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Single herbal remedies for *Sandhivata* (Osteoarthritis): A review on evidence based researches in Dravyaguna department of IPGT & RA, Jamnagar

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Abstract

Osteoarthritis is one of the most common degenerative joint disorders. In Ayurveda, the disease *Sandhivata* resembles with osteoarthritis which is described under *Vatavyadhi*. Classical texts of Ayurveda, recommends different single herbal remedies for the management of *Sandhivata*, and many of them are now in routine clinical practice. The present review has been made from different pre-clinical and clinical research works carried out on single herbal drugs for the management of *Sandhivata* at Dravyaguna department of IPGT&RA, Gujarat Ayurved University, Jamnagar. Analysis of results shows that, about 22 research works comprising of 3 clinical and 19 experimental studies have been conducted by Dravyaguna department of IPGT&RA on *Sandhivata*. Drugs like seeds of *Lepidium sativum* Linn, whole parts of *Leonotis nepetifolia* (L.) and roots of *Blepharispermum subsessile* DC are found effective clinically, in the management of *Sandhivata*. Drugs like *Bridelia scandens* Willd, *Paederia foetida* Linn. *Celastrus paniculatus* Willd. , *Leonotis nepetifolia* (L.) R. Br. are proven experimentally for their anti-arthritis, analgesic and anti-inflammatory activities which are the main line of treatment in osteoarthritis. The findings of present review highlight the use of these single and simple herbal remedies for the treatment of patients suffering from *Sandhivata* and can give a lead to further extensive research on these drugs.

Keywords: Anti-arthritis, anti-inflammatory, ayurveda, osteoarthritis, *Sandhivata*

1. Introduction

Osteoarthritis (OA) is one of the most common joint disorders. It is the second most common rheumatological problem and is most frequent joint disease with prevalence of 22% to 39% in India [1, 2] and inflicts about 4-6 crore Indians. It is the most common cause of locomotor disability in the elderly [3] and begins asymptotically in the 2nd & 3rd decades and mostly persons by age 40 have some pathologic change in weight bearing joints [4].

The sign and symptoms of OA resembles with *Sandhivata*, one of the disease conditions described under *Vatavyadhi* of Ayurveda [5]. *Sushruta samhita* delineates the disease in *Vatavyadhi* chapter under the heading of *Sandhigata vata*, while Charaka delineates under *Sandhigata vata* under the *Vatavyadhi* as *Sandhigata anila* [6].

The nonsteroidal anti-inflammatory drugs (NSAIDs) are the main drugs of choice in this disease condition in modern medicines, which have lots of side effects [7] therefore they are not safe for long-term therapy whereas such type of conditions can be better managed by the drugs, mentioned in Ayurvedic classics.

Ayurveda advocates the use of single or combined drugs of herbal, mineral and animal origin. Because of their simple method of administration, single herbal drugs have their own importance in Ayurvedic therapeutics. Different single herbal remedies have been advocated in the management of *Sandhivata*, and some of them are studied scientifically through different clinical and pre-clinical studies. In recent past many studies have been carried out by various institutions but are still unpublished. But, recent review shows that, there is no single hand information available about these studies being carried out on single herbal drugs used in the management of *Sandhivata*. Therefore, the present review is being undertaken to compile the different research works carried out in the department of Dravyaguna, IPGT & RA, Jamnagar on single herbal drugs used in the management of *Sandhivata*.

2. Material and Methods

Different pre-clinical and clinical research studies carried out as a part of PhD (Ayu) and MD (Ayu) level researches on single herbal drugs at *Dravyaguna* department of IPGT&RA,

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Jamnagar for the management of *Sandhivata* were compiled. The obtained data have been presented in systematic manner with regards to their Sanskrit/local name, botanical identity, part used, dose and result of the research work carried out.

3. Result & Discussion

Analysis of results shows that, 22 research projects, on single herbal drugs have been conducted at *Dravyaguna* department of IPGT & RA on *Sandhivata* (Osteoarthritis). Among them 3 are clinical studies and 19 are experimental studies on related pharmacological activities like anti-inflammatory, analgesic and anti-arthritic.

