

Original Article

# Canine Osteoarthritic Pain and Joint Inflammation: The Role of Poly Herbal Formulations

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**Abstract** - Assess the polyherbal formulation's (PHF) *in vivo* effectiveness for anti-inflammatory and analgesic properties in dogs. Clients-owned 31 dogs having antiquity of arthritis, dysplasia of hip, pain, and inflamed joints were chosen as G1 ( $n = 31$ ) and supplemented with PHF initial 4-6 weeks; for dogs of small breeds: 1 tablet once daily. For dogs of large breeds: 2 tablets daily once, followed by maintenance (After the initial Period): half the quantity of above-recommended usage until complete recovery. Lameness, palpation pain, joint movement, scores of the bearing of weight, and the total score of clinical condition were examined along with changes in the evaluation parameters. The outcomes demonstrated that dogs' lameness, pain on palpation, joint movements, and the score of weight-bearing considerably ( $p < 0.001$ ) declined by one month after PHF supplementation; consequently, the total score of the clinical condition also significantly ( $p < 0.001$ ) dropped by one month. In conclusion, the administration of PHF caused the amelioration of osteoarthritic joint pain and joint inflammation in dogs through the analgesic and anti-inflammatory activities of the individual herbal ingredients in PHF.

**Keywords** - PHF, Canines, Anti-inflammation, Analgesic, Lameness, Joint.

## 1. Introduction

Degenerative joint disease osteoarthritis is a chronic inflammatory joint disease characterized by decreased cushion and synovial fluid variations that result in pain, stiffness, swelling, and numbness. The cartilage, synovial fluid, and bone all suffer from osteoarthritis in the synovial joint as a whole. Changes in the synovial membrane, bone hypertrophy at the margins, and soft tissue and cartilage degeneration are hallmarks of this disease [23, 24]. The friction between the bones caused by the cartilage's continued breakdown results in the thickening of the soft tissue, inflammation, and a loss of movement joints [4].

Arthritis is a chronic condition that affects both humans and animals. Dogs suffer from arthritis more frequently than any other domestic or pet animal species due to overtraining, injury, or genetic predisposition. Some breeds, like the Labrador Retriever and the German Shephard, have a genetic predisposition to causing joint inflammation [3].

Medications such as steroids and Nonsteroidal anti-inflammatory drugs (NSAIDs) are used to treat osteoarthritis. These medications only manage pain and inflammation, not the underlying problem. Prostaglandins, a class of chemicals made by cells that cause inflammation [23, 4], are a target for NSAIDs. Pharmaceuticals, however, Steroids and nonsteroidal anti-inflammatory drugs (NSAIDs) have a danger of side effects and toxicity like gastrointestinal bleeding, renal dysfunction, and hepatic dysfunction. Thus, surge in the search for food supplements as an alternative treatment [26]. Herbal supplements are becoming increasingly popular in

veterinary medicine because of their safety margin and lack adverse effects [4].

The anti-inflammatory and analgesic activities of botanicals, such as avocado/soybean unsaponifiables (ASU) *Zingiber officinale*, *Allium sativum*, *Ananas comosus* and *Commiphora wightii* have been reported in the literature [24],[14],[16],[17].

With this background and the growing popularity of traditional herbal preparations, the polyherbal formulation (PHF) was developed by Himalaya Wellness Company (Bengaluru, India). It claims to possess antiarthritis, anti-inflammatory, and analgesic activities in dogs. Hence, this study assessed the *in vivo* efficacy of PHF to verify its usefulness in managing pain and osteoarthritic inflammation of joints in canines.

## 2. Materials and Methods

### 2.1. Polyherbal formulation (PHF)

PHF is a proprietary polyherbal preparation called Mobility Plus developed through M/s. Himalaya Wellness Company in Bengaluru, Karnataka, India. PHF is composed mainly of Shunti (*Z. officinale*), Lasuna (*A. sativum*), avocado (*Persea americana*), soybean (*Glycine max*), Ananas (*A. comosus*), and Guggulu (*C. wightii*).

### 2.2. Ethical Committee Approval

Use and care of animals guidelines and Himalaya Wellness Company Institutional Animal Ethics Committee approved study protocol (protocol no. AHP/SA/10/18) followed during this study.



### 2.3. Study Subjects

A total of 31 dogs clients-owned, of different age groups, breeds, and sexes, having a history of arthritis, hip dysplasia, and joint inflammation, presented at VetMedix Clinic (Bengaluru, Karnataka), were enrolled in the study. The study details, treatment plan, outcomes, and pros and cons are explained to the pet owner. Consent was obtained before enrollment in the study.

### 2.4. Study Design and Experimental Details

For G1 (n = 31), 31 dogs of clients-owned having arthritis, dysplasia of the hip, and inflamed joints enrolled and supplemented with PHF, initial for -6 weeks in dogs of large breeds: 2 tablets per day, dogs of small breeds: 1 tablet per day, followed by maintenance (After initial Period): half the quantity of above-recommended usage until complete recovery. Based on the severity of the disease, dogs were treated with meloxicam injection. Meloxicam injection single dose, either intravenous or subcutaneous at 0.2 mg/kg body weight, was administered initially. Concurrently, any crusts from injury on the skin were removed gently with a brush, sterile saline solution cleaning, and dry sterile cotton wiping. When PHF was administered to the dogs, concurrent treatment with another analgesic, antipyretic, and anti-inflammatory supplement was not followed.

