony Ayurvedic Medical College, Ferozepur (Punjab).

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*Corresponding Author

Dr. Deepika Puri

M.D.Dravyaguna Scholar
P.G Department of Dravya
Guna Vigyana, Dayanand
Ayurvedic College,
Jalandhar (Punjab).

ABSTRACT

Chemotherapy medications and radiotherapy are profoundly harmful and both harm neighboring solid cells. Incidental effects might be intense (happening inside couple of weeks after treatment), halfway or late (happening months or a long time after the treatment). Some significant symptoms of chemotherapy are: sickness, heaving, loose bowels, mucositis, alopecia, clogging and so on; while radiation treatment however controlled locally, can create foundational side outcomes like weakness, anorexia, queasiness, spewing, change in the taste, rest unsettling influence, migraine, sickliness, dry skin, stoppage and so forth Late inconveniences of these treatments likewise incorporate pharyngitis, esophagitis, laryngitis, steady dysphagia,

weakness, hepatotoxicity, fruitlessness and intellectual deficiencies. These varieties of aftereffects devastatingly affect the personal satisfaction of disease survivors. Because of the disappointment of the greater part of the radio-defenders and chemo-defenders in controlling the symptoms of traditional malignant growth treatment the correlative and elective drugs have drawn in the perspective on scientists and clinical experts all the more as of late. This survey targets giving a thorough administration convention of previously mentioned chemo-radiotherapy aftereffects dependent on *Ayurveda*, which is an old arrangement of customary

medication rehearsed in Indian landmass starting around 5000 BC. At the point when the significant results of chemo-radiotherapy are glanced through an *Ayurvedic* viewpoint, apparently they are the indications of irritated pitta dosha, particularly under the gathering of problems called *Raktapitta* (drain) or *Raktadushti* (vascular aggravation). Every one of the major and normal secondary effects are covered and in view of exhaustive audit of antiquated *vedic* writing and current logical confirmations, *Ayurveda* based mediations are advanced. This original copy should help clinicians and individuals experiencing malignant growth to battle genuine chemoradiotherapy related aftereffects through basic yet successful locally established *Ayurveda* cures. The cures portrayed are usually accessible and safe. These straightforward *Ayurveda* based arrangements might go about as a significant adjuvant to chemo-radiotherapy and upgrade the personal satisfaction of disease patients.

KEYWORDS: *Ayurveda*, Cancer, Chemotherapy, Radiotherapy, Side Effects.

INTRODUCTION

Disease is a significant sickness and a main source of death world over, causing enduring of enormous populace and worldwide financial misfortune overall.^[1] There were 12.7 million malignant growth cases and 7.2 million passings because of disease worldwide in the year 2008.^[2] Hence, studies are being directed internationally to forestall disease or foster nontoxic helpful specialists which incorporate those utilizing *Ayurvedic* home grown prescriptions.^[3] Over the most recent couple of many years however there has been enormous headway in the indicative modalities and therapy of disease which has expanded malignant growth endurance rates, the drawn out impacts of these therapy modalities on the personal satisfaction of the malignant growth survivors have drawn in the consideration.^[4]

Ordinary Management of Cancer and Its Side Effects

Ordinary administration of malignant growth envelops four significant techniques – medical procedure, radiation treatment (counting photodynamic treatment), chemotherapy (counting hormonal treatment and atomic designated treatment) and biologic treatment (counting immunotherapy and quality treatment). These modalities are typically given in blend, and they work through various components to a synergistic impact. For e.g., antibodies (a type of immunotherapy) might be utilized to convey radiation treatment.^[5] Antagonistic impact of these treatments and medication opposition are the two significant deterrents in the better result of treatment and personal satisfaction of the patient separately. Chemotherapy medications and radiotherapy are profoundly poisonous and both harm contiguous sound

cells. The majority of the patients experience the ill effects of antagonistic impacts of chemotherapy and radiation treatment. These secondary effects might be intense (happening inside couple of weeks after treatment), middle or late (happening months or a long time after the treatment).^[6] Some significant symptoms of chemotherapy are: queasiness, spewing, looseness of the bowels, mucositis, alopecia, obstruction and so on^[5,7]; while radiation treatment however managed locally, can deliver foundational side results like weakness, anorexia, sickness, regurgitating, modification in the taste, rest aggravation, migraine, paleness, dry skin clogging and so forth Late confusions of these treatments additionally incorporate pharyngitis, esophagitis, laryngitis, tireless dysphagia, weariness, hepatotoxicity, barrenness and intellectual shortfalls.^[5-7] There is additionally a chance of advancement of auxiliary disease due to chemo-radiotherapy.^[6] These varieties of aftereffects devastatingly affect the personal satisfaction of disease survivors.

To deal with these generally three sort of restorative specialists are utilized in traditional medication; first, which are given to forestall tissue harm before the indications show up, they are called defenders, second those that are given during or soon after a course of radiation treatment (mitigators) and third are the therapies given when harmfulness creates a very long time to years after treatment.^[6] Because of disappointment of the greater part of the radio-defenders and chemo-defenders in controlling the symptoms of regular disease treatment totally, the corresponding and elective meds have drawn in the perspective on specialists and clinical experts all the more as of late. This survey targets giving a thorough administration convention of previously mentioned chemo-radiotherapy secondary effects dependent on *Ayurveda*, which is the most antiquated arrangement of customary medication of the world that has been rehearsed in Indian landmass beginning around 5000 BC.^[8] After a broad writing review of both conventional *Ayurvedic* texts and present day logical writing we give an *Ayurveda* based methodology and answer for previously mentioned issues.

