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Management of Various Musculoskeletal Disorders by Different Kinds of *Agnikarma* Methods- A Systematic Review

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Abstract

Musculoskeletal disorder is a very common condition that affects a person in one or any other form, irrespective of the age group. It includes various conditions, i.e., osteoarthritis of the knee, calcaneal spur, plantar fasciitis, sciatica, and frozen shoulder. Such conditions can be considered under the wide umbrella of *Vata Vyadhi* with its various presentations according to Ayurveda. *Agnikarma, a* para-surgical procedure, is mentioned as a treatment modality for different conditions of *Vata Vyadhi* in the classics. *Acharya* Sushruta has mentioned 10 different types of *Dahana Upakarana* according to the manifestation site of the disease. Many research works or clinical trials are being carried out by researchers on different forms of *Agnikarma* for the management of various musculoskeletal disorders. Among them, many research works remain as grey literature in the library. Hence, summarization of research works published in the research journals is necessary to know the treatment methodology of different forms of *Agnikarma* for the management of various musculoskeletal conditions. In this review article, all the clinical studies or trials are included that are available in online databases. To accomplish this purpose, data mining was carried out through various search engines such as Ayush portal, DHARA, Google Scholar, J Gate, PubMed, Research Gate, Sci-Hub, and Shodhaganga, and journals such as ASL, AYU, AyuCaRe, IAMJ, IJA CaRe, IJAR, JAIM, Journal of Ayurveda, JRAAS. During the search with different keywords related to *Agnikarma* and musculoskeletal disorders, a total of 237 articles were found online. Among these, some articles were scattered on various digital platforms with duplications and the same work on various search engines and Ayurveda journals. In this review article, a total of 38 different research works have been included. Among them, 01 work a pilot study, 12 works are case reports, 01 work a case series, 05 works are single-arm studies, and 19 works are comparative clinical studies. The present review article provides information about different methodologies of *Agnikarma* in the management of various conditions of the musculoskeletal system.

Keywords: *Agnikarma*, Musculoskeletal disorders, Therapeutic cauterization

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Introduction

Evidence-based medicine is a disciplined approach comprised of methods of science, technologies, and biostatistics such as meta-analysis, risk analysis, benefits analysis, and prognosis analysis to give the best and safe treatment to the patients. As per many research trials were conducted to examine various modalities and interventions for better and safe methodology of Ayurveda medicines. In this article, only clinical studies are discussed. In pharmacology, different routes of administration of drugs also have different effects as per mode of action of drugs. In Ayurveda too, various forms of drugs with various routes are described by ancient *Acharyas*. In India, many of the researches on musculoskeletal disorders through Ayurveda has been done in various research institutes and hospitals. Methodology and effects vary from patient to patient and clinic to clinic. To understand the various methods and effects of para-surgical procedures in general and *Agnikarma* through different methods in particular, it is essential to understand the effect of the procedure according to the nature and severity of musculoskeletal disorders. Hence, this review has been undertaken to know the research works done by *Agnikarma* with different methods.

Musculoskeletal disorder is a broad term used for various presentations, which include injury or disorders of muscles, nerves, tendons, joints, cartilage, and spinal disc. In this review article, different entities of the musculoskeletal system are included. It can be due to different pathological factors such as traumatic factors, degenerative conditions, and continuous stress. Pain is one of the chief complaints of musculoskeletal disorders. In Ayurveda, it is considered under the broad heading of *Vata Vyadhi,* where a common line of treatment is followed for its management, as mentioned in the classics.

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Research activities in Ayurveda have gained momentum. Hence, they have generated more precise scientific data in the last few years. This review article includes clinical studies or research works based on the intervention of different kinds of *Agnikarma* in the management of musculoskeletal disorders.

Methodically, the entire thesis work carried out in various research institutes is not practically accessible, so thesis data or unpublished research works as grey literature from the

Table 1: Types of researches observed during online search

Types of research	*No. of articles*
Pilot study	04
Single case report	15
Case series	07
Clinical study- Single arm	13
Comparative clinical studies	23
Review	15

post-graduation institutes are not included in the compressive review work in this article. These research works done in the respective PG institutes need to be manually collected, and then separate grey literature data can be published. Here, data collection or extraction is done through data mining from various search engines as well as from Ayurveda journals. A total of 77 different research works were published from July 2009 to December 2022, which are available on a digital platform regarding musculoskeletal disorders managed by *Agnikarma* in different forms, among them 15 articles were review articles [Table 1].

Inclusion Criteria

The research works on *Agnikarma* in musculoskeletal disorders has been published on a digital platform from July 2009–December 2022.

Online available full articles, case reports, case series, single-arm clinical study, and comparative clinical articles.

Exclusion Criteria

The research works published on digital platforms before July 2009 and after December 2022 were excluded.

Other treatment modalities used for the management of musculoskeletal disorders, except *Agnikarma* were not included in this review.

Review articles or literary data published on *Agnikarma* were excluded.

