

Physiotherapy and Rehabilitation Management of Musculoskeletal Affections in Canines

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ABSTRACT

The present work done on physiotherapy and rehabilitation techniques of locomotor system in canine practice is very meagre, especially on physical assessment and diagnostic findings of chronic complains of locomotor affections especially musculoskeletal in dogs with failed medical treatment and no surgical intervention was possible. Nine dogs (5 in the age group of >5 years, three of age group of 1 to 5 years, and one in the age group of <1 year) ;6, males and 3 females represented with affections of the musculoskeletal system were included in the present study, amongst which 3 cases were of hind quarter weakness and 6 cases of muscles strain, wherein physiotherapy was employed. All nine clinical cases were subjected to a detailed examination, including comprehensive neurological examination, diagnostic imaging, goniometry and haemato-biochemical estimations. All patients were treated with different types of physiotherapy modalities and rehabilitation techniques and observed the effectiveness of physiotherapy. Physiotherapy management of patients had early and optimal resumption of functions. The rehabilitation modalities provided meritorious treatment options for symptomatic pain relief in patients, resulting in improved quality of life.

Keywords: Canine, Musculoskeletal affections, Physiotherapy, Rehabilitation Techniques.

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INTRODUCTION

Physiotherapy is a profession with a recognised scientific basis in human and companion animals (GPTP, 2001). Canine rehabilitation became mainstream in the 1980's (van Dyke, 2011). In recent years, physiotherapy for animals has enjoyed an explosion of interest among the veterinary profession and the pet-owning public, and many techniques, treatments and rehabilitation regimens successfully used on human patients have been readily adapted for use in animals and is also showing the same results in companion animals (Monk *et al.*, 2006). The practice of physiotherapy involves a range of physical modalities for health promotion, treatment and rehabilitation (Ostelo *et al.*, 2008). Major application of physiotherapy in animals is for postoperative management following orthopaedic or neurological surgery (Olby *et al.*, 2005) although it can also benefit other acute and chronic disorders in which surgery is not required, e.g., muscle, tendon or ligament injuries and arthritis.

The physical rehabilitation of animals is a new area of veterinary medicine, which has become important in providing the best opportunities for pets to recover from soft-tissue and orthopedic injuries and beat the pain and immobility of arthritis. Athletes, nonathletes, working dogs, and geriatrics can all benefit from veterinary rehabilitation (Debra, 2007). The literature and work on physiotherapy and rehabilitation techniques of locomotor system in canine practice is very meagre; hence, this study was aimed to evaluate then in selected canine patients.

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MATERIALS AND METHODS

The study was undertaken on 9 dogs (five cases in the age group of >5 years, three cases of age group of 1 to 5 years, and one in the age group of <1 year and six canines were males and three were females) presented at the Department of Veterinary Surgery and Radiology of the College, AAU, Anand (Gujarat) from January 2018 to January 2021 with locomotor conditions along with musculoskeletal and soft tissue injuries. All the patients presented with chronic complaints of failed medical treatment, and no surgical intervention possible were included in the study and treated with different types of physiotherapy modalities and rehabilitation techniques. The response of physiotherapy was studied.

Assessment and Diagnostic Procedure

All the dogs underwent thorough physical assessment (i.e., history, clinical observations, active movement tests, palpation, and passive movement tests), comprehensive neurological examinations (i.e. Specific tests for assessment of neurological function including posture, gait, conscious proprioception, ataxia, and spinal reflexes (or myotactic reflexes). Spinal reflexes of the limbs used in animals were withdrawal reflex in the thoracic limbs and pelvic limbs, patellar reflex, cutaneous trunci reflex (panniculus), perineal reflex or anal sphincter reflex, urinary bladder innervations, and pain perception. Diagnostic procedures like radiography, ultrasonography, goniometry, and hematobiochemical examination were performed in selected cases.