3.1 Clinical studies

Drugs like *Lepidium sativum* Linn, *Leonotis nepetifolia* (L.), *Blepharispermum subsessile* DC and *Pluchea lanceolata* are found effective, clinically, in the management of *Sandhivata*. (Table 1)

3.1.1 Chandrashura (*Lepidium sativum* Linn.)

In a clinical study 40 patients of *sandhivata* were treated with Chandrashura seed powder in the dose of 6 gm. daily for 30 days. There was highly significant relief in cardinal symptoms of *sandhivata* like in *sandhishoola* (78.65%), *sandhi shotha* (86.95%), *sandhigraha* (61.11%), *sparsha asahatva* (81.81%). Overall, 30% patients got complete remission, 37.5% markedly improved, 25% were moderately improved [8].

3.1.2 Granthiparni (*Leonotis nepetifolia* (L.) R. Br.)

Whole plant decoction (25 gm. raw drug mixed with 400 ml of water and boiled reduced to 50 ml) for the duration of 6 weeks and dry aqueous extract capsule (500 mg) for the duration of 2 weeks were studied on the patients of *Sandhigata vata*. Patients treated with decoction showed significant improvement in all the sign and symptoms of *Sandhigata vata* and group treated with capsule showed improvement in *sandhishoola* only [9].

3.1.3 Rasna (*Blepharispermum subsessile* DC, *Pluchea lanceolata* (DC.) Oliv. & Hiern)

The decoction of *P. lanceolata* and *B. subsessile* root were administered at the dose of 50 ml for 3 weeks in 30 patients of *Sandhigata vata* divided in two groups having 15 patients in each group. Comparatively *B. subsessile* showed more percentage relief (85.72%) than *P. lanceolata* (71.43%) in the cardinal symptoms of *sandhivata* [10].

3.2 Experimental studies

Sixteen herbal drugs were evaluated for their anti-inflammatory (17), analgesic (13) and anti-arthritic (7) properties which are related to the management of osteoarthritis (Table 2).

Drugs like *B. scandens*, *L. sativum*, *L. nepetifolia*, *C. paniculatus*, *G. superba* L. are proven experimentally for their anti-arthritic, analgesic and anti-inflammatory activities and plants like *C. quadrangularis*, *P. foetida*, *P. lanceolata*, *B. susessile*, *B. prionitis*, *S. heyneanus*, *S. sessilis* are reported for their analgesic and anti-inflammatory activities while *D. scandens* is reported for anti-arthritic and anti-inflammatory activities.(Table 2)

Anti-inflammatory activity of *S. anacardium*, *H. integrifolia*, *D. sissoo* and analgesic activity of *T. arjuna*, *C. pareira* L. and *C. peltata* are also proved in different experimental studies. (Table 2)

3.2.1 Agastya (*Sesbania grandiflora* Linn.)

In an experimental study, *S. grandiflora* flower and leaf powder were evaluated for analgesic activity. In tail flick method, using Charles foster albino rats, the leaf powder, at the dose of 1.080 g/kg body weight, showed better results compared flower powder. In acetic acid induced writhing syndrome in mice, test drugs, at the dose of 1.56g/kg, showed non-significant decrease in abdominal writhings [11].

3.2.2 Arjuna (*Terminalia arjuna* (Roxb.) W.&A.)

T. arjuna bark powder at the dose of 270 mg/kg and 540 mg /kg body weight showed a significant effect in formalin induced paw licking response in rats. Mice pre-treated with bark powder of *T. arjuna* at the dose of 400 mg/kg and 800 mg /kg body weight statistically increased tail flick response in comparison to control group. In acetic acid writhing syndrome the test drug apparently decreased the frequency of writhing in Swiss albino rats [12].

3.2.3 Asthishrinkhala (*Cissus quadrangularis* Linn.)

Rice water cooked with shoots of *Asthishrinkhala* at the dose of 10ml/kg body weight, orally, exerted a significant anti-inflammatory activity in carrageenan, formaldehyde, nystatin induced inflammation in Charles foster albino rats and showed significant suppression of granulation tissue formation in cotton pellets implanted rats. The test drug also exhibited a weak analgesic effect at same dose on acetic acid induced writhing on Swiss albino rats [13].

3.2.4 Banda (*Bridelia scandens* Willd.)

B. scandens leaf powder at the dose of 550, 1100 mg/kg body weight, orally, exerted a statistically significant anti-inflammatory activity in carrageenan, formaldehyde, nystatin induced paw edema and cotton pellet induced granuloma. In analgesic activity, the test drug at the dose of 550mg/kg body weight exhibited highly significant analgesic effect on formaldehyde induced paw licking response in rats. The leaf powder in the same dose internally and the leaf oil applied externally for the duration of 30 days showed moderate to high significant anti-arthritic property in Freund's adjuvant induced arthritis [14].