Materials and Methods

Available data are procured by the use of different keywords with musculoskeletal disorders like ankle sprain, *Avabahuka,* carpel tunnel syndrome, cervical spondylosis, Dequervain's disease, frozen shoulder, Golfer's elbow, *Gradhasi, Griva Shula, Grivagata Vata, Janusandhigata Vata, Janushula, Katigata Vata, Katishula.* lumber spondylosis, musculoskeletal system disease, planter fasciitis, *SandhiVata, Sandhigata Vata, Sandhigata Anila,* sciatica, Tennis elbow, trigger finger, and *Vata Kantaka.* The keywords related to different forms of *Agnikarma* such as *Agnikarma, Godanta Agnikarma, Kshaudra Agnikarma, Pippali Agnikarma, Shalaka Agnikarma* are used for procurement [Table 2a and b].

Data mining was done on available search engines, such as Ayush portal, DHARA, Google Scholar, J Gate, PubMed, Research Gate, Sci-Hub, and Shodhaganga, and journals as ASL, AYU, AyuCaRe, IAMJ, IJA CaRe, IJAR, JAIM, Journal of Ayurveda, JRAAS [Table 3]. Available research articles collected from various search engines and journals with their respective keywords are mentioned in Table 4.

Table 2a: Available research articles on musculoskeletal disorders with *Agnikarma* according to disease keywords

Keyword	*No. of articles*
Janushula	37
Janusandhi gata Vata	28
Musculoskeletal system disease	12
Gradhasi	10
Avabahuka	8
Vata Kantaka	6
Sciatica	5
Plantar Fascitis	3
Tennis Elbow	3
Carpel Tunnel Syndrome	2
Katigata Vata	2
Cervical spondylosis	1
Frozen shoulder	1
Grivagata Vata	1
Sandhi Vata	13
Trigger Finger	1
Ankle sprain	0
Dequevain's disease	0
Golfer's Elbow	0
Griva Shula	0
Katishula	0
Lumber spondylosis	0
Sandhigata Anila	0

Table 2b: Available research articles on musculoskeletal disorders with *Agnikarma* according to procedure keywords

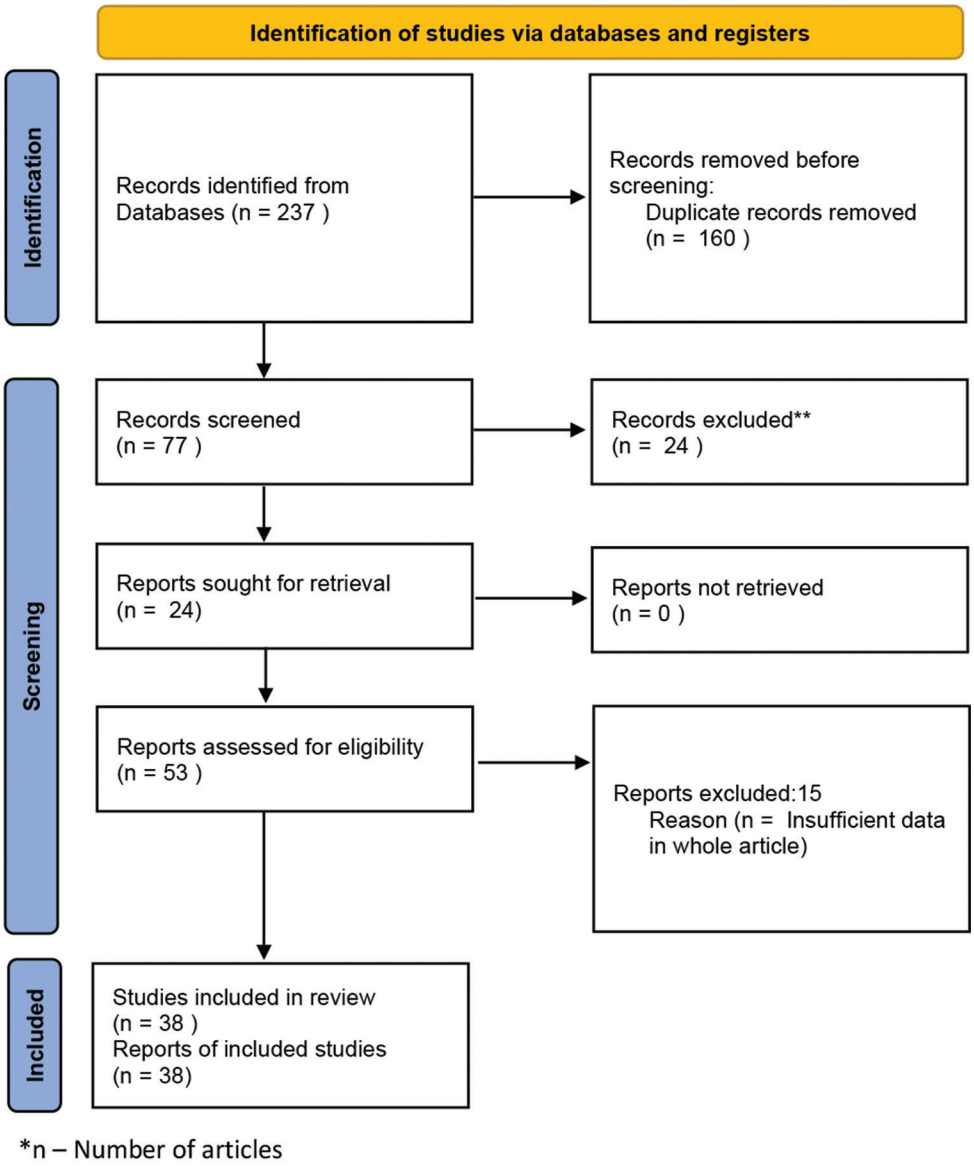
Keyword	*No. of articles*
Agnikarma	86
Shalaka Agnikarma	16
Kshaudra Agnikarma	2
Godanta Agnikarma	0
Pippali Agnikarma	0

