**LITERATURE REVIEW**

- **Rao V. N., et. al., (1996),** standardized the Ksheer bala taila. Study assessed that the medicated oil considered to be of therapeutic value was obtained by Mridu, Madhya and khara paka lakshana. But ama and dugdha paka oils are not recommended. Kshir bala taila was assessed for its boiling point, colour, appearance, clarity, taste, opalescence, specific gravity, refractive index (40°C), acid value, saponification value, Iodine value, unsaponifiable matter and sesame oil test. Spectroscopic analysis of 10% solution taila in cyclohexane showed very weak peak near 675 nm, 2 peaks of lignans sesamin and sesamolin at 287 and 233 nm which are flat in case of dagdha paka oil.

- **Venkatesh S., et. Al. (1999),** evaluated various organic extracts of *Sida rhomboidea* leaves were studied for antinociceptive and anti-inflammatory activity at a dose of 200 mg/kg. Ethyl acetate extract has shown significant (P<0.01) antinociceptive activity. Percentage inhibition of edema by butanolic extract (33.05, P<0.001) is comparable to that of phenylbutazone, 100 mg/kg inhibition (38.83%). Phytochemical screening of the extracts indicated the presence of alkaloids, steroids and/or triterpenoids and their glycosides, tannins, flavonoids and their glycosides, carbohydrates and absence of cardiac glycosides.

- **Shah M.R., et. al., (2010),** studied effect of Matra Vasti (therapeutic enema) - Bala taila as Vasti in vatavyadhies. It has vatashamaka and rasayana properties. Indigenous compound drug containing Guggulu, Shallaki, Yastimadhu, Pippali, Guduchi, Nirgundi, Kupilu and Godanti was given in one group along with Matra Vasti. In this study, 33 patients of Sandhigatavata completed the treatment. Patients were randomly divided into two groups. Sixteen patients in Group-A (sarvanga Abhyanga-swedana + matravasti) and 17 patients in Group-B (sarvanga Abhyanga-swedana+ matravasti + indigenous compound drug). The results of the study indicate that the patients of both the groups obtained highly significant relief in almost all the signs and symptoms of Sandhigatavata.
• **Government of India, Ayurvedic Pharmacopoiea of India, (2007),** included Kshir bala taila preparation information. Preparation was made up of *Sida cordifolia* roots, cow milk, *Sesamum indicum* oil and water. The mornograph like information consisted method of preparation, TLC identification test, Physico chemical parameter standards like Refractive index (40ºC) - 1.451 to 1.460, Density – 0.93 to 0.945 gm/ml, saponification value – 185 to 200, Iodine value – 75 to 100, peroxide value ≤ 2, acid value ≤ 6.5, mineral oil test, rancidity test, storage conditions dose, administration instructions and therapeutic uses – gout, vata, disorders, menstrual disorders, emaciation, horseness of voice etc.

• **Astang hridaya, (1992),** gave method of preparation of kshirbala taila. Taila is processed with kvatha and kalka of bala and ksira. One part of prescribed kalka (paste) is boiled with 4 parts of oil and 16 parts of the drava dravya (liquid). These are boiled till the liquid added has evaporated and the paste does not stick to the bottom of the vessel. Action rasayana, indriya prasadaka, jivana, brmhana, svarya, symptoms sukra, asrk dosa, rasayana, indriya prasadaka, jivana, brmhana, svarya, in dosha, vata hara.

• **Ras rasayan kalp group, (1966),** includes shloka consisting information for ingredients, method of preparation and uses of Kshir bala tail. According to given procedure, bala roots kalka and kashaya, cow milk are boiled with til taila till khara paka lakshana. Taila is taken with milk before lunch in vaat vyadhi (arthritis) and daurbalya (weakness).

• **Sutradhar R. et. al. (2006),** studied anti inflammatory and analgesic effect of an alkaloid isolated from aerial parts of *Sida cordifolia* in acetic acid induced writhings, carageenan induced rat paw edema and radiant tail flick in mice. The purified compound showed significant analgesic activity in both models.

