Chapter 7
Panchakarma: Ayurvedic Detoxification and Allied Therapies—Is There Any Evidence?

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7.1 Introduction

Panchakarma is a collective term that indicates five independent procedures of detoxification to cleanse the body channels, along with many supportive therapies [1]. Literally, *Panchakarma* is made up of *Pancha* = "five" and *karma* = "procedure or action" (procedures of purification).

Ayurveda treats diseases using two different methods—*shodhana* and *shamana*. *Shodhana* means cleansing or detoxification of the body by expelling the deranged doshas. *Shamana* is pacification of symptoms without eliminating the morbid *doshas* [2, 3]. Typically, all treatment protocols ought to begin with *shodhana*, followed by *shamana* for optimal outcomes. When the body is saturated with toxins, the toxins interfere with the absorption of herbal medicines. Metaphorically, it is explained in terms of a delicious recipe being ruined when served in a filthy bowl. Furthermore, it is necessary to eliminate *ama*—accumulated

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toxins in the channels—to re-establish the balance between basic causative factors: *dosha-dhatu-mala* [4].

Detailed descriptions of these unique detoxification and allied therapies are available in classical ayurvedic texts such as *Charaka Samhita*, *Susruta Samhita*, and *Ashtanga Hridaya* [5, 6]. Despite some minor differences, the authors agree upon the primary purpose of the five procedures [1, 2]. Subsequent authors and commentators have expanded on the process and scope for *panchakarma* [2]. Its broad application in various disorders is perhaps one of the reasons why *panchakarma* is becoming more popular and its utilization is increasing. However, there is a general lack of evidence to convince conventional medical practitioners to integrate these services in a regular hospital or clinic [7]. The evidence that is available on *panchakarma* does not match the large body of research done on various ayurvedic herbs over last 100 years [8].

The objective of this chapter is to describe the meaning and purpose of each of the five procedures of purification, as well as the allied therapies that are commonly used within *panchakarma* treatments by an ayurvedic practitioner. Furthermore, an attempt was made to review the evidence-based literature on each of these therapeutic interventions in order to provide the reader with information on how they are used in clinical practice and what the outcomes are.

7.2 Preparatory and Main Procedures

The five main procedures within panchakarma are: *vamana* (emesis), *virechana* (purgation), *nasya* (nasal instillation of herbal oils/powders), *basti* or *vasti* (herbal enema), and *raktamokshana* (bloodletting). Primarily, these practices are aimed at eliminating *ama* (toxins) from different parts of the body and cleansing the channels. For example, *vamana* and *virechana* facilitate elimination of morbid doshas from either end of the gastrointestinal tract; *nasya* helps to clear them via the nostrils.

Each procedure is performed in three phases [9]:

1. *Poorva karma*—preparatory methods
2. *Pradhana karma*—main procedure
3. *Paschat karma*—post-cleansing procedures that include dietary and behavioral regimen.

7.2.1 Snehana and Swedana

Preparatory methods include oleation: *snehapana* (intake of ghee/oil) and *abhyanga* (oil massage) followed by *swedana* (sudation). For internal oleation, one is made to drink ghee or oil for 3–7 days, essentially to lubricate the internal mucosa of the

gastro-intestinal tract, as well as to loosen the toxins lodged within the tissues. During *swedana* (sudation), sweating is induced using herbal steam, herbal leaves, herbal powders tied in cloth bundles, and many other methods. This preliminary practice, which follows oleation, facilitates the movement of loosened toxins to the GI tract [10]. It is important to note that the above mentioned preparatory procedures may also sometimes be used as independent therapeutic procedures. Therefore, a very meticulous selection process is involved in developing a *panchakarma* protocol for each patient. The practitioner is required to consider multiple factors, such as *dosha* imbalance, condition of the patient, and/or ayurvedic constitution (*prakriti*). In general, it takes approximately 2–3 weeks to complete all three phases, depending upon the detoxification procedure selected.

7.2.2 Vamana

Vamana is "therapeutic emesis" performed to expel aggravated *kapha dosha* and *ama*. *Vamana* literally means "to expel out" or "to vomit." Prior to this cleansing procedure, the preparatory stage includes administration of *sneha* (oily substance) for 5–7 days using a graded dosage schedule. Additionally, external *snehana-swedana* procedures are performed on the fifth and sixth days. On the seventh day, *vamana* is induced by repeatedly administering certain herbal powders and concoctions followed by herbal teas or juices to facilitate the procedure. The patient is closely monitored throughout by observation and checking of vital signs. The end point is determined by the practitioner based on the patient's condition, ending *dosha* (*kapha*/*pitta*), and number of vomiting bouts.

In the post-procedure phase, cleaning and inhalation of herbal smoke are advised to clear the throat and nose. Light, warm diet such as watery rice porridge is indicated in this phase. It is recommended that transition to normal diet and lifestyle be gradual, as it takes over a week to replenish the body and re-establish *dosha* balance.

7.2.3 Virechana

Virechana is "purgation." It is aimed at expelling *ama* (undigested food/toxins) and excessive *pitta dosha* from the body. It is performed by giving purgative herbs to the patient after the preliminary practices of *snehana* and *swedana*. Similar to the *vamana* procedure above, the dosage of these herbs depends on the digestive power of the patient. Close monitoring of the vitals and patient's overall condition is very important. End point is decided based upon patient's condition and number of bowel movements. Excessive movements can be controlled by administering certain dietary and herbal preparations. The post-procedure regimen of diet and lifestyle is similar to *vamana*.

7.2.4 Nasya

Nasya karma is mainly intended to clean the channels in the head and neck region. The aggravated *kapha dosha*, which usually blocks the upper respiratory tract, is eliminated with the help of nasal instillation of herbal juices, oils, or powders. *Nasya karma* is classified into many types, but *shirovirechana* and *shodhana* types are the *nasyas* that are used for detoxification. Herbal smoke (*dhooma*) is also used for inhalation through the nose to remove sticky phlegm from the channels. The post-procedure regimens are not as stringent after *nasya*; however, it is necessary to follow certain restrictions in diet and lifestyle.

7.2.5 Basti/Vasti

Herbal enema, or *basti* (which is also pronounced and spelled as "*vasti*"), is very important among the five procedures. This procedure constitutes up to 50% of the whole Ayurvedic treatment for a patient with vata derangement. Of the three *doshas*, *vata* is the most powerful *dosha* as a disease causative factor. Like *nasya* therapy, *basti* is classified into many different types. *Shodhana* (detoxification) *karma* is performed mainly by *niruha* or *asthapana basti*. The protocol is determined according to the disease and the patient's condition. It may be administered for 3, 5, 8, 15, or 30 days continuously with alternate administration of the *anuvasana* type of *basti*. The post-procedure regimen of diet and lifestyle is somewhat less stringent than *vamana* and *virechana*, and is mostly dependent upon the type of *basti*.

