Explor Anim Med Res,
Vol.7, Issue - 1, 2017, p. 64-68

ISSN 2277- 470X (Print), ISSN 2319-247X (Online)
Website: www.animalmedicalresearch.org

Research Article

CLINICAL AND HAEMATO-BIOCHEMICAL ALTERATIONS FOLLOWING TREATMENT WITH INTERFERENTIAL THERAPY IN THE BACK PAIN IN DOGS

A.K. Sharma[1*], S.K. Maiti[2], A.M. Pawde[2]

Received 04 February 2017, revised 05 April, 2017

ABSTRACT: A total of sixteen clinical cases, comprising of 8 animals each in Group I (animals with hindquarter weakness, which could stand, and had staggering gait and intact pain sensation) and Group II (animals with hind quarter paresis, which were unable to stand and dragged hind legs while walking with intact pain sensation) were treated with Computerized interferential unit and conventional therapy. Different clinical and haemato-biochemical study revealed that the post treatment changes were transient and remains within normal physiological limits.

Key words: Back pain, Dogs, Haemato- biochemical changes, Posterior paresis, Interferential therapy.

Interferential therapy is characterized by crossing of two electrical medium, independent frequencies that work together to effectively stimulate large impulse fibers. These frequencies interfere with the transmission of pain messages at the spinal cord level. Interferential current is essentially a deeper form of Trans-cutaneous Electrical Nerve Stimulation (TENS). Frequencies which vary from approximately 80 Hz to 120 Hz are considered most effective for pain management. It provides a comfortable, soothing stimulation and should never be strong enough to cause any discomfort to the patient. Interferential therapy a form of electric stimulation causes muscle contraction, increases blood supply and prompts the body to secrete endorphins and other natural pain killer (Bromiley 1991). The present paper deals with the changes at physiological and haemato-biochemical levels in the dogs affected with hindquarter weakness subsequently treated with Interferential unit.

MATERIALS AND METHODS

The study was conducted on the clinical cases of neuromuscular disorders in hind quarter in dogs reported at referral polyclinic, IVRI, Izatnagar (U.P.) The cases of hind quarter weakness were selected from the cases of neuromuscular disorders and classified in to Groups I (animals with hindquarter weakness, which could stand, and had staggering gait and intact pain sensation) and Group II (animals with hindquarter paresis which were unable to stand and dragged hind leg while walking with intact pain sensation) on the basis of history, clinical signs, radiographic and neurological examination. A total of sixteen clinical cases, comprising of 8 animals each in group I and II were treated with Computerized interferential unit (Vectrostim, electrocare system and services (P) Ltd., Chennai) in conjunction with conventional therapy like injection of B-complex (nervine tonic) and corticosteroid (Methyl prednisolone @ 30 mg/kg bwt i.m followed by 15 mg/kg bwt i.m on alternate day).

The coat was clipped under the site for electrode placement. Positioning of unit and patient was done safely. Couplant cream was applied over the clipped area for insulation. Electrode pad was soaked in 1% normal saline solution. Frequency (base frequency-100 Hz, spectrum frequency-50) and programme no. 12 were selected for treatment. Checking of electrode was done by placing all four pads on fore arm after turning up the intensity dial. Electrode was placed firmly on the

[1]*Assistant Professor, Deptt. of surgery & Radiology, College of Veterinary Science and Animal Husbandry, Birsa Agricultural University, Kanke, Ranchi-6, Jharkhand, India.*
[2]*Principal Scientist, Division of Surgery, Indian Veterinary research Institute, Izatnagar, Bareilly, Uttar Pradesh, India.*
**Corresponding author. e-mail:arsham10@rediffmail.com*

Table 1. Rectal temperature (^{0}F), heart rate (beats/min) and respiration rate (/min) at different intervals before and after Interferential therapy in the animals of groups I and II (Mean ± SE).

Parameters	Groups	Period of observation (days)				
		0	3	7	10	14
Temperature	I	101.100	101.650	101.650	101.700	102.150
		±0.351	±0.340	±0.330	±0.321	±0.151
	II	100.350	101.650	101.550	101.250	101.750
		±0.579	±0.340	±0.309	±0.320	±0.250
Heart rate	I	95.000^{A}	96.000^{AB}	97.500^{AB}	100.000^{BC}	103.750^{C}
		±1.291	±1.410	±1.500	±0.816	±2.174
	II	85.250^{A}	87.500^{A}	97.000^{B}	96.000^{BC}	101.000^{C}
		±2.050	±1.500	±0.577	±1.633	±1.290
Respiration rate	I	34.500	35.000	36.750	37.725	37.500
		±2.217	±1.914	±2.050	±2.520	±1.500
	II	33.500^{A}	34.500^{A}	36.000^{AB}	37.500^{B}	38.500^{B}
		±0.866	±1.320	±0.707	±0.280	±1.190

^{AB}Values (mean ± SE) bearing different superscripts differ significantly (P<0.05) at corresponding intervals within groups.