• **Sotnikova R, et. al., (2009),** studied effect of sesame oil on functional damage induced by adjuvant arthritis (AA) and on changes of selected biochemical parameters reflecting oxidative tissue injury. Mycobacterium butyricum in incomplete Freund's adjuvant was intradermally administered to Lewis male rats. Hind paw edema and endothelium-dependent relaxation of the aorta were
determined on day 28. Further, plasmatic levels of TBARS, gamma-glutamyltransferase (GGT) activity in the joint and spleen tissues, level of protein carbonyls and total antioxidant capacity (TAC) in plasma, as well as activity of the lysosomal enzyme N-acetyl-glucosaminidase (NAGA) in serum were assessed. The effect of sesame oil (SO, 1ml/kg, daily oral administration) was evaluated on day 28. The beneficial effect of sesame oil on markers of oxidative stress accompanying AA was demonstrated by decrease of plasma TBARS and decrease of GGT activity in the joint and spleen tissues. Level of protein carbonyls, TAC in plasma and activity of NAGA in serum and in the kidney were improved, yet not significantly. In the hind paw edema the maximal increase was found on day 28 of AA, and in the same time we observed a significant decrease of aortic endothelium-dependent relaxation.

- Franzotti E.M., et. Al., (2000), studied the anti-inflammatory, analgesic effects and acute toxicity of an aqueous extract of *Sida cordifolia* in animal models. The aqueous extract of *S. cordifolia* showed low acute toxicity in mice. The extract was prepared using leaves collected before the flowering period. The aqueous extract (AE) showed a significant inhibition of carrageenin-induced rat paw edema at a dose of 400 mg/kg administered orally, but did not block the edema induced by arachidonic acid. The AE also increased the latency period for mice in the hot plate test, and inhibited the number of writhes produced by acetic acid at the oral dose of 400 mg/kg.

- Sutradhar R. K., et. Al., (2008), isolated two new flavones: 5,7-dihydroxy-3-isoprenyl flavone (1) and 5-hydroxy-3-isoprenyl flavone (2), along with two known compounds β-sitosterol and stigmasterol from the chloroform extract of *Sida cordifolia*. Their structures were established on the basis of spectroscopic analysis. Flavones were tested for their analgesic and anti-inflammatory activity using Acetic acid induced writhing test and Carrageenan induced rat paw edema. The results showed significant anti-inflammatory and analgesic effect compared to negative control group.

- Kanth V. R., et. al., (1999), studied *Sida cordifolia* extracts of the aerial and root parts showed good analgesic, antiinflammatory and hypoglycaemic activities. The
ethyl acetate (EA) extract of root (SCR-E) showed comparable anti inflammatory activity with Indomethacin and possessed significant higher activity when compared with that of the methanol extract of the root part (SCR-M). The ethyl acetate extract of both root and aerial parts of *Sida cordifolia* (SCR-E and SCA-E) showed very good central and peripheral analgesic activities at a dose of 600 mg/kg. The methanol extract of root (SCR-M) was found to possess significant hypoglycaemic activity. Methanol extract was less active.

- **Sumantran V.N., et. al., (2007),** assessed the chondroprotective potential of Triphala guggulu (TG) by examining its effects on the activities of pure hyaluronidase and collagenase type 2 enzymes. Triphala shodith guggulu (TSG), an intermediate in the production of TG, was also examined. A spectrophotometric method was used to detect potential Hyaluronidase inhibitors. Aqueous and hydro-alcoholic extracts of TSG showed weak but dose-dependent inhibition of hyaluronidase activity. In contrast, the TG formulation was 50 times more potent than the TSG extract with respect to hyaluronidase inhibitory activity. A validated X-ray film-based assay was used to measure the gelatinase activity of pure collagenase type 2. Hydro-alcoholic extracts of the TG formulation were 4 times more potent than TSG with respect to collagenase inhibitory activity. Components of Triphala were also evaluated for their inhibitory activities on hyaluronidase and collagenase. This is the first report to show that the T2 component of Triphala (*T.chebula*) is a highly potent hyaluronidase and collagenase inhibitor. Thus, the TG formulation inhibits two major enzymes that can degrade cartilage matrix.