### 2.5. Evaluation of the Study Parameters

The adjustments to the assessment parameters, namely after PHF supplementation, scores for lameness, pain on palpation, joint mobility, the bearing of weight, and total condition of clinical were to evaluate the PHF role in the management of osteoarthritis and joint disorders in dogs according to the grading system described in Table 1 [22].

### 2.6. Statistical analysis

The data were represented by the standard error of the mean (SEM). A two-way analysis of variance (ANOVA) on the data was performed after the Bonferroni test to compare the conditions before treatment (day 0) and during treatment (i.e., the 15, 30, 45, and 60th days); statistically significant was considered when  $p \leq 0.05$ .

## 3. Results and Discussion

Available pharmacological practices for controlling joint inflammatory conditions with NSAIDs result in severe adverse health illnesses, such as gastrointestinal abnormalities, bleeding, subnormal functioning of renal and hepatic organs, and ulceration-like complications. Furthermore, colchicine and corticosteroid-like medications are associated with endangered toxicity and severe bone marrow disorders [27]. Hence, traditional herbal medicines are gaining popularity for managing and ameliorating inflammatory reactions and preventing aggravations of osteoarthritic conditions [31]. Therefore, the in vivo efficacy study of PHF was evaluated in managing osteoarthritic joint inflammations and pain in canines.

In this study, the assessment parameters *viz.* joint mobility, pain, lameness, and weight-bearing scores

numerically reduced in dogs by 2 weeks 15 after PHF supplementation but significantly ( $p < 0.001$ ) decreased on days 30, 45, and 60; hence, the overall clinical condition score was numerically decreased as early as day 15 and significantly ( $p < 0.001$ ) decreased on days 30, 45, and 60 after PHF supplementation. However, the complete amelioration of joint mobility, pain, lameness, and weight-bearing ability was observed on day 60 (Table 2). The amelioration of dogs' joint mobility, lameness, pain, and weight-bearing ability after supplementation could be ascribed to the anti-inflammatory and antiarthritis activities of PHF.

The anti-inflammatory and antiarthritis activities of PHF could be credited to individual herbal ingredients *viz.* *Z. officinale*, *A. sativum*, *P. americana*, *G. max*, *A. comosus*, and *C. wightii*, present in PHF. It was revealed from the research study that decreased necessity for NSAIDs without significant changes in pain scores after treatment of osteoarthritis patients with ASU along with NSAIDs [6]. Ernst et al. [10] evaluated the usefulness of ASU therapy in osteoarthritis patients and observed a decrease in the functional index of Lequesne, amelioration of disability scores, and pain. In addition, compared to controls, 71% of treated patients consumed 50% fewer NSAIDs [10]. Maheu et al. [20] reported no improvement in the hip joint space width (JSW) after three years of ASU therapy for osteoarthritis patients. However, a 20% prevention of JSW aggravation was noticed [20].

*C. wightii* tree gum resin contains the steroid guggulsterone. The resin of *C. wightii* has been used in Ayurvedic medicine for centuries to treat conditions like inflammation, obesity, arthritis, cardiovascular disease, and lipid abnormalities [33, 29]. Furthermore, numerous research has shown that guggulsterone is efficient in treating knee osteoarthritis [19, 30].

Extracts of *A. sativum* have anti-inflammatory properties. According to Hobauer et al. [15] and Gu et al. [11], *A. sativum* extracts inhibit the migration of neutrophilic granulocytes into epithelia, resulting in their anti-inflammatory properties. According to Jeong and co, aged black garlic's (ABG) anti-inflammatory benefits may be due to its antioxidant capabilities [15, 11]. Additionally, Jeong et al. research [16] showed that the chloroform extract of ABG inhibits tumor necrosis factor- (TNF- $\alpha$ )-induced nuclear factor-  $\kappa$ B (NF- $\kappa$ B) activation in human umbilical vein endothelial cells. Additionally, by inactivating NF-  $\kappa$ B, the ABG methanolic extract reduced the synthesis of cyclooxygenase-2 and prostaglandin E<sub>2</sub> (PGE<sub>2</sub>) [16].