3.2.5 Bhallataka (*Semecarpus anacardium* Linn.)

Powder of *Bhallataka* fruit, processed with gomutra (Cow's urine), *Godugdha* (Cow's milk) and *Ishtika Churna* (Brick powder), at the dose of 270 mg/kg body weight showed the significant suppression of carrageenan induced paw oedema in Swiss albino rats after 3 and 6 hours drug administration [15].

3.2.6 Chandrashura (*Lepidium sativum* Linn.)

Seed powder of *L. sativum* in the dose of 550 and 1100 mg/kg showed moderate decrease in both primary and secondary oedema in Freund's adjuvant induced arthritis in Swiss albino Rats. The seed powder at the dose of 550 mg/kg showed mild to moderate decrease and 1100 mg/kg showed statistically significant decrease in carrageenan and formaldehyde induced paw oedema in rats. In cotton pellet induced granuloma, both the dose levels showed moderate, but statistically non-significant decrease in chronic inflammation [8].

3.2.7 Chirabilva (*Holoptelea integrifolia* (Roxb.) Planch)

Holoptelea integrifolia, leaf powder (900mg/kg p.o) and leaf decoction (4.5ml/kg p.o) showed non- significant anti-inflammatory activity against carrageenan induced acute

inflammation and formalin induced sub-acute inflammation in rats. The test drug at the same dose levels did not produce any effect on radiant heat induced pain and formalin induced paw licking [16].

3.2.8 Eranda (*Ricinus communis* Linn.)

Root decoction of wild variety of *R. communis* Linn. in the dose of 10.8 ml/kg orally, showed moderate suppression of carrageenan induced paw oedema compared to its cultivated variety. In analgesic activity using radiant heat tail flick method, at the dose of 10.8 ml/kg orally, root decoction of wild variety showed highly significant analgesic effect and cultivated variety showed moderate analgesic activity [17].

3.2.9 Granthiparni (*Leonotis nepetifolia* (L.) R. Br.)

L. nepetifolia dry aqueous extract (90mg/kg, po) and decoction (4.5ml/kg, po) of whole plant showed statistically significant inhibition of paw oedema in carrageenan induced inflammation and no significant effect in formaldehyde induced paw oedema. Both the dosage form showed mild to moderate activity against cotton pellet induced granuloma formation. In analgesic activity, extract treated group showed inhibitory activity against formalin induced paw licking in rats whereas the pre-treatment with decoction increased the latency of tail flick response. The test drug in both the dosage forms showed a significant decrease of secondary oedema in Freund's adjuvant induced arthritis in Swiss albino rats [19].

3.2.10 Jyotishmati (*Celastrus paniculatus* Willd.)

Jyotishmati seed powder (200 mg/kg), leaf juice (10 ml/kg), and *Jyotishmati patra ghanavati* (390mg/kg) were studied for their anti-inflammatory and analgesic properties. *C. paniculatus* (*Jyotishmati*) leaf juice at the dose of 10 ml/kg body weight orally showed a statistically significant decrease in formaldehyde induced paw oedema. The leaf juice showed a statistically significant analgesic effect at 10 ml/kg in formaldehyde induced paw licking in rats. Seed powder (150 mg/kg) and *Jyotishmati patra ghanavati* (300 mg/kg) showed moderate anti arthritic activity in Freund's adjuvant induced arthritis [18].

3.2.11 Kupeelu (*Strychnos nux-vomica* Linn.)

In an experimental study, raw and purified seeds (*Kanji* and A.F.I approved method) of *Strychnos nux-vomica* Linn. were studied for anti-inflammatory activity. In carrageenan induced paw edema study, all of three groups failed to inhibit the oedema at the dose of 22.5 mg/kg but in formaldehyde induced paw oedema, the raw drug and *kanji sodhita* sample exhibited significant inhibition in oedema. In Analgesic activity, purified (As per AFI method) seeds, at the dose of 22.5 mg/kg showed significant effect in formaline induced paw licking [19].

3.2.12 Langali (*Gloriosa superba* Linn.)

Roots of natural and cultivated varieties of *G. superba* were studied for their anti-inflammatory, analgesic and anti-arthritic activities. Cultivated variety at the dose of 4.2 ml/kg of body weight showed the mild decrease in carrageenan induced paw oedema (11.51%). A marginal but statistically non-significant increase in latency of onset was observed in natural variety administered group. In formaldehyde induced paw licking, the frequency of licking was not affected to a significant level. In anti-arthritic activity, the effect observed was inconsistent indicating weak magnitude of activity [20].