- **Medhi B., et. al., (2009),** did randomized, double-blind, comparative clinical study to compare the safety and efficacy of castor oil with diclofenac sodium in patients with knee osteoarthritis. Subjects were given a castor oil capsule 0.9 mL (n = 50) thrice daily for 4 weeks or a capsule of diclofenac sodium (n = 50), 50 mg thrice daily for 4 weeks. The subjects completed an overall evaluation of symptom relief at 2 weeks and 4 weeks of completed treatment. The subjects were evaluated by clinical, routine laboratory and radiographic investigations for improvement of disease conditions and also for adverse drug reaction. On completion of 4 weeks treatment it was observed that both drugs were significantly effective in the treatment of knee osteoarthritis (p < 0.001) and adverse drug reactions were high
with diclofenac sodium, whereas with castor oil there were no adverse effects reported.

- **Singh B.B., et. al., (2003)**, conducted both preclinical and clinical investigations of guggul for reduction of pain, stiffness, and improved function and determined tolerability in older patients with a diagnosis of OA of the knee. Using quasi-experimental model, thirty male and female participants meeting the inclusion/exclusion criteria, with a score of 2 or more on the Kellegran-Lawrence scale for at least 1 knee, were admitted in the study. CM was administered in capsule form (500 mg concentrated exact delivered TID) along with food. VAS scales, 6-minute walk-test, and WOMAC subscales were used as outcome measures. At the end of treatment, there was a significant difference in the scores of the primary and secondary outcome measures. On the primary measure, WOMAC total score, participants were significantly improved (P < 0.0001) after taking the supplement for 1 month and continued to improve at the 2-month marker and follow-up. Secondary measures of pain in the VAS format demonstrated participant improvement; however, mood state, and current pain were not significantly different (P < 0.05) than baseline until the 2 month assessment (P < 0.001).

- **Edavalath M., (2010)**, studied effect of Niruha basthi with Balaguduchyadi yoga, combined by Shamana treatment with Rasnerandadi kwatha and Simhanada guggulu in akylowing spondilitis which show a strong association with the genetic marker HLA-B27. Formulations have been found effective in curbing its progression. The case report showed that the treatments achieved considerable success with healing in Inflammatory back pain and stiffness are prominent early in the disease, whereas chronic, aggressive disease may produce pain and marked axial immobility or deformity.

- **Lee S. I., et. al., (2005)**, examined the effectiveness of CHE (Chebulic acid extract) against the onset and progression of collagen-induced arthritis (CIA) in mice. Arthritis was induced in DBA/1J mice by subcutaneous immunization with bovine type II collagen on days 0 and 21. CHE was administered intraperitoneally for 3 weeks, either as prophylaxis (10 or 20 mg/kg) before disease onset or as
therapy (20 mg/kg) after disease onset. In both the prophylactic and therapeutic CHE dosing models, all clinical scores, serum levels of total and anticollagen IgG, and levels of interleukin-10 (IL-10) and IL-6 were reduced, while serum levels of transforming growth factor beta (TGFbeta) were markedley elevated. The number of granulocytes was reduced, but the proportion of CD4+CD25+ T cells was greater in the knee joints of CHE-treated CIA mice. Expression of Foxp3 and TGF beta messenger RNA was also augmented significantly in the knee joints of CHE-treated CIA mice in the therapeutic dosing model.

- **Government of India, Ayurvedic Formulary of of India, (2006),** included Simhanad Guggulu vati preparation, made with ingredients, *Terminalia chebula, Terminalia belerica, Embelica officinalis,* purified *Commiphora weightii* resin, purified sulphur and *Ricinus communis* oil, Vati method of preparation, identification test, test for sulphur. Physico-chemical parameters like Loss on drying, ≤ 12 % w/w, Total ash ≤ 7 % w/w, acid insoluble ash ≤ 3.5 % w/w, alcohol soluble extractive value ≥ 31 % w/w, pH (1%) 4.87 to 5.33. It has therapeutic uses in limping, anaemia, rheumatism, skin disease, asthma, cough, pain etc. It has information of description of formulation, storage conditions, dose and administration guideline.