7.2.6 Raktamokshana

Bloodletting treatment is performed to balance *rakta dosha* (blood). This therapy is carried out using several different devices. Based upon the type of device used, bloodletting is categorized into various types: *pracchana karma* (using tip of scalpel for pricking), *jalaukavacharana* (using leeches), and *siravyadha* (using needles). Of these, applying leeches is considered the safest and most comfortable, and is therefore the most popular type of *raktamokshana*. It is safe to use in all age groups and all types of people (Fig. 7.1, Tables 7.1 and 7.2).

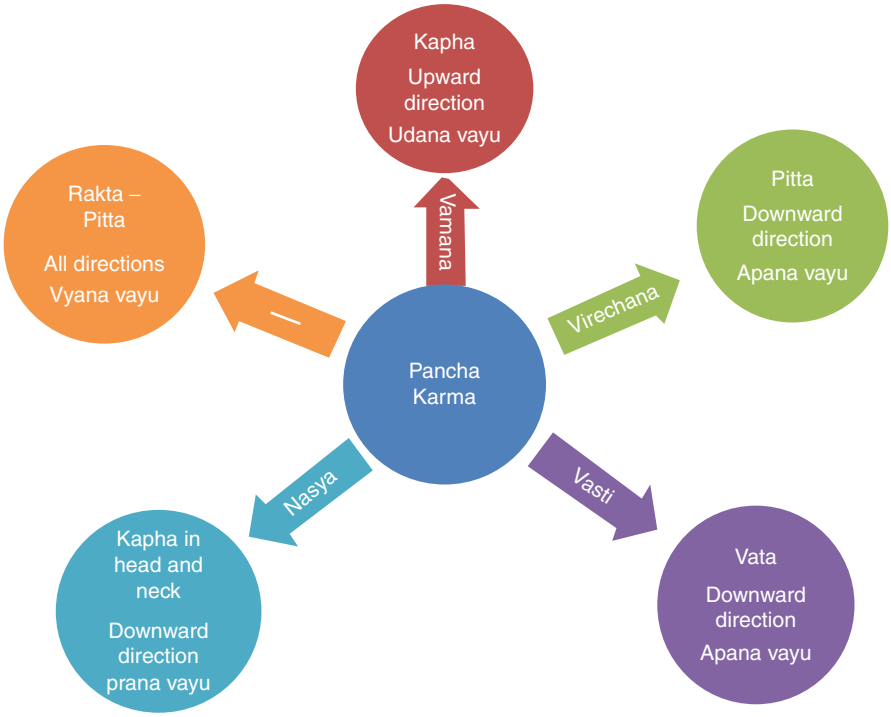

Fig. 7.1 *Panchakarma*

7.3 Allied Procedures

There are various *upakarmas*, or allied procedures/therapies, that fall under this category. Examples include *shirodhara* (ayurvedic oil dripping treatment), *shirobasti* (retention of warm herbal oil on the scalp with the help of a cap), *katibasti* (retention of warm herbal oil on the back with the help of a donut shaped bridge constructed with the help of dough), and *janubasti* (retention of warm herbal oil on the knee with the help of a donut shaped bridge constructed with the help of dough). These therapies are used as preparatory methods for the five main detoxification procedures or, most often, as independent therapeutic procedures to treat various local or systemic conditions. It is beyond the scope of this chapter to discuss the detailed procedures for each of these allied therapies.

Table 7.1 Indications and contraindications for *panchakarma*

Indications	Contraindications
Vamana	
Fever, cold, cough, skin diseases, asthma, epilepsy, anorexia	Very old age, infants/children, chronic fatigue, cardiac disease, chest injury, pregnancy, constipated, ascites, urinary retention, hemorrhage, splenomegaly, cataract, after fasting, parasite infestation, anxiety.
Virechana	
Chronic fever, herpes zoster, hemorrhoids, migraines, ear discharge	Hemorrhage, acute fever, alcoholism, indigestion, weak digestive fire, weak sense organs, after fasting, injured, weak and old, obese, emaciated, pregnant, recently delivered, anxiety
Basti	
Vatavyadhis—musculoskeletal system disorders, neurological deficits	Exhausted, chronic fatigue, indigestion, diarrhea, edema, nausea and vomiting, after *vamana*, *virechana*
Nasya	
Neurological disorders, psychological disorders, conditions of ear, nose, throat, eye, speech defect, delayed milestone, facial palsy	Indigestion, fasting, after taking alcohol, acute rhinitis, acute fever, poisoning, after purgation or diarrhea, asthma, hemorrhage, fainting
Raktamokshana	
Skin diseases, hypertension, menorrhagia, herpes zoster, boils, abscess, inflammatory disorders, gout	Edema, weak, emaciated, anemia, ascites
General contraindications for panchakarma	
Infants, old age, chronic disease, chronic fatigue pregnancy, cardiac and pulmonary diseases, cancer, HIV	
Time: on cloudy day, rainy, or during night panchakarma is not indicated	

Table 7.2 Indications for allied therapies (*upakarmas*)

Shirodhara	Insomnia, anxiety, stress, bipolar disorder, skin diseases
Shirobasti	Depression, bipolar disorder, epilepsy, MS, amnesia
Shali shastika pinda sweda	Chronic fatigue, fibromyalgia, emaciation, poliomyelitis, cerebral palsy, pseudomuscular dystrophy, hemiplegia, paraplegia
Choorna/patra pinda sweda	Fibromyalgia, arthritis, sciatica
Valuka pinda sweda	*Amavata* (rheumatoid arthritis), frozen shoulder
Udvartana	Heaviness, lethargy, cellulitis, obesity

7.4 Evidence Based *Panchakarma*

For our review, we conducted literature searches in PubMed, ABIM, Medknow, and eJIM using the following search terms: *Panchakarma*, *Shodhana chikitsa*, *vamana*, *virechana*, *nasya*, *basti*, *raktamokshana*, *ayurvedic detoxification*, *and others*. The complete list of search terms used is given above in Table 7.3. Our search was limited to articles published in English that are available in the National Library of Medicine or any other institutional library within the United States.