Ayurveda Based Approaches towards Mitigating Chemo-Radiotherapy Side Effects

Ayurveda is an all around reported customary arrangement of medication.^[9] Ayurveda thinks about human body as a resolute entire and depends on the rule that wellbeing is a condition of steadiness of organization of interrelated elements of body, psyche and cognizance though illness shows itself as a side-effect of aggravation in the security of this organization.^[10]

As per Ayurveda, vata, pitta and kapha are three fundamental humors (doshas) liable for every one of the physiological cycles in the body; vata causes movement, pitta helps

digestion and kapha is liable for design or steadiness. Wellbeing is recognized as adjusted working of these three doshas.^[11]

Characteristics of the Three Doshas

An old samskrit ayurvedic text called Ashtanga Samgraha (Ash. Sam.)^[12] portrays the characteristics of three doshas. Exacting importance of the word vata is "air". The characteristics of vata according to ayurvedic science include: dryness, cold, delicacy, versatility, infiltration and unpleasantness. These are liable for a wide range of developments in the body like course, nerve drive travel, breath and so on [Ash. Sam. 19/3; ref no. 12].

Characteristics of pitta referenced in ayurvedic texts include: hotness, sharpness and dampness together. Basic physical processes like hunger, thirst, assimilation, digestion, body hotness, and visual perception, non-abrasiveness of the body, gloss, mental smoothness, and insight are represented by the pitta dosha. Pitta shows itself through the cycles of assimilation, digestion, oxidation, formation, decrease, enzymatic and hormonal exercises and so forth.

The third dosa is kapha, which has the characteristics of dampness, consistent quality, coolness, greatness, non-abrasiveness and tenacity. Kapha is liable for body dampness, security of the joints, solidness of the body, mass, strength, weight and perseverance [Ash. Sam. 19/3 ; ref no. 12].

Chemo-Radio Therapy Side Effects as Manifestations of Aggravated Pitta Dosha

At the point when the significant symptoms of chemoradiotherapy are glanced through an ayurvedic viewpoint, apparently they are the indications of bothered pitta dosha particularly under the gathering of issues called Raktapitta (drain) or Raktadushti (vascular aggravation).

The signs and indications of exasperated pitta according to old ayurveda texts are: dav (consuming sensation), mukhapaka (stomatitis), trushna (extreme thirst), osha (sensation of hot sensation in the body), galpaka (pharyngitis), payupaka (urethritis), gudapaka (proctitis), davatu (corrosive disgoring), dava (consuming sensation in the oral pit), abhishandha (conjunctivitis) [Ash. Sam. 20/14; ref no. 12]. Ayurveda texts additionally notice "atapa sevana" (exorbitant openness to daylight or radiations) as one of the reason for expansion in the pitta dosha. This prompts overabundance of pitta and lopsidedness in the prakruthi (vikruthi).

Bothered Pitta Dosha as Fundamental Basis for Management of Chemo-Radiotherapy Side Effects.

Ayurveda standards portray that to decrease pitta dosha our way of life ought to be to such an extent that it advances different (characteristics of kapha and vata) and it ought to go against the characteristics of pitta. As indicated by the sage Charaka, one of the renowned creators of antiquated ayurvedic texts, "Virechana" (remedial purgation) is the best treatment for irritated pitta dosha. The line of the board is; first – snehana (oleation treatment) with unadulterated or cured ghee (explained margarine), then, at that point, trailed by virechana (restorative purgation) utilizing ayurveda home grown drugs, for example, draksha (vitex venifera or raisins), vidarikhanda (pueraria tuberosa), Ikhsuras (saccharum officinarum or sugar stick juice) and trivrutta (operculina turpethum) and afterward at long last organization of meds (shamana) which are having sweet, astringent, severe taste and are cold in strength for example draksha, sugarcane, kharjura (phoenix dactylifera or dates), yashtimadhu (glycyrrhiza glabra), vasa (adatoda vasika), Chandana (santalum collection or sandalwood), ushir (vtiveria zizanioides) readiness containing rose and honey (gulkand), milk and ghee (explained margarine) and so forth.

Alongside this one ought to embrace a cool air around [Ash. Sam. 21/4; ref no. 12]. Vasadi ghrita (calrified spread cured with Adatoda Vasika), shatavaryai ghrita (calrified margarine cured with asparagus racemosa) and kiratatiktadi churna (swetia chirata) are uncommon multidrug arrangements suggested by Charaka for treatment of sicknesses conceived out of disturbed pitta as referenced in a valid ayurveda text called Charak Samhita Chikitasasthana (Cha. Sam.) [Cha. Sam. 4/76, 4/88, 4/97; ref no. 13].