- **Vaidh Thakkur G. K., (1966),** compiled method of preparation, quantity of ingredients, administration instructions and uses (vaat disorders) of Simh nad guggul. Procedure consisted triphala churna water extract is heated with shuddha guggul, shuddh gandhak (sulphur) till froth disappears. Dried mixture is then rolled between palm covered with castor oil.

- **Ras rasayan kalp group, (1966),** described method of preparation in shloka manner, use in ama vata condition. Kalka of amla, harde, baheda, piper, devdaru, vidang, marich, sarp tail, sunth, piper root, hing, sea salt, nagarmotha, fennel, kuth, bach, bijaura svaras, are prepared and heated to complete removal of water and then rolled between palm with help of sarsav taila.

- **Deng R., et. al., (2007),** found that oleo gum resin from *Commiphora* species found in India, Bangladesh and Pakistan are known to treat various disorders like
hyper cholesteremic, arthrosclerosis, rheumatism and obesity from several thousand years. Guggulosterols were isolated from guggul and identified for their actions. Apart from variations in sample size, study designs, method qualities, statistical analysis and subject populations, cumulative data from in vitro, preclinical and clinical studies largely support the therapeutic claims. Guggulosterone is an antagonist at FXR receptor- a key transcriptional regulator for maintenance of cholesterol and bile acid homeostasis. Recent study demonstrates that guggulosterone up-regulates the bile salt export pump (BSEP), an efflux transporter responsible for removal of cholesterol and bile acids and their metabolites from liver. It also inhibits activation of nucelar factor KB a critical regulator of inflammatory responses.

- **Meena A.K., et. al., (2010)**, standardized Yograj guggulu lab and marketed formulation. Standardization was done with physic-chemical parameters like Moisture content, Ash value, extracability in water, alcohol, TLC study, Resin content, hardness, Uniformity of weight, friability, Disintegration time, according to WHO guidelines.

- **Patwardhan S.K., et. al., (2010)**, reviewed the efficacy of some of the valuable herbs like guggulu, bhallataka, ginger, ashwagandha etc. having anti inflammatory and anti arthritic action. Pre clinical and clinical studies reports proved that these herbs usage is effective and safe for anti arthritic therapy.

- **Rasool M., et. al., (2007)**, evaluated the antiarthritic effect of the Indian Ayurvedic herbal formulation Triphala on adjuvant-induced arthritis in mice and to compare it with that of the non-steroidal anti inflammatory drug indomethacin. Triphala (1 g/kg/bxwt) and indomethacin (3 mg/kg/bxwt) were administered orally for 8 days (from day 11 to 18) after adjuvant injection. The levels of lysosomal enzymes, tissue marker enzymes, glycoproteins and paw thickness were increased in adjuvant-induced arthritic animals. The body weight was found to be reduced when compared with the control animals. These physical and biochemical changes observed in arthritic animals were altered significantly to near normal conditions after oral administration of Triphala (1 g/kg/bxwt). The results indicates the fact that the Triphala has promising anti-inflammatory activity.
Sabina E.P., et. al. (2008), investigated the efficacy of Indian ayurvedic herbal formulation Triphala on monosodium urate crystal-induced inflammation in mice; an experimental model for gouty arthritis and compared it with that of the non-steroidal anti-inflammatory drug, Indomethacin. The levels of beta-glucuronidase and lactate dehydrogenase were also measured in monosodium urate crystal-incubated polymorphonuclear leucocytes (PMNL). Triphala treatment (1 gm/kg/b.w./p.o.) significantly inhibited the paw volume and the levels of lysosomal enzymes, lipid peroxidation and inflammatory mediator tumour necrosis factor-alpha; however the anti-oxidant status was found to be increased in plasma, liver and spleen of monosodium urate crystal-induced mice when compared to control mice. In addition, beta-glucuronidase and lactate dehydrogenase level were reduced in Triphala (100microg/ml) treated monosodium urate crystal-incubated polymorphonuclear leucocytes. In conclusion, the results obtained clearly indicated that Triphala exerted a strong anti-inflammatory effect against gouty arthritis.