7.4.1 Studies on Vamana

A clinical study on *vamana* ($n=18$) for uncomplicated psoriasis reported highly significant outcomes in reduction of symptoms of scaling ($p<0.001$) in patients ranging in age from 12 to 70 years old [11]. The reduction in erythema, induration, itching, burning sensation, discoloration, and dryness of skin was also found to be highly significant ($p<0.001$ to $p<0.01$). In this study, vomiting was induced with *madanaphala*, *yastimadhu*, and *vaca*. Preparatory *snehana* and *swedana* was done 9 days prior to induction of vomiting.

The effectiveness of *vasantic vamana* and other *panchakarma* procedures including *virechana karma*, *vasti karma*, *nasya*, and *raktamokshana* on disorders of various systems was also reported. In one clinical trial ($n=30$), *vasantic vamana* followed by other *panchakarma* procedures and specific diet and lifestyle modification over a period of 1 month significantly improved the symptoms of skin, GI tract, respiratory tract, and *vata vikara* ($p<0.001$) [12].

Table 7.3 Databases, search terms and limits

Databases	Search terms		Limits
Pubmed	*Panchakarma*	*Upakarma*	Humans
ABIM	*Oleation therapy*	*Raktamokshana*	Clinical trial
eJIM	*Shodhana Chikitsa*	*Shirodhara*	Randomized controlled trial
Medknow	*Oil therapy*	*Jaluaka*	Review
	Ayurvedic detoxification	*Shirobasti*	English
	Abhyanga	*Leech therapy*	
	Vamana	*Shirolepa*	
	Swedana	*Poorva Karma*	
	Virechana	*Udwarthana*	
	Sudation	*Snehana*	
	Nasya	*Lepana*	
	Therapeutic sweating	*Snehapana*	
	Basti	*Keraliya Panchakarma*	
		Dhara	
		Pinda Sweda	

7.4.2 Studies on Virechana

Unlike studies on other types of *panchakarma*, studies on *virechana karma* included its use for longer periods, as opposed to the classical practice of a single administration of herbs after proper *snehana* and *swedana*.

A single blinded randomized controlled trial (RCT) ($n=42$) compared *virechana karma* integrated with oral administration of *Nyagrodhadi* pills (herbal formula for diabetes) with *Nyagrodhadi* pills alone in diabetic patients. The authors reported that the integrated treatment group improved significantly ($p<0.001$) more than the *Nyagrodhadi* pills only group, in both subjective and some objective measures used for assessing diabetes in this study [13]. However, there was no significant difference ($p<0.1$) in the fasting and postprandial blood sugar values between baseline and end of study within either group. In the combination group, *virechana karma* (*shodhana chikitsa*) preceded the administration of *Nyagrodhadi* pills (*shamana chikitsa*). The paper did not describe the herbs or the procedure used for *virechana karma*.

The benefits of *shodhana* treatment with *virechana karma* prior to symptomatic treatment (*shamana*) were noted in a patient with a history of 4 years recurrent eczema. The patient did not report any recurrence for 1 year after this *shodhana*/*shamana* approach, which included a combination of *panchakola phanta*, *panchatikta guggulu*, and *plain ghrita* for *sneha paana* followed by *trivrut leha* for *virechana* [14].

The effectiveness of *virechana karma* was also tested when given for longer periods as indicated in *amavata* (rheumatoid arthritis) [15]. *Gandharvahasthadi kwatha*, a decoction made with castor as one of the principal ingredients, was given to 60 patients diagnosed with *amavata*. The patients received 50 ml of the decoction for 21 days. The author reported clinical improvement in all of the patients (either cured or relieved, based on a scale developed by the investigators) in addition to reduction in erythrocytic sedimentation rate (ESR), C-reactive protein (CRP) levels, and seroconversion of RA factor. The improvement continued at the end of 1 year follow up in almost all of the patients.

Similar therapeutic benefits of daily *virechana karma* were reported [16] in a study on *nithyavirechana* and *nayopayam kashayam* for *tamaka shwasa* (bronchial asthma). In this single group pre-test post-test study ($n=20$), significant improvement ($p<0.001$) was noted in subjective symptoms such as the severity of disease based on self-report, shortness of breath, cough, effort of speech, and objective measures such as breath sounds and selected pulmonary function tests. *Eranda tailam* (castor oil) was administered as the agent for daily *virechana* (15–30 ml) in this study for 28 days. *Nayopayam kashayam* was given in 50 ml dosage twice per day during the same period. No information was available regarding follow-up and adverse events. The subjective improvements were determined with the help of a scale developed specifically by the investigators for this study. Information about its validity and reliability is missing.

7.4.3 Studies on Nasya

In a randomized clinical study on *nasya* ($n=37$) for chronic cold, participants were given either *trayodashanga kwatha* with honey or *pradhamana nasya* with *trikatu* and *triphala churna*. The third group received a combination of *pradhamana nasya* followed by *trayodashanga kwatha* using the above described vehicles. The authors reported that the combination group had better symptom relief. Relief in other clinical features was also better in the combined group when compared to just *nasya* or herbal formula [17].

Similar findings were reported in another study on *nasya* for sinusitis [18]. In this study, an integrated approach was adopted. The treatment was comprised of external treatment of *anu tailam nasya* followed by inhalation of steam made up of *dasamoola kwatha*. Additionally, *tribhuvan kirti rasa*, an herbo-mineral formula, was given orally along with specific dietary advice for 90 days. The authors reported that the overall clinical success rate was 96.6%.

In addition to the studies on *nasya* for nose or sinus related symptoms, the therapeutic benefits of this procedure were also investigated in non-respiratory conditions. Bittar [19] investigated the efficacy of *virechana nasya* in subjects ($n=25$) with history of intermittent chronic daily headache. Specifically the subjects had migrainous type of pain and had previous pharmacological treatment failures and were using over-the-counter (OTC) analgesics or other symptomatic/prophylactic drugs. In this study, *nasya* significantly improved ($p<0.05$) the symptoms of chronic daily headache with an average drop in pain intensity of 63%. In this study, *nasya* was administered with either *ksheerabala* (101) or *anu tailam* according to the types of symptoms and patients, for either 7 or 14 days. Comparable dramatic outcomes were noted in another study on *nasya* and Bell's palsy. In this study ($n=20$), both *anu taila* and *mashadi taila* were effective for this condition, with *anu taila* being slightly better. Both oils significantly relieved the symptoms of aphasia, closing of eyes and discomfort in eyes, tongue deviation, and drooling of saliva at the end of the study within each group. Preparatory *snehana* and *swedana* preceded *nasya karma* for the entire 15-day regimen. [20].