Schematic Representation of Management of Aggravated Pitta dosha

1.Snehana (oleation Therapy)

With unadulterated or sedated ghee(clarified margarine)



2.Virechana (Therapeutic purgation)

Utilizing draksha(vitex venifera),vidarikhanda (pueraria tuberosa),
Ikhsuras (saccharum officinarum) and trivrutta (operculina tuperthum)



3.Shamana Chikitsa (Medications)

(Natural prescriptions which are having sweet,astringent,bitter taste and cold in power)

(For e.g., Vasadi ghrita (clarified margarine cured with *Adatoda Vasika*), shatavaryai ghrita (clarified spread sedated with *asparagus racemosa*) and kiratatiktadi churna (*swetia chirata*))

Ayurveda Based Management of Common Chemo-Radiotherapy Side Effects in Cancer Patients

Following passages in this part of the original copy portray significant results of chemoradiotherapy individually alongside the likely ayurveda put together solution for the issue with respect to the premise of both antiquated ayurvedic and present day logical writing review:

Radio-Protective Effects of Ayurveda Polyherbal Preparations

Chavanprash avaleha is a notable ayurvedic poly home grown arrangement, which has Indian gooseberry (*embelica officinalis*) as its essential part. In a randomized control study, oral organization of another poly natural ayurvedic planning called Rasyana avaleha (*embelica officinalis* is the standard fixing) has shown altogether better impact in controlling the unfavorable impacts of chemotherapy and radiotherapy than the benchmark group.^[14] Comparatively in a creature concentrate on it was seen that Chavanprash avaleha has a possible radio-defensive impact in the creatures which are presented to gamma radiation.^[15] A survey depicts a polyherbal ayurvedic readiness called Triphala which contains three fixings viz. haritaki (*Terminala chebula*), vibhitaki (*Terminala belerica*) and amalaki (*Embilica officinalis*), as helpful in disease as an enemy of malignant growth, chemo-defensive and radio-defensive specialist.^[16] Another ayurvedic spice – guduchi (*Tinospora cardifolia*) has shown its strong radio defensive impact in creature tests. In a creature concentrate on it was observed that radiation prompted testicular injury was altogether improved in the trial bunch who burned-through guduchi, prompting critical expansion in the body just as the tissue weight in examination with the benchmark group (which was denied of the spice).^[17]

Anorexia

Almost 80% of the malignant growth patients foster anorexia-cachexia disorder ahead of time organizes which is deteriorated further with the organization of chemotherapy.^[18] Anorexia is the commonest chemotherapy aftereffect and is related with weight reduction, fatiguability and diminished hunger which further prompts decreased possibilities of better result and lessened endurance.^[19]

Ayurveda perceives this condition as Arochak wherein patient feels loss of interest, yearning, and taste in the food. Old ayurvedic composition called Charak samhita^[13] suggests mouth washes by the fluid details produced using the spices, for example, shunthi (dried ginger) maricha (Black pepper), pippali (Pepper longum), lodra (Symlocos racemosa), teja patra (Cinnamomum zeylanicum) and yavaksharas (Hordeum vulgare) [Cha. Sam. 26/217; ref no. 13]. According to Sharangdhar Samhita (Sha. Sam.) Lavangadi churna is one more polyherbal planning showed for patients experiencing anorexia because of persistent sicknesses [Sha. Sam. 6/65-69; ref no. 20], it additionally works on actual strength. This polyherbal arrangement showed in the sicknesses of throat tuberculosis, and so on additionally it invigorates the body. Other significant reasons for anorexia are oral ulcers and dryness of the mouth actuated by chemo and radiotherapy. In such cases another multi-spice planning called Khadiradi vati is exhorted for biting a few times in a day [Cha. Sam. 26/213; ref no. 13].

Mucositis

Oral mucositis is one of the normal and genuine intricacies of chemotherapy. Chemotherapy-induced mucositis is exceptionally difficult condition with next to no positive fix; this condition is a significant reason for low quality of life in disease patients getting chemotherapy.^[21]

According to Charak Samhita, the manifestations of mucositis take after the sign and indications of pittaja mukh roga, which is essentially because of expanded pitta dosha in the body. Mouth washes with kalaka churna blended in with fluids, for example, water and honey is demonstrated for such medical issues, it is written in the text that this therapy fixes a wide range of mouth problems brought about by abundance of pitta dosha (for example giving indications of irritation like hotness, redness and consuming sensation)[Cha. Sam. 26/195-199; ref no. 13].

Ongoing logical review showed that nearby use of Yastimadhu (Glycyrrhiza Glabra or licorice) powder (blended in with honey) in the oral hole, before radiotherapy, lessens radiotherapy actuated mucositis.^[22] Oral utilization of honey is considered as a basic solution for skin and mucosal surface harm because of radiotherapy.^[23] Another ayurvedic spice called arka (Crotalaria procera) has shown its mitigating property against chemotherapy initiated mucositis.^[24]

Rectal mucosal harm is likewise a typical entanglement of radiotherapy in ano-rectal carcinoma. In one review, oral organization of triphala preceding the radiotherapy, every day for sequential five days, altogether diminished the mucosal harm related with radiotherapy.^[25]