Table 3: Research articles on various online journals and search engines

Journals	*No. of articles*	*Search engines*	*No. of articles*
ASL	25	Ayush Portal	11
AYU	22	DHARA	15
Ayu CaRe	00	Google Scholar	42
IAMJ	07	J Gate	36
IJA CaRe	18	PubMed	12
IJAR	02	Research gate	29
JAIM	06	Sci-Hub	00
Journal of Ayurveda	00	Shodhaganga	12
JRAAS	00		

Observations

Musculoskeletal disorders is a very common presentation of musculoskeletal system which dealt by the clinicians and researchers with various treatment modalities. *Agnikarma* is one of the para-surgical measures which is commonly used as the treatment for pain management in musculoskeletal disorders. Still, across all the available research works on various search engines and journals, limited works have been found in the management of musculoskeletal disorders with *Agnikarma.* A total of 77 non-duplicated research works have been procured through online platform. Only clinical studies are included in this review article, which are mentioned here with the help of PRISMA flow chart. Data scrutinization for inclusion and exclusion criteria is presented in Flow Chart 1.



Flow Chart 1: PRISMA systemic review flow diagram for online database

Many research works that were carried out on musculoskeletal disorders by internal and external treatments, such as conservative treatment and *Panchakarma*. Among them, only clinical studies in which *Agnikarma* was used as a treatment modality are considered here, and they are about 38 in number after application of inclusion and exclusion criteria. Among them, 01 work as a pilot study was conducted, 12 works are case reports, 01 work was carried out as case series, 05 works are single arm studies, and 19 works are comparative clinical studies.

One research work as a pilot study was carried out for *Sandhigata Vata* (O.A. knee) with the use of *Rajat Shalaka Agnikarma* found effective as mentioned in Table 5.

Table 6 describes 12 single case reports in which *Agnikarma* was administered for the management of various musculoskeletal system. Single case study initially opens up the safety of treatment administration, adverse drug reaction (ADR), and effects of the intervention on the disease. Single case report on various methodologies of administration by various forms of *Agnikarma* opens up safe uses of various methods of *Agnikarma* in different musculoskeletal disease. All the studies had shown the different effects on the subjective and objective parameters discussed in the result column.

Tables 7 and 8 show clinical comparative studies between two and three groups with different methodologies of *Agnikarma* with or without internal and external treatment modalities. Comparative clinical studies open up to elect better treatment methodologies along with minimal side effects. A total of 19 studies are completed and published, showing the comparison between different groups with different treatment modalities, with or without *Agnikarma* had different effects on the various conditions of musculoskeletal disorders. Among them, 15 works carried out with two group comparisons and 4 comparative clinical works were carried out by three group comparisons.

One study was conducted as case series on *Janugata Vata* and 5 single arm studies were carried out on different conditions as per mentioned in Tables 9 and 10.

Table 4: Available research articles on the given search engines and journals with the respective keywords

Search engine	*Keyword*	*No. of articles*
ASL	*Agnikarma*	10
	Avabahuka	02
	Gridhrasi	02
	Janusandhigata Vata	04
	Janushula	03
	Musculoskeletal system disease	02
	Sciatica	02
AYU	*Agnikarma*	05
	Janusandhigata Vata	01
	Janushula	05
	Katigata Vata	01
	Kshaudra Agnikarma	01
	Musculoskeletal system disease	06
	Shalaka Agnikarma	02
	Trigger finger	01
IAMJ	*Agnikarma*	02
	Janusandhigata Vata	01
	Janushula	02
	Shalaka Agnikarma	01
	Vata Kantaka	01
IJACaRe	*Agnikarma*	08
	Avabahuka	01
	Janusandhigata Vata	03
	Janushula	05
	Plantar fascitis	01
IJAR	*Agnikarma*	02
JAIM	*Agnikarma*	01
	Grivagata Vata	01
	Janusandhigata Vata	01
	Janushula	03
Ayush Portal	*Agnikarma*	05
	Janusandhigata Vata	03
	Janushula	03
DHARA	*Agnikarma*	06
	Gradhasi	03
	Janusandhigata Vata	01
	Janushula	01
	Plantar fascitis	01
	Sciatica	02
	Tennis elbow	01
Google Scholar	*Agnikarma*	20
	Avabahuka	02
	Cervical spondylyis	01
	Frozen shoulder	01
	Gridhrasi	03
	Janusandhigata Vata	03
	Janushula	03
	Katigata Vata	01
	Musculoskeletal system disease	02
	Plantar fascitis	01
	Sciatica	01
	Shalaka Agnikarma	01
	Tennis elbow	01
	Vata Kantaka	02
J Gate	*Agnikarma*	15
	Janusandhigata Vata	02
	Janushula	04
	Sandhigata Vata	08
	Shalaka Agnikarma	07
PubMed	*Agnikarma*	03
	Janusandhigata Vata	01
	Janushula	02
	Musculoskeletal system disease	01
	Sandhi Vata	02
	Shalaka Agnikarma	02
	Vata kantaka	01
Research gate	*Agnikarma*	06
	Avabahuka	03
	Carpel tunnel syndrome	02
	Gridhrasi	02
	Janusandhigata Vata	05
	Janushula	06
	Kshaudra Agnikarma	01
	Musculoskeletal system disease	01
	Tennis elbow	01
	Vata Kantaka	02
Shodhaganga	*Agnikarma*	03
	Janusandhigata Vata	03
	Sandhigata Anila	03
	Shalaka Agnikarma	03