Physiotherapy Management

In the present study, the clinical cases underwent various physiotherapy and rehabilitation protocols, i.e., manual therapy (massage and passive range of motion and stretching), physical therapy (thermal therapies, electrical stimulation, and therapeutic exercise), and emerging modality (pulsed electromagnetic field therapy).

Infrared lamp, Therapeutic ultrasound (with analgesic ointment), Transcutaneous electrical nerve stimulation, Manual therapy (Massage, passive range of motion, and cold

pack in acute cases), and Therapeutic exercise (Balancing and weaving and circling)

Evaluations of Veterinary Patients for Recovery

The cases covered under the treatment outcome groups were observed for treatment time, grades of pain, resumption of functional activity, grades of muscle strength, weight bearing with coordination and balance.

RESULTS AND DISCUSSION

Assessment and Diagnostic Findings

Hind quarter weakness:

The dogs with hind quarter weakness showed paresis (muscle weakness) with decreased proprioception and had staggering gait with dragging hind limbs while walking (Plate 1). Neurological grading (0 to 5) in dogs having hind quarter weakness (n=3) was done based on posture gait and deep pain perception as suggested by Bali (2000). It provided very useful information regarding severity and exact location of the injury (Ansari *et al.*, 2012).

Muscles strain

Dogs (n=6) having muscle contraction showed swelling of the affected limb with pain on palpation. A painful response to

Table 1: Physiotherapy management (PT) in canine (n=9)

Patients' Conditions	Treatment Protocols
Hind quarter weakness (n=3)	Pulse electromagnetic field therapy, Infrared lamp, Therapeutic ultrasound, Interferential therapy, Manual therapy (Massage and passive range of motion), and Therapeutic exercise (Balancing, stairs climbing, stand to sit-sit to stand, and resistance)
Muscles strain (n= 6)	Infrared lamp, Therapeutic ultrasound (with analgesic ointment), Transcutaneous electrical nerve stimulation, Manual therapy (Massage, passive range of motion, and cold pack in acute cases), and Therapeutic exercise (Balancing and weaving and circling)

Table 2: Recovery evaluation of dogs with hind quarter weakness and muscle strain following physiotherapy management

Animal's Condition	Treatment Time (Days) (Mean ± SE)	Grades of Pain	Resumption of Functional Activity (Score:1-10)	Grades of Muscle Strength	Weight Bearing with Coordination and Balance
Hind quarter weakness (n=3) (Plate 1)	13.50 ± 3.50	Normal	10	Normal	Normal
Muscle strain (n=6) (Plate 2)	8.00 ± 0.44	Normal	10	Normal	Normal

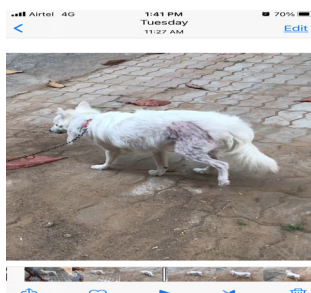


Plate 1: Hind quarter weakness in a dog before and after physiotherapy management

Plate 2: Muscle strain in a dog before and after physiotherapy management

stretching is indicative of strain (Laurie Edge-Hughes, 2007). Gait was abnormal in all the 6 animals with flexed affected limb while walking and standing (Plate 2). Tibio-tarsus joints were measured by goniometer in all affected limbs (n=6) with mean value of $32.60^{\circ} \pm 1.32^{\circ}$. Haematobiochemical examination revealed mild elevated ESR (Forte, 2020) and SGOT (Moses and McGowan, 2007) in two animals with history of sleeping indicative of muscle damage.