Literature reports confirm that *Z. officinale* has analgesic and anti-inflammatory activities. Drozdov et al. [7] reported that *Z. officinale* extracts possess comparable efficacy concerning analgesic effects to 100 mg diclofenac in osteoarthritis patients [7]. Various studies documented the analgesic effects of *Z. officinale* extracts are comparable to the analgesic effects of ibuprofen and

**Table 1. Assessment parameters grading system**

Parameters	Description	Score
<b>Lameness score</b>	Walks normally	1
	Slightly unable to move	2
	Moderately unable while moving	3
	Severely unable while moving	4
	Hesitant to stand and unable to move more than five hops	5
<b>Joint mobility score</b>	Complete movement	1
	Minor constraint (10–20%) in range of movement; no crepitus	2
	Minor constraint (10–20%) in range of movement, with crepitus	3
	Moderate constraint (20–50%) in range of movement; $\pm$ crepitus	4
	Severe constraint (>50%) in range of movement; $\pm$ crepitus	5
<b>Pain on palpation score</b>	None	1
	Minor signs; dog turns its head in recognition	2
	Modest signs; dog pulls its limb away	3
	Severe signs; dog exhibits vocalization or aggression	4
	The dog will not let touch him	5
<b>Weight-bearing score</b>	Standing and walking on all fours legs	1
	Normal position; favors walking with the affected limb	2
	Standing and walking with some weight on one leg	3
	Standing with some weight on one leg; walking without bearing	4
	Standing and walking without using its weight	5
<b>Overall clinical condition score</b>	Not influenced	1
	A little affected	2
	A little bit affected	3
	Incredibly affected	4
	Extremely affected	5

**Table 2. Effect of PHF on the assessment parameters in dogs**

Parameter	Initial	15 <sup>th</sup> day	30 <sup>th</sup> day	45 <sup>th</sup> day	60 <sup>th</sup> day
<b>Lameness score</b>	4.84 $\pm$ 0.08	4.48 $\pm$ 0.15	***3.90 $\pm$ 0.20	***3.71 $\pm$ 0.22	***3.35 $\pm$ 0.26
<b>Joint mobility score</b>	4.55 $\pm$ 0.13	4.26 $\pm$ 0.15	***3.65 $\pm$ 0.21	***3.42 $\pm$ 0.22	***3.29 $\pm$ 0.25
<b>Pain score</b>	4.00 $\pm$ 0.22	3.81 $\pm$ 0.19	***3.16 $\pm$ 0.19	***3.00 $\pm$ 0.22	***2.81 $\pm$ 0.20
<b>Weight-bearing score</b>	3.74 $\pm$ 0.25	3.35 $\pm$ 0.23	***2.77 $\pm$ 0.19	***2.71 $\pm$ 0.20	***2.55 $\pm$ 0.17
<b>Overall clinical condition score</b>	3.23 $\pm$ 0.28	3.00 $\pm$ 0.27	***2.52 $\pm$ 0.23	***2.45 $\pm$ 0.19	***2.19 $\pm$ 0.16

Values are expressed as the mean  $\pm$  SEM (n = 31).  
 \*\*\*p < 0.001 compared to day 0 based on repeated-measures two-way ANOVA followed by the Bonferroni test.

indomethacin. Indomethacin, ibuprofen, and ginger extract have all seen improvements in pain scores as a result of these findings [12-13], [2]. In addition, inhibiting the synovial fluid pathways such as lipoxygenase and cyclooxygenase ginger powder helps patients with rheumatism and musculoskeletal conditions [8].

In the paw edema rat model (carrageenan-induced), Hassan et al. revealed that the administration of aqueous ginger extracts at 400 mg/kg body weight resulted in a significant (p < 0.001) reduction of carrageenan-induced paw edema in rats compared to controls. Furthermore, Hassan et al. reported that ginger contains shogaol, gingerol, and other structurally related substances that inhibit the biosynthesis of leukotriene and prostaglandin by

suppressing prostaglandin synthetase or 5-lipoxygenase. Hence, *Z. officinale* extract (aqueous) possesses anti-inflammatory properties [14]. According to several additional studies [32, 34], gingerol and shogaol, found in ginger, inhibit the synthesis of cytokines of proinflammatory like interleukin (IL)-1, IL-8, and TNF- $\alpha$ .

*A. comosus* possesses anti-inflammatory [28], antirheumatic [18], and other immunomodulatory properties [9]. Kargutkar and Brijesh [17] demonstrated the anti-inflammatory properties of *A. comosus* leaf extracts in rats by inhibiting carrageenan-induced paw edema. In addition, Kargutkar and Brijesh demonstrated the potential mode of action of the *A. comosus* leaf extracts anti-inflammatory activity may be the inhibition of proteinase

activity, protein denaturation, and the synthesis of TNF- $\alpha$ , IL-1b, PGE2, and reactive oxygen species [17]. Literature reports Bromelain is abundantly available in fruits and stems of *A. comosus* and has analgesic and anti-inflammatory activities [5], [25] [21]. Akhtar *et al.* first showed that treatment with a combination of trypsin, rutin and Bromelain resulted in reduced inflammation and pain activities comparable to diclofenac treatment [1].

#### 4. Conclusion

The preliminary study found that the analgesic and anti-inflammatory activities of the individual herbal

ingredients in PHF helped dogs with osteoarthritic joint pain and inflammation improve when PHF was given to them. However, it suggests that additional clinical studies using biochemical parameters be carried out to gain a better precise mechanism of action and its final impact on decreasing pain and inflammation in osteoarthritic joints in dogs.

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