Sickness and Vomiting

They are the most well-known event during chemo-radiotherapy. Disregarding utilization of hostile to emetic drugs, 70% of patients show diligent side effects.^[26] Ayurveda perceives this condition as Chardi. Queasiness and retching incited by chemo-radiotherapy can well relate with pittajachhardi (pitta dosha prevailing). The treatment referenced for something similar in ayurveda is as per the following: Powder of haritaki (terminal chebula) blended in with honey or the Juice of gums or cold water handled with delicate leaves of mango (*mangifera indica*) and jamun (*Syzygium Cumini*) are totally shown for queasiness and retching.^[27] Multidrug arrangements like Kalyanaka Grita, Jivaneeya Ghrita are likewise valuable in the treatment of regurgitating. Khandkushmandavaleha a poly-home grown readiness is demonstrated in different conditions like heaving, roughness of the voice, weariness, weakness, consuming sensation and hack.^[27] Eladi churna is another multi-drug arrangement which has capability of restoring any sort of spewing [Sha. Sam. 6/65-69; ref no. 20].

One logical review has shown that ginger (*Zingiber officinalis*) supplementation at every day portion of 0.5g-1.0g fundamentally helps with decrease of the seriousness of intense chemotherapy-incited queasiness in grown-up disease patients.^[26]

Weakness

Frailty is one more typical condition in disease patients getting chemotherapy. It altogether hampers the personal satisfaction and is a significant reason for blood bonding in disease patients.^[28]

Ayurveda makes reference to weakness under the heading of pandu roga. The treatment of pandu roga incorporates foundational purificatory treatment (Panchakarma), oleation treatment (inside and outside use of sedated oil or ghee) trailed by purgation, dietary alterations and oral meds. Charak samhita advocates utilization of cow's pee with different definitions for weakness. Cow's pee with haritaki or with triphala decoction or cow's milk is likewise shown in the event of pallor [Cha. Sam. 16/64; ref no. 13]. Dhatriavaleha is one of the most mind-blowing multidrug arrangements for panduroga referenced in ayurveda texts [Cha. Sam. 16/16; ref no. 13].

In a new logical review Dhatriavaleha twisted as a decent adjuvant in the administration of thalassemia by lessening manifestations of weariness, mid-region agony, paleness and joint torment in thalassemia patients.^[29]

Looseness of the bowels

Fifty to a lot of patients getting chemotherapy experience the ill effects of loose bowels which is supporter of low quality of life and diminished treatment yield.^[30] Ayurveda recognizes this condition as *atisara*. *Pittaja atisara* is a sort of *atisara* which is described by side effects of unreasonable thirst, consuming sensation and blacking out. These are normally found in looseness of the bowels related with chemo-radiotherapy. Treatment cure referenced in ayurveda is pepper powder with honey or spread milk with powder of *chitraka* can possibly fix all sort of bowel issues [Cha. Sam. 29/79; ref no. 13]. *Pippalyadi yoga* and *dadimastaka churna* are likewise not many of the multi-drug arrangements demonstrated in the runs [Cha. Sam. 29/113; ref no. 13, Sha. Sam. 6/65-69; ref no. 20].

Brahmi (*Boswellia serrate*)^[31] and *Jatiphala* (*Myristica fragrans*)^[32] are different spices with demonstrated enemy of diarrheal properties.

Rest Disturbances

Upset rest is a significant issue in patients getting radiotherapy.^[33] Ayurveda thinks about rest as one of the significant parts of wellbeing. According to ayurveda, upset rest prompts nervousness, stress, stress and spewing [Cha. Sam. 21/55-56; ref no. 13]. Ayurveda deal with the upset rest by Whole body rub, shower, taking the food like rice with curd or milk or ghee and so forth meat soup of the amphibian creatures or woods creatures, paying attention to the delicate and charming music, taking the lovely smell, dozing in the delicate and agreeable bed in the agreeable spot [Cha. Sam. 21/52-54; ref no. 13]. *Kshirbala* oil and *mahamasha* oil are additionally viewed as useful for body rub.

The spices *Shweta Musli* (*borivilianum*) and *Atmagupta* (Velvet bean) have fundamentally expanded rest quality in a logical report.^[34] Methionic concentrate of another spice called *Mundi* (*S. Indicus*) has shown its soothing property.^[35]

Stoppage

Stoppage is one more serious issue in patients getting explicit chemotherapeutic specialists, for example, cisplatin.^[36] As indicated by ayurveda, expanded pitta irritates vata, which prompts evaporating of the colon and causes obstruction.^[37]

Erand tail (caser oil) with the decoction of triphala or milk or with meat soup is shown in clogging brought about by expanded pitta and vata dosha [Cha. Sam. 26/27-28; ref no. 13]. Triphala powder 2-6 gms with warm water and ghee is considered as great solution for blockage [Cha. Sam. 26/27-28; ref no. 13].

In a logical report a polyherbal planning, which contains Ayurvedic spices, for example, Isabgol husk, senna separate and triphala, has shown its adequacy and security in the administration of practical blockage.^[38]

Weariness

Weakening of the overall actual wellbeing with diminished exercise resilience and muscle strength and exhaustion are normal indications of chemotherapy related aftereffects.^[39] Ayurveda perceives weakness as krish or dourbalya and advocates utilization of medications which are having the property of advancing strength (Balya). Ashwagandha (*Withenia Somnifera*) and Shatavari (*Asparagus Racemosa*) are the renowned medications which are referenced in this classification [Cha. Sam. Sutra 4/7; ref no. 13].