Physiotherapy Management

Hind quarter weakness:

Infrared lamp was used as superficial heating agent. Interferential therapy was used for muscle contraction and 1 to 10 Hz constant frequency was used for 10 to 20 min once daily to three times a week for one to two weeks for muscles strengthening, as suggested by Chakrabarti *et al.* (2007). Therapeutic ultrasound was used in the cases of muscles atrophy with 1 MHz frequency and 1-2 W/cm² intensities with continuous mode because it heats the tissues deeply. Treatment started with 5 to 10 min daily up to 10 days followed by less frequent application as the condition improved (Bromiley, 1991). Pulse electromagnetic field therapy was applied to prevent muscle fatigue for 1-h. Massage and passive range of motion exercise was performed twice a day at the limbs of animals (n=1). Therapeutic exercises, i.e., balancing, stairs climbing, resistance and stand to sit-sit to stand was performed as required to improve strength and power in the rear limb's muscles, active range of motion, balance, and coordination as suggested by Evans *et al.* (2013).

Muscles strain

Transcutaneous electrical nerve stimulation was used for pain reduction; the frequency or pulse rate used was a low setting, 0 to 10 Hz for chronic pain for initial treatments, 15 to 20 min time was applied, to reduce any anxiety and to familiarise the animal with the sensations associated with stimulation. At subsequent sessions, treatment time was increased up to half an hour for six to seven sessions (Baxter and McDonough, 2007). Transcutaneous electrical nerve stimulation therapy has a primary goal of pain relief rather than muscle contraction and also helps to reduce edema, increase perfusion speed tissue healing, and attract certain inflammatory cell types to the affected area (Gurgen *et al.*, 2014). Therapeutic ultrasound was used for relief from the muscle stiffness with 1 MHz frequency of continuous mode with intensities of 1 W/cm² were used with 5 to 10 min daily up to 10 days followed by less frequent application as the condition improved (Sharma and Maffulli, 2005). Analgesic ointment was used during a therapeutic ultrasound to enhance the analgesic effect. Infrared lamp was used for superficial heating in chronic cases as suggested by Chakrabarti *et al.* (2007).

In all cases of muscle strain, massage and passive range of motion exercise was performed to accomplish the

regeneration phase, which should begin with pain-free activity and range of motion (ROM) up to day 14, but progress to regaining flexibility by stretching into a small amount of discomfort (but not pain) and beginning strengthening of the associated muscle (Wilson and Best, 2005). At this time, the goals were to help new fibres align in the strongest format possible and reduce adhesion formation, strengthen the structure, promote circulation, encourage tissue regeneration and metabolism and restore coordination and body awareness (Rees *et al.*, 2006). Cold pack application was advised twice a day for three days because rest and ice are beneficial to minimize the initial bleeding, control swelling, prevent stress and tension, control inflammation, and reduce pain (Sharma and Maffulli, 2005). Therapeutic exercises done for early strengthening of the hind limb in the dogs were three-leg standing balancing (lifting the unaffected contralateral limb off the ground) and easy concentric muscle contractions achieved by walking on flat land or stepping over ground-level obstacles. Weaving and circling exercise were also performed as suggested by LaStayo *et al.* (2003).

Evaluation of Recovery

The recovery of patients from hind quarter weakness (n=3) and muscle strain (n=6) following physiotherapy management was evaluated based on the treatment time, grades of pain, resumption of functional activity, grades of muscle strength and weight bearing with coordination and balance. All patients recovered normally with a mean treatment time of 13.50 ± 3.50 and 8.00 ± 0.44 days in cases of hind quarter weakness (n=3) and muscle strain (n=6), respectively (Table 2).

CONCLUSIONS

Outcomes of the physiotherapy management group of patients had early and optimal resumptions of functions. Musculoskeletal injuries, nerve injuries and soft tissue injuries respond well to the physiotherapy techniques and rehabilitation and physiotherapy plays a significant role in restoring, maintaining, and passive range of motion of not only optimal physical function but also optimal wellness, fitness, and quality of life. Physiotherapy plays an important role in minimizing impairments' progression and improving functional rehabilitation. The rehabilitation modalities provide meritorious treatment options for symptomatic relief of pain in patients, resulting in improved quality of life.

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