Positive outcomes and usefulness of *nasya karma* with *balavilwadi* ghee were demonstrated while treating dementia and Alzheimer's disease in a recent study conducted by Madhavikutty [21]. Similarly, the usefulness of *nasya karma* as a therapeutic method in treating hepatitis symptoms was also documented in a case report. A 23-year-old male presented with a total serum bilirubin of 34 mg/dl. *Avapidaka nasya* with the *svarasa* of *Luffa cylindrica* (*Koshataki*) was performed on the first and fourth day together with 14 days of *kshiradhara*. On the fourth day after the first administration, bilirubin level came down to 2.8 mg/dl, which was later stabilized with oral herbal therapy [22].

Although, the above studies are encouraging, their preliminary nature and limited sample sizes restrain us from making any generalizations based on the results (Tables 7.4 and 7.5).

Table 7.4 *Virechana* and *Basti*

Study	Design and sample size	Control, treatment, and duration	Outcome measures	(+/−)
Virechana				
Kumari et al. [13]	RCT $n=42$	Tx1: Oral administration of *Nyagrodhadi* pills Tx2: Virechana and *Nyagrodhadi* pills Duration: 30 days	Signs and symptoms F.B.S. P.P.B.S. Serum cholesterol Urine sugar	+
Hegde et al. [14]	Case study $n=1$	Tx: *Virechana* by *Trivrutta leha* along with the pre- and post-procedures Duration: 1 administration	Features of cellulites and eczematous changes	+
Srinivasulu [15]	Clinical study $n=60$	Tx: *Virechana* by *Gandharvahasthadi kwatha* Duration: 21 days	Scale developed by the investigators ESR and CRP levels	+
Prasad et al. [16]	Single group pre-test post-test study $n=20$	Tx: *Nithyavirechana* with *Eranda taila* along with oral administration of *Nayopayam kashayam* Duration: 28 days	Scale developed by the investigators	+
Basti/Vasti				
Krishnashastry et al. [23]	RCT $n=83$	Tx: *Vasti* with herbal mixture Placebo Gr: *Vasti* with sterile plain water Duration: 4 weeks	Customized assessment criteria developed by the investigators	+
Nair et al. [24]	Single group study $n=72$	Tx: *Vaitarana vasti* after 7 days of *patra pinda sweda* Duration: 7 days	Scale developed by the investigators	+
Gupta et al. [24]	RCT $n=30$	Tx1: *Vaitarana vasti* Tx2: Oral administration of *Sinhanada Guggulu* Tx:3 Combined Tx Duration: 30 days	Clinical, functional and hematological measurements	+

Shah et al. [26]	Clinical study *n* = 35	Tx1: *Abhyanga* and *swedana* along with *Matra vasti* Tx2: *Abhyanga* and *swedana* along with *Matra vasti* with indigenous compound drug Duration: 3 weeks	Signs and symptoms scoring upon the severity	+
Karunagoda et al. [27]	Clinical study *n* = 40	Tx1: *Matra basti* with *Dashamoola* oil Tx2: *Mastra basti* with plain sesame oil Duration: 7 days	Scoring of pain and associated symptoms	+
Khagram et al. [28]	RCT *n* = 118	Tx1: *Matra basti* with *Brihat saindhavadi taila* along with oral administration of *Vatari Guggulu* Tx2: Oral administration of *Vatari Guggulu* Duration: 45 days	RA factors Biochemical and hematological factors Urine routine analysis Functional assessment	+
Tripathy et al. [29]	Clinical trial *n* = 15	Tx1: *Dasamoola Ksheerapaka vasti* Tx2: Oral administration of *Amrataka* and *Parnabeeja* leaves paste with milk Tx3: Combined TX Duration: 30 days oral Tx. One *Vasti*	Subjective symptom scale developed by the investigators	+

Table 7.5 *Vamana*, *Nasya*, and *Raktamokshana*

Study	Design and sample size	Control, treatment, and duration	Outcome measures	(+/−)
Vamana				
Rai el al. [11]	Clinical study $n=18$	Tx: *Vamana* along with *snehana* and *swedana* Duration: one administration	PASI score	+
Rawal et al. [12]	Clinical research $n=30$	Tx1: *Vamana* Tx2: *Sampurana Panchakarma* Duration: 13–21 days for Tx1 29–39 days for Tx2	Cardinal signs and symptoms *Bahu dosh Lakshana* and fitness Graded symptoms Effect of the Tx	+
Nasya				
Chaudhari et al. [17]	RCT $n=37$	Tx1: Oral administration of *trayodashanga kwatha* with *madhu* Tx2: *Pradhamana nasya* with *trikatu+triphala churna* Tx3: Combined Tx Duration: 45 days for Tx1 Max of 7 *nasya* for Tx2 7 *nasya* followed by 45 days of *trayo-dashanga kwatha* for Tx3	Subjective improvement in clinical features Objective parameter (CRP level)	+
Panigrahi [18]	Randomized non-comparative trial $n=30$	Tx: Oral administration of *tribhvan kirti rasa* (Tablet) along with inhalation of steam of *dashamulakwath* (decoction) followed by *nasya* with *anu tailam* Duration: 45–90 days	Overall assessment of symptoms Overall assessment of efficacy recorded (after 3 months of Tx)	+
Bittar [19]	Preliminary study $n=25$	Tx: *Nasya* with *ksheerabala* (101) *tailam* for *vataja* and *pittaja* headache or *anutailam* for *kaphaja* and *sannipata* headache Duration: 7 days and 14 days for severe conditions	Laboratory results Total serum bilirubin	+

Thanki et al. [20]	Randomized clinical study $n=20$	Tx1: *Nasya* with *anu taila* Tx2: *Nasya* with *mashadi taila* Duration: 15 days	Scoring of cardinal signs Associated signs symptoms *Doshanubandhita Lakshanas* House classification system of facial paralysis	+
Anand [22]	Case study $n=1$	Tx: *Avapidaka nasya* with *savarasa* of *Luffa cylindrica* along with 14 days of *ksiradhara* Duration: two administrations on the first and fourth day	Laboratory results Total serum bilirubin	+
Madhavikutty [21]	Review Article	Tx: Purana ghrita / Balavilwadi ghrita for Nasya; Dhoopana (specific name not provided) for unmada, apasmara	N/A	N/A
Raktamokshana				
Michalsen et al. [30]	RCT $n=51$	C: Topical diclofenac regimen Tx: Leech therapy Duration: 28 days for C 1 administration for Tx Along with 91 days outcome comparison	Western Ontario and McMaster Universities Osteoarthritis Index Medical outcomes study	+
Rao et al. [31]	Open trial $n=7$	Tx: Leech therapy Duration: 6 administrations	Pre- and post-symptom observation	+
Pantakar et al. [32]	Case Reports	Tx: Leech Therapy		+