Discussion

Acharya Dalhana has mentioned *Agnikarma* as a treatment for *Vatakaphaja Vyadhi*.[39] Hence for the management of musculoskeletal disorders, different form of *Agnikarma* is mostly practiced now a days with or without oral medications and local applications. This review article includes various research work which were procured from online search engine by planned data mining. In most of the conducted studies for the management of musculoskeletal disorders 40–70 years of age group patients were included in which pain was the most common complaint of patients. Along with this stiffness, crepitus, swelling and restricted range of movements of joints were also present as associated complaints.

Among 38 research works, more than half number of studies were conducted as randomized controlled clinical trial in the form of comparative study in two or three groups. 13 studies were found as single case reports. Maximum clinical research works have been carried out on *Janusandhigata Vata* and *Gridhrasi* i.e., 12 and 7 respectively, due to their more prevalence rate.[40,41] In consideration of the *Dahana Upakarana, Shalaka Agnikarma* was mainly used for the management purpose especially *Panchadhatu Shalaka* and *Tamra* (copper) *Shalaka* due to its easy availability, cost-effective, good heat carrying capacity, easy handling and good therapeutic efficacy.[42] Other *Dahana Upakarana* like *Lauha Shalaka, Suvarna Shalaka, Rajata Shalaka, Guda, Madhu, Pippali* were also used for *Agnikarma* in the management of musculoskeletal disorders. It is also observed that different patterns of *Agnikarma* i.e., *Bindu, Vilekha, Ashtapada* were used in clinical research works but there was only one work carried out as comparative clinical trial for comparison in the pattern of *Shalaka Agnikarma* i.e., *Ashtapada* and *Bindu*. Hence, it is one of the research area to assess significance between different patterns of *Agnikarma*. In few research studies modified methods of application for *Agnikarma* were used like *Viddha Agnikarma,* electrocautery *Agnikarma, Agnikarma* with *Suchi.* In majority of the studies 4 sittings of *Agnikarma* at the interval of one week duration were considered as treatment protocol. It shows significant results during and after the completion of treatment with *Agnikarma*. It is observed that *Guggulu* formulations were most commonly used as oral medications in combined treatment i.e., *Panchatikta Guggulu, Rasonadi Guggulu.* Although *Agnikarma* alone is as non-pharmacological single treatment modality which showed good therapeutic efficacy especially in pain, but in combination of various treatment modalities it reveals additional

Table 5: Pilot study

S. No.	*Authors*	*Title of study*	*Methodology*	*Results*
1	Jethava *et al*.[1]	Clinical efficacy of A*gnikarma* in *Sandhigatavata* w.s.r. to Osteoarthritis of knee joint – A pilot Study	Patients: 14 Intervention: *Agnikarma* with *Rajata Shalaka* Total sittings: 4 sittings Interval: weekly Follow-up: after 1 month	*Agnikarma* is effective in pain relief without any side effect.