In a randomized control preliminary, utilization of cured ghee called Ashwagandha ghrita lead to huge improvement in shoulder stretch and weight bearing limit. It demonstrates that this detailing might help in the patient experiencing exhaustion.^[40]

Additionally in many investigations against growth movement of Ashwagandha has been accounted for. In one of them ashwagandha has shown hostile to growth property on Chinese Hamster Ovary (CHO) cells carcinoma, subsequently it can synergize with traditional treatments of disease.^[41]

Intellectual Deficits

Studies have shown that almost 61% of the patients getting chemotherapy have intellectual decreases in learning, consideration and handling speed and intellectual troubles in the spaces of chief capacity, memory, psychomotor speed, and consideration.^[42]

Ayurveda utilizes terms like dhriti, medha, smriti and so forth, which are various features of insight. There are a few medications referenced under the heading of Medhya rasayana which work on these aspects of comprehension [Cha. Sam. chi 1/73; ref no. 13]. Multi-drug definitions like shankhapushpa (*Convolvulus pluricaulis*), Brahmi (*Bacopa monniera*), Mandukaparni (*Centella asiatica*), Vacha and so on are considered as medhya rasayana [Cha. Sam. chi 1/73; ref no. 13]. Chavanprash is one of the rasayana which has immense use according to ayurveda, corresponding to comprehension, it further develops memory and insight. It likewise helps in soothing over the top thirst and weakness which is normal in malignant growth and disease treatment [Cha. Sam. chi 1/73; ref no. 13].

In ongoing review, Chavanprash has shown its defensive impact against memory hindrance alongside diminished free extreme age and expanded searching of free revolutionaries.^[43] In another creature trial concentrate on Ayurvedic spice Brahmi (*Bacopa monniera*) which is considered as one of the most mind-blowing medhya rasayanas (which upgrades the keenness and memory) has shown its impact further developing the unique learning execution and improving the memory maintenance.^[44]

Another spice Ashwaganda (*Withania Somnifera*) has a comprehension advancing impact and was tracked down helpful in youngsters with memory shortage and in advanced age individuals loss of memory.^[45] Ashwaganda likewise been displayed to have against growth property in a creature concentrate on where it decreased cell multiplication and expanded apoptosis.^[46]

In another creature explore, a poly home grown planning containing *Withania somnifera* (Ashwagandha), *Nardostachys* (Jatamansi), *Rauwolfia serpentina* (Sarpagandha), *Evolvulus alsinoides* (Shankhpushpi), *Asparagus racemosus* (Shatavari), *Emblica officinalis* (Amalki), *Mucuna pruriens* (Kauch bij separate), *Hyoscyamus niger* (Khurasani Ajmo), Mineral gum (Shilajit), Pearl (Mukta Shukhti Pishti), and coral calcium (Praval pishti) has shown critical improvement in learning and memory recovery.^[47]

Pharyngitis

Pharyngitis is one more typical issue in patients getting chemo-radiotherapy. A splash ready from five fragrant fundamental oils (*Eucalyptus citriodora*, *Eucalyptus globulus*, *Mentha piperita*, *Origanum syriacum*, and *Rosmarinus officinalis*) has shown better quick alleviation from the indications of sore throat than fake treatment control bunch.^[48]

Skin Toxicity

Cutaneous unfavorable impacts are among the more normal antagonistic impacts of more current antitumor medications, they happen in up to 34% of patients getting multikinase inhibitors, up to 90% of those getting specific tyrosine kinase inhibitors, (for example, EGFR or BRAF inhibitors) and up to 68% of those getting immunotherapeutic specialists (like CTLA4 inhibitors).^[49] Usually observed cutaneous conditions aftereffects are - seborrhea, epidermal decay, xerosis cutis, tingling, dry dermatitis and weakness of the skin to gaps - particularly on the fingers, toes, and heels.^[49]

The previously mentioned manifestations of the skin poisonousness because of chemotherapy or radiotherapy are like skin infection due to expanded vata dosha as referenced in the Charaka samhita. While depicting the treatment of these conditions Charaka referenced Abhyanga (rub) and swedana karma (sudation treatment) and basti (purification) for vata related issues [Cha. Sam. chi 28/30; ref no. 13]. Bala taila is referenced with regards to treatment of vata related issues. This oil can be utilized for back rub, douche or inside use moreover. So body knead with bala taila may assist with beating skin related issues because of chemotherapy or radiotherapy [Cha. Sam. Chi. 28/148-154; ref no. 13].

Fruitlessness

Malignant growth treatment influences ripeness through both mental too as physiological impacts; barrenness could cause long haul trouble.^[50]

Ayurveda has clarified exhaustively about male fruitlessness under the heading Klaibya and female barrenness under vandhya. Concerning treatment in both male and female fruitlessness Sage Charaka endorsed every one of the helpful purging systems. These methodology are vamana (emesis treatment), Virechana (remedial purgation), Basti (douche with sedated decoctions or oils) and so on once purifying is more than one ought to follow the endorsed dietary regimens [Cha. Sam. chi 30/45, 30/196; ref no. 13].