7.4.4 Studies on Basti (Vasti) Karma

Our search also resulted in a limited number of studies on *basti*. Krishnashastry et al. [23], in a randomized controlled trial, compared *vasti karma* with herbal mixture and sterile plain water in patients ($n=83$) with irritable bowel syndrome [23]. The herbal mixture was made up of a homogenized combination of the following herbs: *Vaca*, *Bilwa*, and Ashwagandha, with sesame oil and salt. Both groups received the interventions for 4 weeks and were followed for 12 weeks after the intervention period. Significant difference ($p<0.001$) in severity of abdominal pain, abdominal distension, and *vasti* retention time was reported in the treatment group when compared to the placebo group based on customized assessment criteria developed by the investigators. The article failed to report patient demographics, inclusion/exclusion criteria, randomization method adopted, and whether blinding was used. Similar beneficial results were also reported by Nair et al. [24] on the therapeutic effect of *vaitarana vasti* for sciatica due to inter-vertebral disc prolapse. In this single group study ($n=72$), the participants received sudation therapy with hot leaf bundles (*patra pinda sweda*) for 7 days prior to *vaitarana vasti karma*, which was also administered for 7 consecutive days. The *vasti* mixture included rock salt, molasses, tamarind, and sesame oil added to cow's milk. The authors reported improvement ($p<0.1$) in symptoms such as back pain, numbness, leg pain, and activities of daily living, as well as other items that were part of a scale developed by the study investigators. The study is limited by lack of a control group and follow-up data [24].

It was also noted that *vaitarana vasti* when combined with *simhanada guggulu* produced better improvement than either *vaitarana vasti* or *sinhanada guggulu* given alone in patients with rheumatoid arthritis for 30 days [25]. A three-armed RCT ($n=30$), which explored the efficacy of the above three interventions reported statistically significant ($p<0.001$ to $p<0.05$) improvement in clinical, functional, and hematological measurements between baseline and end of study within each group. In addition to the smaller sample size, the study is limited by lack of follow-up, between-group analysis, and failure to report patient demographics.

In addition to the studies on *kashaya vasti*, efficacy of *matra vasti* was also investigated in the management of *sandhivata* (osteoarthritis) and *kashtartava* (dysmenorrhea). In the osteoarthritis trial ($n=35$) by Shah et al. [26], the participants received either *matra vasti* alone or *matra vasti* and an indigenous herbal formula, depending upon the group assignment, for 3 weeks. In addition, all participants received *abhyanga* and *swedana* in this trial prior to giving *matra vasti* with *bala taila* (60 ml). It is interesting to note that the outcomes did not differ much between the groups, as both groups had significant within group improvements from baseline at the end of study [26]. The dysmenorrhea trial ($n=40$) by Karunagoda et al. [27] compared *matra vasti* between *dashamoola* oil and plain sesame oil (60 ml each). The results were similar to the osteoarthritis trial in that there was no significant difference between the groups, but within group significant differences ($p<0.001$) were reported. It is important to note here that such outcomes (lack of statistical

significance between groups) are expected when two active treatments are compared [27]. The results of another RCT ($n=118$) that used *matra basti* with *brihat saindhavadi taila* in addition to *vatari guggulu* (an oral analgesic and anti-inflammatory herbal formula) for reducing the symptoms of rheumatoid arthritis indicate the benefits ($p<0.01$ to $p<0.001$) of *matra vasti* for another painful condition. However, the benefits were only marginally better than *vatari guggulu* given alone. Furthermore, the findings of this study were based on within group analysis, but not on between group analysis [28].

Effectiveness of *vasti* was also tested on chronic amebic colitis in a small pilot study by Tripathy et al. [29]. In this three armed clinical trial ($n=15$) *dasamoola ksheerapaka vasti* was compared with *amrataka* and *parnabeeja* leaves paste (30 g) given orally with milk. The third group received both *vasti* and the oral herbal formula. Although some improvements were reported in certain symptoms, the authors did not notice significant differences between the groups. Besides the sample size, this study is beset with weaknesses such as poor diagnostic criteria, treatment protocol, and nonstandardized outcome measures [29].

7.4.5 Studies on Raktamokshana

The most common type of bloodletting that has been investigated systematically is leech therapy. Our search did not retrieve studies on other types of bloodletting.

Michelsen et al. [30] reported in a randomized controlled trial ($n=51$) that leech therapy provided more significant improvements in the symptoms of osteoarthritis of the knee than the topical diclofenac therapy [30]. The primary end point, pain at day 7, was reduced from a mean of 53.5 ± 13.7 to 19.3 ± 12.2 after leech therapy compared with 51.5 ± 16.8 to 42.4 ± 19.7 with topical diclofenac. Furthermore, there was a remarkable improvement in function, stiffness, and total arthritis symptoms throughout the 91 day follow-up period in the leech therapy group when compared to the diclofenac group. In this trial, leech therapy was administered only once (4–6 leeches applied locally), whereas the diclofenac gel was applied twice a day for 28 days in the control group.

The benefits of leech therapy in non-pain related conditions such as leukoderma and Buerger's disease were also investigated. Bloodletting in these conditions is indicated because these are considered as diseases related to blood or *raktavaha srotas*. The usefulness of leech therapy for *svritra* or *leukoderma* was investigated in a case series [31]. In this small trial, positive changes in skin pigmentation were noted in four out of seven patients (age group 13–48 years). In one case, the white patch was fully covered with new pigmentation. New 5–8 pigmentation spots of 0.2–0.4 mm size appeared on each affected patch in 3 cases and only changed in color from white to light pink without producing any pigmentation in the rest of the cases. Hemoglobin levels pre and post leech applications with a mean of reduction of 0.43% was also observed. In this study, 2–3 leeches were applied six times once a week for 6 weeks over the affected area for a period of 30–45 min.

A discussion on the application of leeches in Buerger's disease by Patankar et al. [32] reported that *raktamokshanam* provided excellent results in several patients who underwent leech therapy [32]. Specific details of the studies were not available in this review article. However, the authors recommended more rigorous clinical trials in this area.