Table 6: Single case reports

Sr. No.	*Authors*	*Title of studies*	*Methodology*	*Results*
1	Sharamao and Vedpathak[2]	A case study of *Tamra Shalaka Agnikarma* in the management of *Janusandhigata Vata* (osteoarthritis)	*Agnikarma: Tamra Shalaka* Total sittings: 7 consecutive days Follow-up: 1 month	*Agnikarma* therapy is helpful in management of local pathological diseases. *Agnikarma* procedure proves to be one of the easiest ways to reduce the *Janusandhigata Vata* symptoms.
2	Rathod *et al*.[3]	Management of *Janusandhigata Vata* w.s.r. to osteoarthritis of the knee joint with modified method of *Agnikarma* by the use of electrocautery- A Case Reports	*Agnikarma:* by electrocautery Total sittings: 4 Interval: 7 days Follow-up: 2 months	*Agnikarma* with electrocautery having satisfactory result in the sign and symptoms of *Janusandhigata Vata*.
3	Lobo *et al*.[4]	*Agnikarma* with *Suvarna Shalaka* in *Janu Sandhigata Vata* (osteoarthritis of knee joint) - A Case Report	*Agnikarma: Suvarna Shalaka* Total sittings: 4 Interval: 7 days Follow-up: 1 month	The case was successfully treated and cured with *Agnikarma* within 1 month.
4	Ramani *et al*.[5]	A role of *Agnikarma* in the management of *Vatkantak* w.s.r. Planter Fasciitis	*Agnikarma: Panchadhatu Shalaka* Total sittings: 3 Interval: 1 week Follow-up: 3 weeks	*Agnikarma* procedure proves to be one of the easiest way to reduce the plantar fasciitis
5	Ganatra *et al*.[6]	*Agnikarma* (therapeutic heat burn) an unique approach in the management of V*ata Kantaka* w.s.r. to plantar fasciitis- A Single Case Report	*Agnikarma: Panchadhatu Shalaka - Bindu Dagdha* Total sittings: 4 Interval: 1 week Follow-up: 2 months	After 1 month of treatment, patient got complete relief in pain and stiffness.
6	Yadav and Shukla[7]	Role of *Viddha-Agnikarma* in chronic Plantar Fasciitis- A Case Study	*Agnikarma: Viddha Agnikarma* Total sittings: 3 Interval: 1 week Follow-up: not mentioned	*Viddha-Agnikarma* is a non-invasive treatment modality and can be done as OPD procedure *Agnikarma* gives immediate relief in pain.
7	Tamrakar *et al*.[8]	Management of Ankylosing Spondylitis through *Ayurvedic* medicine along with *Agnikarma*- A Case Study	*Agnikarma: Tamra Shalaka* Total sittings: 12 Interval: 15 days Follow-up: 6 months	After 4 months of regular treatment all other typical features related to disease like *Amajeerna*, *Shoola* etc., were also improved.
8	Kumar *et al*.[9]	Role of *Agnikarma* in the management of *Avabahuka*- A Case Report	*Agnikarma- Tamra Shalaka* along with some adjuvant *Ayurvedic* drugs Total sittings: 4 Interval: 1 week Follow-up: 2 months	*Agnikarma* by copper-made *Shalaka*, along with some adjuvant *Ayurvedic* drugs, brought out significant results by reducing pain, tenderness and stiffness.
9	Chahna *et al*.[10]	Effect of *Agnikarma* with *Tapta Guda* in Carpal Tunnel Syndrome - A Case Study	*Agnikarma:* T*apta Guda* Total sittings: 1 Follow-up: 1 month	*Agnikarma* by T*apta Guda* therapy is effective in Carpel Tunnel Syndrome.
10	Charde *et al*.[11]	Role of *Agnikarma* and *Snehapana* in management of pain in Cervical Spondylosis- A Case Study	*Agnikarma* with *Snehapana* Total sittings: not mentioned Interval: not mentioned Follow-up: not mentioned	In acute painful stage of cervical spondylosis *Agnikarma* and *Snehapana* can play a major role in management of pain.
11	Verma *et al*.[12]	Long-term effect of ancient *Ayurvedic Agnikarma* therapy on heel pain associated with Calcaneal Spur: A Case Report	*Agnikarma: Panchadhatu Shalaka* Total sittings: 3 Interval: 1 week Follow-up: not mentioned	*Agnikarma* treatment was found to be a cost-effective, simple and quick pain relief procedure wherein no hospitalization or surgeries are required as compared with the modern medicine treatments.
12	Ganatra and Dudhamal[13]	Agnikarma with *Kshaudra* (honey) along with adjuvant Ayurveda therapy in the management of trigger finger A single case report	*Kshaudra Agnikarma* and *Bandhan* along with oral medication Total sittings: daily for 30 days Follow-up: 9 months	*Agnikarma* and *Bandhana* are safe and effective as nonsurgical therapeutic interventions along with oral *Ayurvedic* medicines in the management of trigger finger.

Table 7: Comparative clinical studies (two groups)