3.2.13 Patha (*Cissampelos pareira* Linn. and *Cyclea peltata* (Lam) Hook F & Thomas)

In an experimental study, root powder (540mg/kg) of *Cissampelos pareira* and *Cyclea peltata* showed significant analgesic activity in tail flick method, whereas ethanolic extracts (200 mg/kg) of both the test drugs exhibited statistically significant analgesic activity in acetic acid induced writhing model [21].

3.2.14 Prasarani (*Paederia foetida* Linn.)

The decoction of *P. foetida* whole plant at the dose of 10ml/kg of body weight orally and intra peritonally exerted anti-inflammatory activity in contrast the cotton pellet dipped in *P. foetida* oil (10ml/kg) implanted rats showed no granulation formation. The drug exhibited weak to moderate decrease in primary and secondary oedema in Freund's adjuvant induced arthritis in Rats and a weak analgesic activity in acetic acid induced writhings in Swiss albino mice [22].

3.2.15 Rasna (*Blepharispermum subsessile* DC, *Pluchea lanceolata* (DC.) Oliv. & Hiern)

In an experimental study, the decoction of *P. lanceolata* and *B. subsessile* root were studied for anti-inflammatory and analgesic activities in dose of 4.5ml/kg body weight of rat. Both the test drugs showed mild to moderate anti-inflammatory activity in carrageenan and formaldehyde induced paw oedema. In analgesic activity, *P. lanceolata* and *B. subsessile* in the dose of 4.5ml/kg body weight showed statistically significant increase in latency onset of paw licking after formaline injection in rats [10].

3.2.16 Sahacara (*Barleria prionitis* Linn, *Strobilanthes heyneanus* Nees, *Strobilanthes sessilis* Nees.)

Alcoholic extract and pills extract of stem of *B. prionitis* Linn., *S. heyneanus* and ethanolic extract of *S. sessilis* at the dose of 400, 800, 1600 mg/kg body weight intra- peritoneal exerted a significant anti-inflammatory activity in acute inflammation (carrageenan induced) and at the dose of 400,800mg/kg body weight exerted a significant anti-inflammatory activity in chronic inflammation (cotton pellets implantation). Ethanolic extract of stem of *B. prionitis* and *S. heyneanus* and methanolic and aqueous extract of *S. sessilis* at the dose of 400, 800mg/kg body weight intra- peritoneal exerted a significant analgesic effect on acetic acid induced writhing on mice [23].

3.2.17 Shinshapa (*Dalbergia sissoo* Roxb.)

In an experimental study, *Ghanavati* (Tablet) of *Shinshapa kandatwak* (Stem bark of *Dalbergia sissoo*) at the dose of 200 mg/kg body weight for seven consecutive days exerted a weak anti-inflammatory activity in carrageenan and formaldehyde induced paw oedema. In the same dose level, the drug exhibited mild analgesic activity in formaldehyde induced paw licking in rats. The drug, in the dose of 260 mg/kg body weight showed significant decrease in tail flick response in analgesic activity [24].

3.2.18 Shyonaka (*Oroxylum indicum* Linn.) Vent

Decoction of root and stem bark of *O. indicum* at the dose of 14ml/kg body weight produced significant attenuation of carrageenan induced paw oedema in rats [25].

3.2.19 Surma (*Derris scandens* Benth.)

The decoction of stem of *D. scandens* at the dose of 5,10, 20 ml/kg and juice at the dose of 20 ml/kg body weight exerted a significant anti-inflammatory activity in carrageenan, formaldehyde and nystatin induced paw oedema and showed

significant suppression of granulation tissue formation in cotton pellets implanted rats. The decoction at the dose of 10 ml/kg body weight also exhibited weak to moderate anti-arthritis property in Freund's adjuvant induced arthritis [26].