7.4.6 Studies on Panchakarma (All Procedures Included)

During our literature search, we also identified a few studies that included more than one procedure as an intervention for the treatment groups. We reviewed them independently below. These studies were either single group studies or randomized controlled trials. The control group interventions were often active other forms of treatment for the same condition. Unless the sample sizes are properly calculated and statistically powered, it is difficult to find between group differences.

A clinical study investigating the efficacy of *Shodhana* therapy in rheumatoid arthritis ($n=15$) provided *snehapana*, *swedana*, *virechana*, and *basti karma* within a period of 32 days. Significant improvement in pain, morning stiffness, joint swelling, and joint tenderness was observed at the end of the trial period. Furthermore, functional improvement was also noted by way of improved grip strength and walking time. The improvement continued during the 6-month follow-up period in 8 of the 15 patients with no signs of relapse. However, three patients had acute exacerbation within 3 months [33]. Another study ($n=80$) that also adopted *snehapana*, *swedana*, *virechana*, *and basti karma* for paraplegia reported marginal improvement in the panchakarma group when compared to shamana group that received Ashwagandha kwatha with *Gorochanadi gulika* internally and *Balashwagandhadi taila* for Abhyanga. Patients were assessed for disability to walk and raise the legs, sensory impairment, and control over bowels and bladder. At the end of the intervention period of 60 days both groups showed significant improvement, but the panchakarma group demonstrated more improvement in muscle power and bowel/bladder control [34].

Results of another RCT ($n=150$) reiterate similar benefits of panchakarma in hemiplegia patients. Namboodiri et al. [35] compared panchakarma and shamana therapy in this three-armed study. The panchakarma group received *snehapana*, *swedana*, *virechana*, *basti*, *and nasya* therapies while the shamana groups received either the combination of *bhadradarvyadi kwatha*, *dhanwantharam gulika*, and *mahamasha thaila abhyanga* or the combination of *ekangaveera rasa* internally along with *pinda sweda* for 14 days. The total study duration was 60 days, by which the panchakarma group improved better than the two control groups [35]. Another study ($n=112$) that adopted the combined therapy that included s*nehana*, *swedana*, *virechana*, and *basti* treatment with *mashadi kashaya* and *taila* for hemiplegia also demonstrated similar improvement when compared to the comparison group that received colored water and oil for *vasti* [36]. A retrospective data analysis based

upon the observation of patients of *Pakshaghata* (hemiplegia) for a decade validates that a multi-therapy *panchakarma* treatment that includes cleansing prior to tonification produced better results than plain *shamana* therapy alone [37]. The combination of *snehana*, *swedana*, and *basti karma* also provided better relief in sciatica patients than those who received *shamana* treatment alone. This study ($n=61$) had a 50% drop out rate, but all those who continued improved [38].

Effectiveness of multi-therapy *panchakarma* was also investigated in psychological disorders such as major depressive disorder [39]. In a randomized controlled trial ($n=80$), participants were divided into four groups: (1) *vamana* therapy group; (2) *shamana* therapy group, which received herbo-mineral pill, *Unmada gajankusha rasa* 250 mg bid for 3 months; (3) *vamana* and the herbo-mineral pill group; and (4) Western medicine group, which received fluoxetine 20 mg once a day for 3 months. Hamilton Depression rating scale as well as clinical assessment were utilized to determine the improvement in symptoms. A between group analysis revealed that the *vamana* group patients demonstrated significant improvement ($p<0.01$) than the fluoxetine group. Similarly, the group that received both *vamana* followed by the herbo-mineral pill improved significantly ($p<0.01$) than the pill only group. It is interesting to note that there was no significant difference ($p>0.05$) between the combination group and the fluoxetine group. Both groups improved similarly. In this study, the participants were not equally divided into the four groups. The herbo-mineral group and the fluoxetine group had 30 each and the two *vamana* based groups had 10 each.

A prospective longitudinal evaluation (pre test-post test) of ayurvedic detoxification procedure on 15 healthy individuals was conducted by Herron and Fagan [40]. In this study, a comprehensive 2-week program of detoxification was adopted. It included: internal and external oleation, herbal steam bath, purgation, and herbal oil enema. Each session lasted 2.5–3 h. All participants continued with oil massage at home for 6–8 weeks. The investigators observed for lipophil-mediated reduction of toxicants such as dichlorodiphenyldichloroethylene (DDE) and polychlorinated biphenyls (PCBs) in the study participants when compared to 40 control subjects. After treatment, mean levels of PCBs (46%) and beta-HCH (58%) declined significantly in the study subjects to suggest that lipophil-mediated detoxification may be an effective method to reduce fat soluble toxicants inside our bodies [40].

7.4.7 Studies on Upakarmas (Allied Procedures)

7.4.7.1 *Shirodhara*

Shirodhara is an ayurvedic oil dripping therapy. It is one of the most popular ayurvedic treatment methods in the West due to its noninvasive nature. In addition to medicated oils, medicated buttermilk, milk, and some herbal concoctions are also used for 30–60 min.

Pokharel et al. [41] reported that *shirodhara* with lukewarm milk when combined with a proprietary herbal blend Insomrid® is more effective in reducing insomnia than *shirodhara* or Insomrid® given alone. In this study ($n=30$), Insomrid® tablets were given with warm milk for 30 days, *shirodhara* was done for 15 days, and the combination group received both Tab. Insomrid® and *shirodhara* simultaneously in the same dose and schedule as mentioned above [41].

In a three-armed randomized controlled trial on menopause ($n=43$), *shirodhara* was compared with internal use of either estrogen or *saraswatarishta*. The authors reported that *shirodhara* showed better effect in improving the emotional state of menopausal women as compared to the other two groups. The dosage schedule of interventions adopted in this study was: estrogen 0.025 mg once a day, *saraswatarishta* 20 ml twice a day before meals for 45 days. In this study, *shirodhara* was performed for 30 min a day for 45 days with a gap of 3 days after every 7 days of treatment [42]. Similar encouraging outcomes were also obtained in a case series ($n=10$) when *shirodhara* was added to conventional ayurvedic treatments such as *shirovasti*, *abhyanga*, *swedana*, and oral herbal treatments in the treatment of degenerative cerebellar ataxia [43].

Shirodhara with *mucukanda kashaya* when combined with *anu taila nasya* and *jatamansi* powder orally significantly reduced chronic headache symptoms as opposed to each of the above interventions given separately. In this RCT ($n=72$), the investigators performed *shirodhara* for 30 min daily and applied two drops of *anu taila* for *nasya karma* daily for 21 days. However, *jatamansi* powder (6 g orally) was given for 3 months to the subjects in the *jatamansi* group alone. The combined group also received all the above treatments for 21 days only [44].