S. No.	*Authors*	*Title of studies*	*Therapeutic groups*		*Result*
			Group A	*Group B*	
1	Chavan[14]	A Comparative Study Of *Janu Basti* With *Sahacharadi Taila* and *Agnikarama* With *Tamra Shalaka* in *Janu Sandhigata Vata*	Patients: 50 Intervention: *Janubasti* with *Sahachara Taila* Total sittings: 7 Interval: Daily Follow-up: on 7th and 30th day	Patients: 50 Intervention: *Agnikarma* with *Tamra shalaka* Total sittings: 7 Interval: Daily Follow-up: on 7th and 30th day	*Agnikarma* was found highly effective in *Shula*, *Shotha* and *Sparsha-Asahatva.*
2	Lata *et al*.[15]	A comparative study of conductive and direct method of *Agnikarma* with *Tamra Shalaka* in *Sandhigat Vata* w.s.r. to osteoarthritis of knee joint.	Patients: 30 Intervention: *Agnikarma* by conductive method with *Tamra Shalaka* Total sittings: 4 Interval: 1 week Follow-up: just after treatment	Patients: 30 Intervention: *Agnikarma* by direct method with *Tamra Shalaka* Total sittings: 4 Interval: 1 week Follow-up: just after treatment	Significant results were seen in both methods but more satisfactory in direct *Agnikarma* as compared to conductive method.
3	Pandey and Dudhamal[16]	Effect of *Agnikarma* along with *Panchatikta Guggulu* in the management of *Janusandhigata Vata* (osteoarthritis of knee joint)	Patients: 21 Intervention: *Panchadhatu Shalaka Agnikarma* Total sittings: 4 Interval: 7 days Follow-up: not mentioned	Patients: 20 Intervention: *Panchadhatu Shalaka Agnikarma* along with *Panchatikta Guggulu* 2 tds Total sittings: 4 Interval: 7 days Follow-up: not mentioned	*Agnikarma* alone has a definite role in reducing the knee joint pain and tenderness but addition of *Panchatikta Guggulu* found convincing results in stiffness, swelling and (ROM) of knee joint.
4	Kumar *et al*.[17]	Clinical study on the evaluation of analgesic effect of *Agnikarma* and *Rasonadi Guggulu* in the management of osteoarthritis of knee joint.	Patients: 20 Intervention: *Agnikarma* with *Pancha Loha Shalaka* Total sittings: 1 Follow-up: after 7 days	Patients: 20 Intervention: *Rasonadi Guggulu* Dose: 500 mg tablet thrice daily with *Usnodaka Anupana* Duration: 7 days Follow-up: after 7 days	Analgesic effect in group A treated with *Agnikarma* was significant than group B treated with *Rasonadi Guggulu.*
5	Sharma *et al*.[18]	Clinical study of *Agnikarma* and *Panchatikta Guggulu* in the management of *Sandhivata* (osteoartheritis of knee joint)	Patients: 18 Intervention *Agnikarma* with *Panchadhatu Shalaka* Total sittings: 4 Interval: 1 week Follow-up: 3 months	Patients: 15 Intervention *Agnikarma* with *Panchadhatu Shalaka* along with *Panchatikta Guggulu* orally (*Agnikarma* as per group A) Dose: 2 tab (each 500 mg) tds after meal Duration: 1 month Follow-up: 3 months	*Agnikarma* is effective in the management of pain in the *Sandhivata*. However, addition of *Panchatikta Guggulu* in the treatment provides better efficacy on joint stiffness and crepitus.
6	Puri and Savadi[19]	A comparative study on *Agnikarma* and indigenous drugs in the management of Janus*andhigata Vata* w.s.r. to osteoarthritis of knee joint	Patients: 15 Intervention: oral Indigenous drugs Dose: not mentioned Follow-up: not mentioned	Patients: 15 Intervention: *Agnikarma* by *Rajata Shalaka* Total sittings: not mentioned Interval: not mentioned Follow-up: not mentioned	Both the groups had almost same significance. Especially in pain and range of movements, *Agnikarma* treated patients showed very good result and having long lasting effect.

(*Contd*...)

Table 7: (*Continued*)

S. No.	Authors	Title of studies	Therapeutic groups		Result
			Group A	Group B	
7	Bhagyashree and Shridhar Rao[20]	The effect of *Asthapada Panchalauha Shalaka Agnikarma* in the pain management of *Gridhrasi* w.s.r. To Sciatica	Patients: 20 Intervention: *Asthapada Panchalauha Shalaka Agnikarma* Total sittings: 3 Interval: 7 days Follow-up: 30 days after treatment	Patients: 20 Intervention: *Bindu Panchalauha Shalaka Agnikarma* Total sittings: 3 Interval: 7 days Follow-up: 30 days after treatment	The study shows that the treatment is statistically significant in group A when compared to group B.
8	Bali *et al*.[21]	Efficacy of *Agnikarma* over the *Padakanistakam* (little toe) and *Katibasti* in *Gridhrasi*: A Comparative Study.	Patients: 20 Intervention: *Panchalauha Shalaka* Total sittings: 3 Interval: 1 week Follow-up: 1 year	Patients: 20 Intervention: *Ksheerabala Taila Katibasti* Total sittings: 7 Interval: daily Follow-up: 1 year	*Agnikarma* had a significant effect in relieving the pain and SLR test in cases of *Gridhrasi*.
9	Jethva ***et al***.[22]	A comparative clinical study of *Siravedha* and *Agnikarma* in management of *Gridhrasi* (sciatica).	Patients: 19 Intervention: *Panchalauha Shalaka Agnikarma* Total sittings: 4 Interval: 1 week Follow-up: after 1 month	Patients: 11 Intervention: *Siravedha 4 angula* below *Janusandhi* Total sittings: 4 Interval: 1 week Follow-up: after 1 month	Individually both groups had given relief in cardinal symptoms of *Gridhrasi*. 68.42% patients showed marked improvement & 21.05% had complete relief after *Agnikarma*. In *Siravedha*, 72.73% patients had moderate improvement whereas 27.27% patient had marked improvement.
10	Pandao and Morey[23]	Comparative clinical study of *Siravedha* and *Agnikarma* in management of *Gridhrasi* (sciatica).	Patients: 19 Intervention: *Agnikarma Panchdhatu Shalaka* Total sittings: 4 Interval: 7 days Follow-up: 1 month	Patients: 11 Intervention: *Siravedha* below 4 of *Janusandhi* Total sittings: 4 Interval: 7 days Follow-up: 1 month	*Agnikarma* has better effect then *Siravedha*.
11	Nandini and Dudhamal[24]	A comparative clinical evaluation of *Agnikarma* and *Raktamokshana* in management of *Gridhrasi* (sciatica)	Patients: 16 Intervention: *Panchdhatu Shalaka Agnikarma* Total sittings: 4 Interval: 1 week Follow-up: 1 month	Patients: 16 Intervention: *Raktamokshna* with *Shringa Yantra* Total sittings: 2 Interval: 1 week Follow-up: 1 month	*Agnikarma* group, 26.67% patients had got complete remission, 20% patients had marked improvement whereas 40% had moderate improvement in the symptoms of *Gridhrasi*. In group B, *Raktamokshana* 50% had moderate improvement, 42.85% had marked improvement.
12	Badwe *et al*.[25]	Comparative study of *Agnikarma* and intralesional steroidal Injection in *Vatakantaka* w.s.r. Plantar Fasciitis	Patients: 30 Intervention: *Agnikarma* with *Tamra Shalaka* Total sittings: 1 Follow-up: on 1st, 3rd and 7th day	Patients: 30 Intervention: triamcinolone 40 mg intralesional injection Total sittings: 1 Follow-up: on 1st, 3rd and 7th day	Both procedures found effective in *Vedana*.
13	Sandeep and Angial[26]	A comparative study on efficacy of *Agnikarma* and *Upanaham* in *Vatakantaka*	Patients: 15 Intervention: *Agnikarma* with *Suchi* Total sittings: 1 Follow-up: on 7th and 14th day	Patients: 15 Intervention: *Upanaha* with *Kottamchukadi Churna* Total sittings: 7 consecutive days Follow-up: on 7th and 14th day	The treatment is significant in group A when compared to group B.