Table 1: Single drugs clinically studied for their effect on *Sandhivata* (Osteoarthritis)

S.N.	Name	Botanical name/family	Part used
1.	<i>Chandrashura</i>	<i>Lepidium sativum</i> Linn. (Cruciferae)	Seed powder
2.	<i>Granthiparni</i>	<i>Leonotis nepetifolia</i> (L.) R.Br. (Laminaeae)	Dry aqueous extract and decoction of whole plant
3.	<i>Rasna</i>	<i>Blepharispermum subsessile</i> DC, <i>Pluchea lanceolata</i> (Asteraceae)	Decoction of root

Table 2: Single drugs reported for their pharmacological activities related to the management of *Sandhivata* (Osteoarthritis)

S. No.	Name	Botanical identity	Family	Part used	Research activity
1.	<i>Agastya</i>	<i>Sesbania grandiflora</i> Linn.	Fabaceae	Flower and leaf powder	Analgesic Activity
2.	<i>Arjuna</i>	<i>Terminalia arjuna</i> (Roxb.) W. & A.	Combretaceae	Bark powder	Analgesic Activity
3.	<i>Asthi-shrinkhala</i>	<i>Cissus quadrangularis</i> Linn.	Vitaceae	Shoots	Anti-inflammatory, Analgesic
4.	<i>Banda</i>	<i>Bridelia scandens</i> Willd.	Euphorbiaceae	Leaf powder	Anti-inflammatory, Analgesic, Antiarthritic.
5.	<i>Bhallataka</i>	<i>Semecarpus anacardium</i> Linn.	Anacardiaceae	Fruit powder	Anti-Inflammatory
6.	<i>Chandrashura</i>	<i>Lepidium sativum</i> Linn.	Cruciferae	Seed powder	Anti-Inflammatory, Analgesic, Anti-arthritis.
7.	<i>Chirabilwa</i>	<i>Holoptelea integrifolia</i> (Roxb.) Planch	Ulmaceae	Leaf powder, leaf decoction	Anti-inflammatory
8.	<i>Eranda</i>	<i>Ricinus communis</i> Linn.	Euphorbiaceae	Root decoction	Anti-Inflammatory, Analgesic
9.	<i>Granthiparni</i>	<i>Leonotis nepetifolia</i> (L.)R.Br.	Laminaeae	Extract & decoction of whole plant	Anti-Inflammatory, Analgesic, Anti-arthritis.
10.	<i>Jyotishmati</i>	<i>Celastrus paniculatus</i> Willd.	Celastraceae	Leaf juice	Anti-inflammatory, Analgesic, Anti-arthritis.
11.	<i>Kupeelu</i>	<i>Strychnos nux-vomica</i> Linn.	Loganiaceae	Seeds (<i>shodhita</i> and <i>ashodhita</i>)	Anti-inflammatory, Analgesic
12.	<i>Langali</i>	<i>Gloriosa superba</i> Linn.	Colchicaceae	Root powder	Anti-inflammatory, Analgesic, Anti – arthritic
13.	<i>Patha</i>	<i>Cissampelos pareira</i> Linn. and <i>Cyclea peltata</i> (Lam) Hook F & Thomas	Menispermaceae	Root powder	Analgesic
14.	<i>Prasarani</i>	<i>Paederia foetida</i> Linn.	Rubiaceae	Decoction and oil form by entire plant	Anti-inflammatory, Analgesic
15.	<i>Rasna</i>	<i>Blepharispermum subsessile</i> DC <i>Pluchea lanceolata</i> (DC.) Oliv. & Hiern	Asteraceae	Root decoction	Anti-inflammatory, Analgesic
16.	<i>Sahacara</i>	<i>Barleria prionitis</i> Linn. <i>Strobilanthes heyneanus</i> Nees, <i>Strobilanthes sessilis</i> Nees	Acanthaceae	Alcoholic extract and pills extract of stem	Anti-inflammatory, Analgesic
17.	<i>Shinshapa</i>	<i>Dalbergia sissoo</i> Roxb.	Fabaceae	Pill of stem bark	Anti-inflammatory
18.	<i>Shyonaka</i>	<i>Oroxylum indicum</i> (Linn.) Vent	Bignoniaceae	Root stem bark decoction	Anti-inflammatory
19.	<i>Surma</i>	<i>Derris scandens</i> Benth.	Fabaceae	Decoction and juice of stem	Anti-inflammatory, Anti-arthritis.

4. Conclusion

Sandhivata (Osteoarthritis) is the most common rheumatological problem hampering the quality life of the patients and the main aim of the therapy should be focused on improving it. Different single herbal drugs mentioned in Ayurveda showed significant results in improvement quality of life of the patients. Being easily available and because of their simple method of administration and devoid of any adverse reactions, these drugs can be used in the management

of *Sandhivata* (Osteoarthritis) in clinical practice.

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