In the recent past, a group of Japanese researchers lead by Kazuo Uebaba studied the physiological and psychoneuroimmunologic effects of *shirodhara* in different subjects. This group developed a healing robot to perform *shirodhara* in a computerized reproducible manner. Five experiments on physiological changes of both subjects and technicians during manual *shirodhara*, standardization of oil weight between the manual and robotic *shirodhara*, physio-psychological changes during *shirodhara* by the healing robot in relation to anxiety and altered state of consciousness (ASC), anxiolytic effect of the robotic therapy, and impact of different dripping media on the experiences of *shirodhara* were investigated. The results showed that *shirodhara* induced bradycardia and lower tidal volume and CO_2 output ($p<0.05$), and the state of anxiety decreased abruptly ($p<0.005$). ASC scores were highest in the domain of trance, passiveness, timeless sensation, wordless sensation, and concentration. ASC scores and anxiolytic effects showed a significant correlation ($p<0.01$). The authors report that successive *shirodhara* treatments reduced tension and anxiety of anxious subjects in 1 month. However, similar positive changes were not noted in the EEGs of the technicians, who performed *shirodhara* manually. Their EEGs indicated a stressful state which may also justify the utility of the healing robot as an assistant to the technicians [45].

Another randomized controlled ($n=16$) by Uebaba et al. [45] compared *shirodhara* treatment and control supine position with monitoring of physiologic, biochemical, immunologic, and psychometric parameters including anxiety and altered

states of consciousness (ASC). The results showed that *shirodhara* treatment showed lowered level of state anxiety and higher levels of ASC. The correlation between anxiolysis and the depth of ASC was significant in *shirodhara* treatment group ($p<0.05$). NK cell activity after *shirodhara* treatment also showed significant correlation with anxiolysis and the depth of Trance of ASC ($p<0.05$ and $p<0.01$, respectively). However there was no significant difference by two-way ANOVA. The treatments were administered for 30 min and used plain sesame oil and the robotics to regulate oil dripping during *shirodhara* [46]. A subsequent study by Xu et al. from the same group also demonstrated that *shirodhara* performed with medicated sesame oil produced larger correlation between anxiolysis and improved ASC than plain sesame oil *shirodhara* or just lying in supine position. Simple increased correlation was observed between psycho-physiologic effects and the elevated foot skin temperature in the medicated oil *shirodhara* than plain sesame oil *shirodhara* and supine position. In this study lavender essential oil was mixed with sesame oil to make it medicated oil. This study ($n=16$) adopted a randomized cross-over design and used all standardized outcome measures [47]. Nevertheless, the results of all the above experiments on *shirodhara* by this group need to be interpreted with caution due to the small sample sizes and the study on healthy subjects.

7.4.7.2 *Shirovasti*

Shirovasti is a form of independent *snehana*, wherein warm medicated oil is made to stay on the scalp for 30–45 min. In this technique, a leather cloth 20″ × 18″ is wrapped around the head of the patient with the top open to allow pouring oil. This therapy is predominantly used for conditions that originate from brain or head.

We identified only one study on *shirovasti*. In this study 30 patients with Parkinson's disease received either *shirovasti* with *mandukaparni ghrita* or the herbo-mineral formula, *kampavatari rasa*. Both groups received 5 g of *Mucuna pruriens* powder internally. Although symptoms in both groups improved significantly over time, the *shirovasti* group showed better improvement than the oral pills only group. Positive outcomes were noted in speech, posture, emotional stability, and bradykinesia [48]. *Mandukaparni ghrita* was made up of Mandukaparni herb and cow's ghee only. The dosage of *kampavatari rasa* was 250 mg twice a day.

7.4.7.3 *Agnikarma*

Agnikarma is cauterization. Application of severe heat that would burn the skin or local tissue is occasionally practiced by ayurvedic practitioners specially trained in certain surgical techniques to reduce pain and cure non-healing ulcers. The efficacy of *agnikarma* was tested in a comparative study ($n=40$) for sciatica. *Agnikarma* significantly reduced pain ($p<0.01$) and improved straight-leg raising (SLR) test ($p<0.01$) compared to the control group that was treated with *katibasti* using *ksheerabala* oil. In this study, *agnikarma* was administered on the 1st, 8th and 15th

day while *katibasti* was administered once daily for 7 days continuously. The author also cited the limitations of the study as small sample size and lack of follow-up for longer periods [49].

7.4.7.4 *Uttara Vasti*

Uttara vasti is per urethral administration of medicated oil to treat urinary disorders. In women, per vaginal administration of oils, primarily done to treat gynecological disorders, is also known as *uttaravasti*. A randomized controlled clinical trial ($n=36$) compared *uttara vasti* ($n=28$) with a commonly used nonsteroidal anti-inflammatory drug ($n=8$) in primary dysmenorrhea. Significant relief in the intensity of pain and less painful successive cycles was observed in the *uttara vasti* group than the NSAID group. This improvement within *uttara vasti* group continued during follow-up period too. Significant improvement ($p<0.001$) was noted between baseline and second follow up in all the symptoms, except diarrhea, backache, and vaginal pain. Pain relief was also noted in the NSAID group, but only with frequent dosage and bad side effects such as burning sensation in stomach, nausea, and vomiting. The trial utilized *Operculina turpethum* (Trivrit) and *Allium sativum* (Lasuna) oil for *uttara vasti*, which was administered for 3 days from the ninth day of menses for three menstrual cycles. Tablet Meftal-Spas was administered twice a day during the menstrual cycle for 3 days to the control group [50].

Similar positive outcomes were also noted in another clinical study ($n=30$) on leukorrhea (*svetapradara*). This trial compared *uttara vasti* with *lodhra kwatha* and *dhatakyadi yoga* given orally ($n=15$) with oral herbal medicine alone ($n=15$). The combination group demonstrated significant improvement in all the cardinal symptoms ($p<0.001$) and that it is more beneficial with 62.86 percentage of relief compared to 45.90 of the oral therapy only [51].

7.4.7.5 *Snehana* and *Swedana*

Although *snehana* and *swedana* (oleation and sudation) are essentially used during preparatory phase of *panchakarma*, their use as independent allied treatment methods is widespread in ayurvedic practice. In such an instance, the drastic elimination procedures are not included in the treatment protocol.