Male Infertility and Ayurveda

This condition is called Klaibya in Ayurveda. The treatment which is given to keep up with or recover the ripeness to have great offspring is called vajikarana. Bhavprakash (Bha. Pra.) is another ayurveda text which depicts that one ought to stay away from all that which is the reason for the barrenness [Bha. Pra. 72/22; ref no. 51]; stress nervousness are given as the normal elements which add to barrenness alongside chemotherapy. These elements can be

eliminated by the assistance Yoga Brahatashatavari Grita, which is polyherbal planning shown for issues identified with conceptive framework both in male and female [Bha. Pra. 26/30; ref no. 51]. A few single medications and polyherbal arrangements are referenced in ayurveda texts for fruitlessness. Wheat powder cooked with milk alongside cow ghee [Bha. Pra. 72/39; ref no. 51] or milk planning with powder of wheat blended in with powder of Kapikachhu (*Mucuna pruriens*) ought to be taken first then one should drink the milk which is likewise great love potion [Bha. Pra. 72/39; ref no. 51]. A few multidrug arrangements like Gorakshadi modak, Amrapaka, Vanari vati are likewise considered as not many of the best love potion specialists [Bha. Pra. 25/27; ref no. 51].

In a new clinical review on the Ayurvedic spice *Mucuna pruriens* (Kapikachhu), which is considered as a best among the Aphrodisiac, has fundamentally decreased mental pressure and original plasma lipid peroxide levels alongside critical improvement in the sperm count and motility toward the finish of 90 days.^[52] In a creature try, spice *Tribulus terrestris* additionally referenced as Gokshura in the Ayurvedic text, has shown its sexual enhancer property by expanding mount recurrence, intromission recurrence, and penile erection file, just as a decline in mount idleness and intromission dormancy alongside expansion in the serum testosterone levels.^[53]

Female Infertility

Fruitlessness is normal in ladies getting chemotherapy.^[54] Vandhya is the term used to mean this condition in females in Ayurveda. Like in male fruitlessness female additionally ought to go through fundamental purging methods and afterward oral prescription Following are the couple of cures told in the Ayurveda - as the first and for most line of treatment, the ladies ought to keep away from all food varieties and ways of life that exasperate this issue. The spice of decision for female fruitlessness is ashoka (*Saraca asoca* Roxb De Wilde) – by its astringent taste and cold intensity, it fortifies the uterus. It quits draining by getting the uterine veins and advancing uterine strong constriction. It invigorates uterine capacity by animating the decidual and ovarian capacities. Kumari (*Aloe vera*) is another spice that further develops blood stream to the decidual layer and it invigorates uterine muscular build to contract. It along these lines works on the feminine stream. It ought not be given during pregnancy as it might cause early termination.^[55] It is valuable in instigating ovulation. Shatavari (*Asperagus recemosus*) likewise sustains the uterus and invigorates the muscles. It prompts ovulation and it likewise forestalls fetus removal or unsuccessful labor. Ashokarista

(matured medication which is ready by utilizing *Saraca asoca* and different spices) is most generally used to manage the monthly cycle, further develop endometrium and to animate ovulation. From the fourth day of the monthly cycle, *Ashokarista*, in mix with *Kumaryasava* (matured medication which is made by utilizing *Aloe vera* and different spices) ought to be given. It is typically joined with *Aloes compound* [a tablet which is made by utilizing *Aloe vera*, *Manjistha* (*Rubia cardifolia*), etc], *Rajapravrttinivati* (*asafoetida*, and so on) to incite ovulation.^[55]

Ayurvedic enemies of oxidants

Mental pressure because of malignant growth conclusion and disease treatment itself can be cause for lack of enemies of oxidants. Lack of enemies of oxidants might affect resistance of ordinary tissue to antitumor treatment and against oxidant enhancements might prompt portion decreases and compromised treatment result.^[56]

As of late, studies have been directed on the Ayurvedic therapeutic spices and large numbers of them are viewed as wealthy in cancer prevention agents. *Amalaki Rasayana* (AR) is one among them. AR is a polyherbal arrangement referenced in the *Charaka Samhita*, it revives and restores the cells to neutralize age-related weakening. In one of the in-vitro concentrates on methanoic concentrate of AR, its cancer prevention agent property and free extremists searching action have been exhibited.^[57] *Selagenella bryopteris* is one more Ayurvedic spice with demonstrated enemy of disease, against oxidant, anti-fiery and chemo defensive movement.^[58] Different medications, for example, *vyaghra nakhi* (*Capparis zeylanica*), *amalaki* (*Amlica officinalis*), *bhunimba* (*Andrographis paniculata*), *Mango* (*Mongefera indica*), *haritaki* (*Terminalia chebula*), *Brahmi* (*Bopa monniera*) and so forth are other amazing enemies of oxidants.^[59-61] Quite possibly the most notable preparation called *Triphala* is a polyherbal Ayurvedic compound which contains three fixings viz. *Haritaki* (*Terminalia chebula*), *vibhitaki* (*Terminalia belerica*) and *Amalaki* (*Embilica officinalis*). It is an intense enemy of oxidant and diuretic. Test concentrates on *triphala* have accentuated its significance as an enemy of disease, chemoprotective and radio-defensive, particularly *Haritaki* decreased lipid peroxidation by expanding the glutathione levels.^[62-63]