(*Contd*...)

Table 7: (*Continued*)

S. No.	Authors	Title of studies	Therapeutic groups		Result
			Group A	Group B	
14	Sehgal *et al*.[27]	Role of *Agnikarma* and *Ajamodadivati* in the management of *Sandhigata Vata* w.s.r. To Cervical Spondylosis	Patients: not mentioned Intervention: *Panchadhatu Shalaka Agnikarma* Total sittings: 1 Follow-up: not mentioned	Patients: not mentioned Intervention: *Ajamodadi Vati* Dose: not mentioned Duration: not mentioned Follow-up: not mentioned	Comparatively more relief was found in group A where *Agnikarma* was administered.
15	Jethava *et al*.[28]	Role of *Agnikarma* in *Sandhigata Vata* (osteoarthritis of knee joint).	Patients: 15 Intervention: *Agnikarma* with *Rajat Shalaka* Total sittings: 4 Interval: 1 week Follow-up: 1 month	Patients: 15 Intervention: *Agnikarma* with *Loha Shalaka* Total sittings: 4 Interval: 1 week Follow-up: 1 month	*Loha shalaka* provided better results than *Rajata Shalaka*. *Agnikarma* is nonpharmacological, OPD procedure required minimum equipment so that it can be used for pain management in *Sandhigata Vata*

Table 8: Comparative clinical studies (three groups)

S. No	Authors	Title of studies	Therapeutic groups			Result
			Group A	Group B	Group C	
1	Deshpande *et al*.[29]	The study protocol of comparative study on efficacy of *Marma Chikitsa*, *Agnikarma* and Physiotherapy in *Avabahuka* (frozen shoulder)	Patients: 50 Intervention: *Marma Chikitsa* Total sittings: 8 Interval: alternate days Follow-up: after 15 days	Patients: 50 Intervention: *Tamra Shalaka Agnikarma* Total sittings: 4 Interval: 1 week Follow-up: after 15 days	Patients: 50 Intervention: Physiotherapy Total sittings: 15 consecutive days Follow-up: after 15 days	*Marma Chikitsa* may have a better outcome as compared to *Agnikarma* and physiotherapy
2	Meena[30]	A clinical evaluation of *Agnikarma* in the management of *Sandhigata Vata* w.s.r. to osteoarthritis.	Patients: 30 Intervention: *Nirgundi* and *Shigruyakta Trayodashanga Guggulu* Dose: 2 tab (500 mg each) bd with lukewarm water after meal Duration: 2 moths Follow-up: 3 months	Patients: 30 Intervention *Agnikarma* with *Panchadhatu Shalaka* (*Bindu* or *Vilekha Dahana Vishesha*) Total sittings: weekly sittings upto 2 months Interval: 1 week Follow-up: 3 months	Patients: 30 Intervention combined therapy of group A and group B As per group A and B Duration: 3 months	Total effect of therapies had shown that in comparison to group A and group B, group C had better results, this could be due to the effect of *Agnikarma*.
3	Shekokar and Borkar[31]	A comparative study of *Agnikarma* and *Ajmodadi Vati* in the management of *Gridhrasi* w.s.r. to Sciatica	Patients: 22 Intervention: *Agnikarma* Total sittings: 2 Interval: 1 week Follow-up: not mentioned	Patients: 18 Intervention: *Ajmodadi Vati* Dose: 500 mg thrice a day Duration: 30 days Follow-up: not mentioned	Patients: 16 Intervention: combined therapy As per group A and B	Significant reduction in combined therapy of group C had been observed.
4	Bakhashi *et al*.[32]	A comparative study of *Agni karma* with *Lauha*, *Tamra* and *Panchadhatu Shalaka* in *Gridhrasi* (sciatica)	Patients: 8 Intervention: *Agnikarma* with *Panchdhatu Shalaka* Total sittings: 4 Interval: 1 week Follow-up: 1 month	Patients: 7 Intervention: *Agnikarma* with *Lauha Shalaka* Total sittings: 4 Interval: 1 week Follow-up: 1 month	Patients: 7 Intervention: *Agnikarma* with *Tamra Shalaka* Total sittings: 4 Interval: 1 week Follow-up: 1 month	*Agnikarma* by *Panchadhatu Shalaka* had better result in combating the symptoms, especially in *Ruka* and *Tandra*, while *Lauhadhatu Shalaka* gave better results in combating symptoms of *Spanadana* and *Gaurava*. In the meantime, *Tamradhatu Shalaka* had better effect in controlling symptoms like *Toda*, *Stambha* and *Aruchi*.