In a three-armed clinical trial, *snehana* and *swedana* together were compared to an ayurvedic herbal formula, *ashwagandha guggulu* or to an integrated group. The third group received both the pills and underwent *snehana* and *swedana* for osteoarthritis ($n=30$). For *snehana*, *panchaguna taila* was used as an external application. *Swedana* was provided with steam generated by boiling *dashamoola kwatha* for 90 days. Significant improvements ($p<0.0001$) in pain, swelling, and stiffness were noted within each group over time, but the authors reported marginally better improvements in the groups, which underwent *snehana* and *swedana* [52].

Similar results were obtained with 21 days of *snehana* with *nirgundi taila* and *swedana* with *patra pinda* (leaves bundle) were combined with *trayodashang guggulu* and *vishatinduka vati* orally for sciatica. Some of the limitations of this trial include lack of comparison group and the short duration of the trial [53].

Another clinical trial on the efficacy of *snehana* and *swedana* on osteoarthritis of the knee reemphasizes the value of these allied treatments when provided along with oral herbal analgesics and physical therapy. This three-armed study ($n=30$) demonstrated that an integrated approach that included three interventions—*snehana, swedana* externally, *lakshadi guggulu* orally, and physical therapy (traction)—is relatively better than the latter two interventions given independently for 28 days. The improvement in this study was assessed by the score based upon the severity of the following signs and symptoms: joint pain, edema, tenderness, restriction of movement, stiffness, local crepitation, and walking time [54]. The small sample size and non-reliable outcome measures limit a broader application of the results of this study. The usefulness of *snehana* and *swedana* as a primary treatment method in the management of *vata vyadhi*, specifically low back pain, has also been established [55]. All these studies demonstrate the significance and specific function of *snehana* and *swedana* in the management of pain related conditions.

Pinda sweda, a specialized type of *swedana* that includes applying heat with cooked rice bundles dipped in warm milk and *dashamoola kashaya*, has been shown to decrease creatine kinase (CK) levels in a patient with Duchenne's muscular dystrophy. In this progressive condition, the authors also noted improvement in muscle power at the end of 6 weeks of treatment with *pinda sweda*. This single case report does indicate the promise of this treatment for such chronic progressive condition and calls for more attention and larger clinical trials [56].

In an interesting pilot study on *snehana* alone ($n=20$), two methods of internal oleation, *achasneha* (ingestion of oil or ghee in a graded dose for 7 days) and *vicarana sneha* (ingestion of small amounts of oil/ghee twice a day for 30 days) were compared. *Bhadradarvadi tailam*, given as *vicarana sneha*, was more effective ($p<0.0001$) than *achasneha* in relieving the symptoms of sciatica, although both methods reduced the symptoms [57]. The effects of *snehapana* on the lipid profile of patients were demonstrated by another pilot study ($n=10$). In this study, the patients consumed between 104 and 163 ml of *sneha* within 5–7 days and the type of *sneha* was individualized. One of the following was used as the *sneha* for this study: *ksheerabala taila*, *dashamoolabala taila*, *indukanta ghrita*, and *murchana taila*. All the patients received *swedana* with steam and *virechana* at the end of *snehapana*. There was a significant reduction ($p<0.0001$) in total serum cholesterol and increase in HDL cholesterol [58].

Results of a small case series ($n=6$) on ichthyosis vulgaris (dry scaly skin) also suggest the extended effects of *snehana* and *swedana* in conditions other than pain. This pilot trial utilized *avagaha sweda* induced by cow's urine as the medium for steam generation and *yashtimadhu taila* for *snehana* for 30 days of treatment. A significant improvement (60–82%) was noticed in the clinical features such as roughness, scaling, mal odor, pruritus, and hair change [59].

7.5 Summary and Conclusions

The purpose of this chapter is to provide a brief overview of ayurvedic detoxification therapies and allied therapies as well as to review the research literature available on these therapies. This review is intended to inform the reader of the current evidence on these therapies to help them understand their strengths and weaknesses based on the limited information available.

Panchakarma is one of the most important treatment methods in Ayurveda that is used to restore balance to the body through five different cleansing methods. Its proper administration ensures that the body will be more receptive to other remedies, making them more effective with minimal doses [9]. The collective five-fold therapeutic approach can be used for preventive and rejuvenative purposes as well [60]. Furthermore, it has been shown to be helpful as a program for behavior change by assisting one's expected and reported adherence to new and healthier behavior patterns [10]. These benefits support the use of *panchakarma* for everyone, including healthy persons. The meticulous three phase process is comprised of careful preparation of a person before undergoing drastic cleansing methods, followed by the main procedures and the final phase of restoration and systematic rebuilding of *agni* and energy [60]. These processes are tweaked and adjusted per individual needs to match the person's disease and/or body constitution.

The literature review does indicate that almost all the procedures under the umbrella of *panchakarma* have been investigated—some of them very thoroughly. However, previous literature reviews done on this topic indicate an overall poor quality and paucity of clinical studies [7]. Our review supports this viewpoint. While there are several studies on *vasti karma* and *nasya karma*, the studies on *vamana* and many allied therapies are very limited in number. Regardless, a majority of the studies we reviewed showed that the main procedures, *vamana*, *virechana*, *nasya*, *vasti*, and *raktamokshana* and the allied therapies, such as *shirodhara*, are useful and have been shown to be significantly better or equal to the controls they were compared against. The significant levels ranged from $p<0.05$ to $p<0.0001$. Nonetheless, several of these studies are beset with limitations and are of poor quality. A common limitation that was seen across all the studies was the small sample sizes that were as low as just five in each group. Secondly, the randomization method adopted in assigning participants to either group was not explained in the randomized controlled trials. Thirdly, the outcome measures were often developed for the study by the authors and did not validate them. Fourthly, neither the diagnostic criteria nor the trial duration were supported with literature in these trials. Fifthly, there was no description of blinding protocol or its evaluation at the end of the studies to determine absence of bias. It was also noted that some studies had no control group, no clear inclusion/exclusion criteria, and no details about patient demographics or baseline characteristics.

Last but not least, the majority of the trials did not describe the compliance and dropout rates and presence or absence of adverse events. In view of these limitations, we have to be careful in interpreting the findings of these studies and generalizing the results.

Despite the limitations, however, *panchakarma* and the allied therapies have a definitive role in the management of diseases from an ayurvedic perspective. The findings from the preliminary and pilot studies are encouraging and pave the way for future large clinical trials. It is recommended that well-designed rigorous clinical trials with sufficient sample sizes be conducted using a whole system approach to study this complex treatment method.

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