Hepatotoxicity

Large numbers of the chemotherapeutic specialists are hepatotoxic and they regularly cause hepatic injury in the patients.^[64]

Ayurveda distinguishes irregularities identified with liver by the term Yakrittodar. It is related with manifestations of weariness, anorexia, clogging, queasiness, heaving, unnecessary thirst, starvation, gentle fever, loss of taste, stomach distension, heartburn, conspicuous veins on the mid-region swooning, dyspnoea and hack [Cha. Sam. Chi. 13/38, ref no. 13].

Ayurveda suggests foundational purificatory treatment (panchakarma) contingent upon dominance of the dosha (thinking about the strength of the patient). Knead, sedated douches and admission of milk are unequivocally suggested. Oral organization of various poly-natural arrangements is additionally given for long haul [Cha. Sam. Chi. 13/67; ref no. 13].

The multi-drug arrangements, for example, rohitaka ghrita, panchakola ghrita, pippalyadi churna panchgavya ghrita and so forth are suggested in such conditions related with liver and stomach sicknesses [Cha. Sam. chi 13/83-85, 13/149, 13/79; ref no. 13].

A new creature concentrate on where pale skinned person rodents were presented to gamma radiation, the rodents treated with Ashwagandha (*Withenia somnifera*) showed critical decrease in serum hepatic catalysts, DNA harm, malondialdehyde (MDA levels), hepatic nitrate and huge expansion in trim oxynase, super oxide dismutase and glutathione peroxidase action when contrasted with the controls, proposing a hepatoprotective and hostile to oxidant improving impact against radiation actuated hepato-toxicity.^[65] In another creature study, root concentrate of ayurveda spice Himsra (*Capparis sepiaria* L) was found to have critical hepato-defensive property against acetaminophen actuated hepatotoxicity.^[66] Essentially, ayurvedic polyherbal detailing called Punarnavastaka kwath has additionally been exhibited to have hepato-defensive property against CCL-4 prompted hepatotoxicity.^[67] Liv 52 is another multi-spice readiness demonstrated to have hepato-defensive impacts against CC14 actuated liver poisonousness.^[68] Kumaryasava is one more significant polyherbal compound displayed to diminish liver weight that is expanded because of CC14 actuated hepatotoxicity.^[68] Table 1 sums up all major chem.- radiotherapy related aftereffects and ayurveda based solutions for them.

Table 1: Outline of Chemo-radiotherapy aftereffects and Ayurveda based cures.

S.No.	Side effects of chemo-radiotherapy	Ayurvedic remedy Classical	Research based
1.	Mucositis	Khadiradi vati for biting Mouth washes with kala churna [Cha.	Oral utilization of Yestimadhu powder

		Sam. 26/195-199; ref no. 13]	with honey ^[22] Triphala organization for multi day before chemo ^[23]
2.	Nausea and Vomiting	powder of Haritaki with honey or Khandkushmandavaleha ^[28] Eladi churna ^[29]	Gut-Gard a concentrate from the ayurvedic spice Yestimadhu (glycrrhiza glabra) [Kadur Ramamurthy Raveendra et al] 2012 Ginger supplementation ^[26]
3.	Anaemia	Oliation, purgation, oral admission cows pee with milk or Cow's pee with decoction of triphala for 7 days [Cha. Sam. 16/64; ref no. 13]	Dhatriavaleha ^[29]
4.	Diarrhoea	Pippali powder with honey then, at that point, margarine milk with powder of chitraka or Pippalyadi yoga [Cha. Sam. 29/79; ref no. 13] Dadimashtaka churna [Cha. Sam. 29/113; ref no. 13, Sha. Sam. 6/65-69; ref no. 20]	Extract from spice Brahmi ^[31] and Jatiphala ^[32]
5.	Constipation	Triphala with warm water and ghee(evidence based) [Cha. Sam. 26/27-28; ref no. 13] Constipation brought about by vata and pitta castor oil (Erand taila) with decoction of triphala or milk or meat soup. ^[56,47]	Isab husk, senna concentrate and Triphala. TLPL/AY/01/2008 [Cha. Sam. 26/27-28; ref no. 13]
6.	Sleep problem	Whole body knead, shower, rice with curd or ghee or milk and so forth music, agreeable bed, snuggling prior to resting. [Cha. Sam. 21/52-54; ref no. 13]	Methoinic concentrate of Mundi (Sphaeranthus indicus) has narcotic impact ^[35] dietary enhancement of Shweta musli and atmagupta ^[43]
7.	Hepatotoxicity	Panchakola ghrita Rohitaka ghrita [Cha. Sam. chi 13/83-85, 13/149, 13/79; ref no. 13]	Punarnavashtaka kwath ^[65] Syr Liv 52 ^[68] Syr Kumaryasav ^[68]
8.	Male Infertility	Gokshuradi modaka [Bha. Pra. 25/27; ref no. 51]	Mucuna pruriens ^[52]
9.	Female infertility	Brahataashatavari Ghrita	Ashokarista ^[55]
10.	Fatigue	Ashwagandha, Shatavari [Cha. Sam. Sutra 4/7; ref no. 13]	Ashwagandha ghrita ^[41]
11.	Skin changes	Massage with bala taila [Cha. Sam. chi 28/30; ref no. 13]	
12.	Cognitive deficit	Kalyanaka GritaCharaka	Chavanprash ^[43]

	chikatsa 9 Chavanprash [Cha. Sam. chi 1/73; ref no. 13].	Ashwagandha ^[46]
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Ayurvedic drugs having against malignant growth property