Gupta M., et. al., (2010), studied a polyherbal preparation Triphala, which consists of equal amounts of fruits of three plants namely Terminalia chebula Retz., Terminalia bellirica Roxb. and Emblica officinalis Gaertn. in fine powder form, has been specifically mentioned in traditional Ayurvedic texts for its beneficial effects in geriatric diseases. The article contained chemical constituents - tannins, phenols and glycosides which are responsible for its strong antioxidant activity apart from its immunomodulatory, anti-inflammatory, analgesic and antimutagenic properties. These showed Triphala as an effective remedy for geriatric degenerative diseases.

Nair V, et. al, (2010), studied the anti-arthritic effect of Terminalia chebula hydroalcoholic extract (TCHE) in experimental models and attempted to correlate the effect of treatment on macrophage-derived pro-inflammatory cytokine expression and extent of disease activity. An acute and 28-day oral toxicity study was carried out to evaluate the safety of the test drug from which results showed that the oral LD50 of TCHE was >2000 mg/kg. Arthritis was induced in rats by subplantar administration of either formaldehyde or complete Freund's adjuvant
Joint size was measured at regular intervals by using a micrometer screw gauge. Serum and ankle joints of rats immunized with CFA were collected and subjected to ELISA for estimation of TNF-α level and immuno-histochemistry for detection of IL-1β, IL-6 and TNF-R1, respectively. TCHE produced a significant inhibition of joint swelling as compared with control in both formaldehyde-induced and CFA-induced arthritis. TCHE treatment also reduced serum TNF-α level and synovial expression of TNF-R1, IL-6 and IL-1β. Results indicated that the anti-arthritis activity of TCHE was due to modulatory effect on pro-inflammatory cytokine expression in the synovium.

- **Bernard I., et. al. (1939)**, reviewed for sulphur mineral in pathogenic condition of arthritis. Colloidal sulphur was first used in treatment of arthritis. By French and German clinicians it was proved that in arthritis that is disturbed sulphur metabolism. Review it was noticed that sulphur demand had increased for body detoxification from injurious metabolism. Lower content of cysteine of nails in arthritis is proof for the same. Sulphur is given induced arthritis, in different forms, orally, parenterally, at baths, ointments etc. In greek sulphur is known as ‘theriou’ – devine sulphur and molasses are old remedy for rheumatic diseases.

- **William P. A., et. al., (2000)**, studied sole sulphur therapy, no other form of therapy was used. The injections were given, either intravenously or intramuscularly (2 cm³), in the form of Sulfur-Diasporal at weekly or biweekly intervals. The cystine content of the finger nails was determined by Sullivan and the results, indicated the percentage of the substance in the material examined. The sedimentation reaction was determined by the Cutler method and the readings were observed at the end of one hour only, two types of improvement were noted: a marked improvement consisted of cessation of pain and tenderness, disappearance of the muscular rigidity and swelling and restoration of mobility to the point of expectancy. Roentgenographic examination disclosed new bone formation, with marked evidence of periosteal changes.

- **Banerjee et. al., (1991)**, studied petroleum ether extract of *Ricinus communis* exhibited significant anti inflammatory activity against formaldehyde and adjuvant induced arthritis. It was found that *Ricinus communis* was safe up to a dose of 1
gm/Kg p.o. in rats and below 150 mg/Kg p.o. dose it has no analgesic effect but significant anti inflammatory activity in rat paw edema.

- **Saini A. K., (2010)**, screened *Ricinus communis* (RC) for anti-inflammatory potential using carrageenan-induced paw edema (Acute model) and cotton pellet induced granuloma models (Sub-chronic model) in Wistar rats. For this 80% methanolic extract (ME) at 2 doses 250 and 500 mg/kg and total flavonoids fractions (FF) at three different doses 25, 50 and 100 mg/kg, were studied in acute model. The ME (500 mg/kg) and FF 50 mg/kg showed potent anti-inflammatory action in this model. Moreover FF (50 mg/kg) had shown almost same effect as shown by FF at the dose of 100 mg/kg. Hence, ME (500 mg/kg) and FF (50 mg/kg) have been selected for further evaluation in sub-chronic model. The results of ME (500 mg/kg) and FF (50 mg/kg) were at par with diclofenac sodium (20 mg/kg). The study shows the RC leaves have anti-inflammatory potentials and flavonoids are dominating this activity in the extract.