Table 9: Case series

S. No.	Authors	Title of study	Therapeutic method	Result
1	Tiwari and Yadav[33]	Efficacy of *Agnikarma* in management of *Janugata Vata* at 50° temperature.	Patients: 10 Intervention: *Agnikarma* (50° temperature) with specially designed *Agnikarma* device Total sittings: 1 (if needed then repeat again after 1 week interval) Follow-up: 3 weeks	Pain and range of motion of the knee joint was improved significantly.

Table 10: Single arm studies

S. No.	Authors	Title of studies	Therapeutic groups	Result
1	Bhorale and Hungundi[34]	A clinical evaluation of *Agnikarma* in the management of *Greeva Sandhigata Vata* w.s.r. to Cervical Spondylosis	Patients: 40 Intervention: *Agnikarma* with *Panchdhatu Shalaka* Total sittings: 3 Interval: 7 days Follow-up: 42 days	Agnikarma was found effective.
2	Shetye *et al*.[35]	Clinical study of efficacy of *Agnikarma* in pain management of *Avabahuka* by using *Tamra Shalaka*	Patients: 30 Intervention: *Tamra Shalaka Agnikarma* Total sittings: 1 (second sitting if needed) Interval: 5 days Follow-up: on 5th, 10th and 15th day	Significant effects of *Agnikarma Chikitsa* were observed.
3	Daga *et al*.[36]	Management of *Sandhigata Vata* (cervical spondylosis) by *Agnikarma* with *Lauha Shalaka* -An observational pilot study	Patients: 18 Intervention: *Lauha Shalaka Agnikarma* Total sittings: 2 Interval: 15 days Follow-up: after 15 days	*Agnikarma* is a non-pharmacological, para surgical and reliable technique which gives instant relief to the patients of *Sandhigata Vata*.
4	Sreelatha *et al*.[37]	*Agnikarma* using honey in tennis elbow	Patients: 16 Intervention: *Agnikarma* by *Madhu* Total sittings: 2 Interval: 7 days Follow-up: on 15th, 22nd and 29th day.	Result was 68.22% found in complaint of tennis elbow.
5	Ganjoo[38]	Role of *Agnikarma* with *Pippali* on *Kadara*- An open labeled clinical trial.	Patients: 15 Intervention: *Agnikarma* with *Pippali* Total sittings: 1 Follow-up: 14 days	*Pippali* was able to provide satisfactory result in case of superficial hyperkeratosis lesion.

benefits in *Sotha, Stambha* like complaints. Ultimately it increases quality of life of an individual particularly in geriatric age group patients.

These effects of *Agnikarma* are manifested due to *Sukshma* (minute), *Ushna* (hot), *Tikshna* (sharp), *Ruksha* (dry) or *Snigdha* (unctuous) and *Laghu* (light) *Guna* of *Agnikarma* which are in the contrary to *Shita* (cool), *Chala* (mobile), *Manda* (mild) and *Guru* (heavy) *Guna* of *Vata* and *Kaphadosha* accordingly. Thus, *Akunchana Prasarane Vedana* (painful movements during flexion and extension), *Guruta* (heaviness), *Stambha* (stiffness), *Shotha* (swelling) like complaints diminishes and patient get relief.

Here, only those studies are included which are available at different online database with planned data mining by use of related key words. But many research works which are not accessible through public domain and remains in institutional library as gray literature, which possess significant importance in reference to scientific evidence data. Hence, uniform content and availability of data online which can be easily accessible may help further for meta-analysis of all research works carried out in various research institute. Thus, all trials which are conducted should be registered and published in Clinical Trial Registry India. It will help to collect data easily for analysis in the further study. This review article consists and enlightens scientific process of data mining, methodology and analysis of included data of past work done on *Agnikarma* for the management of musculoskeletal disorders available on digital form in public domain.

Conclusion

Agnikarma is very effective in various conditions of musculoskeletal disorders including *Janusandhigata Vata* (osteoarthritis), *Gridhrasi* (sciatica), *Vatakantaka* (plantar Fasciitis), cervical spondylosis and trigger finger by alleviating pain, stiffness and swelling. Studies showed *Panchadhatu Shalaka* emerged as most effective tool due to its high heat retention, therapeutic efficacy, and suitability for procedure. *Khsaudra (honey)* and *Guda* (jaggery) *Agnikarma* showed effectiveness in localized condition like trigger finger and carpel tunnel syndrome. Electrocautery *Agnikarma* showed satisfactory results in OA knee joint indicating its potential and good adaptation. As per observation *Agnikarma* with *Shalaka* is more effective easy to administer at OPD level as office procedure and cost-effective para-surgical procedure in Ayurveda.

Limitation

This review article contains only those clinical works which are available from online search engines.

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