Logical Evidences

In a creature try, Wathaferin A, a constituent of Ashwagandha (*Withenia somnifera*) has been found compelling in lessening mammary growth size, infinitesimal cancer region and frequencies of pneumonic metastasis.^[69-70] Aswagangadha specifically kills malignant growth cells by actuating of ROSsignaling.^[71] In another review, Bhandirah (*Clerodendrum viscosum*) was displayed to have particular bioactivity against cervical disease cells, its supportive of apoptotic, hostile to proliferative, and against transitory exercises were exhibited in a portion subordinate style against cervical malignant growth cell lines.^[72] In one of the examinations, Haridra (*Curcuma longa*) with a functioning element of curcumin was displayed to tie to malignant growth cell surface layer and afterward penetrate into cytoplasm to start apoptotic process. It was likewise announced that curcumin instigated development hindrance and cell cycle capture at G2/M stage in the glioblastoma and medulloblastoma cells. This shows that curcumin has against disease property.^[73] Manjistha (*Rubia cardifolia*) is another generally utilized spice, later in-vitro concentrate on utilized its methanolic concentrate to incite apoptosis in HEP-2 (Human laryngeal cell line) as proven by cytotoxicity, morphological changes and alteration in the degrees of supportive of oxidants.^[74] Another review showed that watery concentrate of Palash (*Butea monosperma*) restrained cell multiplication and collection of cells in G1 stage. Additionally there was a stamped decrease in the degrees of actuated Erk1/2 and SAPK/JNK alongside acceptance of apoptotic cell passing.^[75] Triphala is one more helpful ayurveda plan for therapy and counteraction of disease.^[76]

Ayurveda for Inhibition of Cancer Stem Cells

Many investigations report relationship of irritation and malignant growth. The distinguishing proof of record factors like NF- κ B, AP-1 and STAT3 and their quality items, for example, cancer rot factor, interleukin-1, interleukin-6, chemokines, cyclooxygenase-2, 5-lipoxygenase, grid metalloproteases, and vascular endothelial development factor have given the atomic premise to the job of aggravation in disease.^[77] These incendiary pathways might get initiated by tobacco, stress, dietary specialists, corpulence, liquor, irresistible specialists, illumination, and ecological upgrades. These pathways have been embroiled in change, malignant growth cell endurance, multiplication, attack, chemo-opposition, and

radio-obstruction in disease. The endurance and expansion of most kinds of disease cells themselves have all the earmarks of being reliant upon the enactment of these incendiary pathways through their antecedents, apparently malignant growth foundational microorganisms.^[77]

Ayurveda chips away at the central standards of tridosha and panchamahabhuta (five essential components of nature). As per ayurveda the fiery cycle is sign of unusually expanded pitta dosha. The majority of the previously mentioned spices in the administration of chemo-radiotherapy aftereffects are pitta dosha moderating and accordingly, these spices may by implication hinder development of disease immature microorganisms by means of decreasing aggravation. Further logical investigations are required around here. Till now one concentrate on methanolic concentrate of the entire product of harsh melon likewise called karravella (*Momordica charantia*) has shown dosedependent decrease in the number and size of colonospheres. The concentrates additionally restrained disease foundational microorganisms by decreasing the statement of DCLK1 and Lgr5, which are markers of quiet and initiated undifferentiated organisms.^[78]

Rasayana is one among the eight appendages of ayurvedic treatment which acts through different ways. The arising information recommend that the potential components might be by insusceptible incitement, extinguishing free revolutionaries, upgrading cell detoxification systems; fix harmed nonproliferating cells, actuating cell expansion and selfrenewal of harmed multiplying tissues, and recharging them by wiping out harmed or transformed cells with new cells.^[79] These rasayana may likewise hinder disease undifferentiated organisms; future examinations should test the impact of these gatherings of drugs on malignant growth undeveloped cell endurance and development.

End

This original copy covers a vital space of chemo-radiotherapy actuated aftereffects in disease patients. Every one of the major and normal aftereffects are covered and in view of thorough survey of antiquated vedic writing and current logical confirmations, ayurveda based mediations are advanced. This original copy should help clinicians and individuals experiencing disease to battle genuine chemoradiotherapy related aftereffects through straightforward however compelling locally established ayurveda cures. The cures portrayed are regularly accessible and safe. These straightforward ayurveda based arrangements might go about as a significant adjuvant to chemo-radiotherapy and improve the personal

satisfaction of disease patients. Future examinations ought to experimentally test these suggestions for different incidental effects initiated by regular administration of disease.

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