Table 2. Haemoglobin (g%), packed cell volume (%) and total leucocyte count(x10^3/µl) at different intervals before and after Interferential therapy in the animals of groups I and II (Mean ± SE)..

Parameters	Groups	Period of observations				
		0	3	7	10	14
Hb	I	14.330	14.460	14.330	15.166	15.510
		±0.401	±0.646	±0.542	±0.401	±0.397
	II	14.416	15.200	15.360	15.830	15.130
		±0.238	±0.561	±0.402	±0.477	±0.333
PCV	I	39.000^{AB}	37.500^{A}	40.000^{AB}	40.750^{AB}	44.000^{B}
		±1.914	±1.500	±1.410	±1.887	±1.825
	II	38.500^{A}	40.500^{A}	44.500^{AB}	44.750^{AB}	48.750^{B}
		±1.890	±2.060	±1.700	±2.130	2.050
TLC	I	9.125^{A}	9.650^{A}	10.050^{AB}	9.870^{AB}	9.570^{B}
		±0.688	±0.717	±0.518	±0.769	±0.370
	II	9.000^{A}	9.175^{AB}	9.750^{AB}	10.220^{B}	9.850^{AB}
		±0.305	±0.278	±0.434	±0.392	±0.298

^{AB}Values (mean ± SE) bearing different superscripts differ significantly (P<0.05) at corresponding intervals within groups.

appropriate areas to ascertain the two circuits crossed at the site of the injury. Inspection of skin was done for any adverse effect like burning etc. Skin was washed thoroughly and dry. Treatments were given biweekly for 10-15 min till discharge of the case.

The patient was evaluated after presentation to the Referral Veterinary Polyclinic, IVRI on the basis of history, (etiology, duration of illness, affected portion, treatment given by local vet.) mental status (alert, depressed, stupor, coma), general conditions and clinical signs. Besides, RT, HR, RR, were recorded before and on days 3, 7, 10, 14 and thereafter once in a week after treatment till the discharge of the case.

A total 5 ml of blood was collected from each animal

Table 3. Total protein (g%), A: G ratio (g%), glucose(mg/dl) and alkaline phosphatase (U/L) at different intervals before and after Interferential therapy in the animals of groups I and II (Mean ± SE).

Parameters	Groups	Period of observations (days)				
		0	3	7	10	14
Total protein	I	5.042	4.540	4.625	4.897	5.057
		±0.376	±0.320	±0.216	±0.387	±0.287
	II	4.372	3.892	3.852	4.590	4.880
		±0.1325	±0.042	±0.079	±0.497	±0.445
A:G ratio	I	0.685	0.662	0.787	0.667	0.662
		±0.211	±0.178	±0.168	±0.152	±0.190
	II	1.727	1.465	1.662	1.435	1.120
		±0.749	±0.837	±0.835	±0.551	±0.320
Glucose	I	69.000	75.330	73.833	74.166	70.000
		±2.569	±1.909	±2.271	±1.470	±1.424
	II	60.550^{A}	67.500^{B}	70.633^{B}	68.883^{B}	64500^{AB}
		±0.576	±1.910	±1.689	±1.521	±1.857
Alkaline phosphatase	I	108.733^{B}	103.466^{AB}	101.533^{B}	98.530^{B}	99.616^{B}
		±3.9832	±2.161	±1.650	±0.879	±0.407
	II	115.500^{C}	112.216^{BC}	106.85^{AB}	103.666^{A}	103.330^{A}
		±1.668	±2.189	±2.483	±1.873	±1.308

^{AB}Values (mean ± SE) bearing different superscripts differ significantly (P<0.05) at corresponding intervals within groups.

before and on day 3,7,10 and 14. Out of 4 ml, 1 ml was collected in a vial containing EDTA and used for estimation of Hb, PCV, TLC and DLC as per method described by Jain (1986).

Total protein and A : G ratio, glucose and alkaline phosphatase were estimated as per modified Biuret and Dumas methods, GOD – POD methods and Kind and King Methods respectively.

The data obtained for different haemato-biochemical parameters were subjected to paired 't' test and ANOVA (Snedecor and Cochran 1994).

RESULTS AND DISCUSSION

A non-significant increase in rectal temperature (P>0.05) was recorded from day 3 to 14 in group I, while, non-significant increase followed by decrease was recorded in group II (Table 1). Initially the increase was non-significant which might be due to increase blood circulation and release of endorphin (Bromiley1991). A slight increase in rectal temperature after treatment might be attributed to increase in circulation produced by either local pumping effect of stimulated muscles or effect on autonomic nerves and blood vessels resulting in removal of chemical from the injured area. Later on the circulation was decreased after repair of tissue, which might be responsible for decrease in temperature. A significant increase (P<0.05) in values of heart rate were recorded in the present study in group I and group II after interferential therapy (Table 1). The electric stimulation of medium frequency might be responsible for sympathetic contraction (Bromiley1991). Further it was explained with the fact that the electrical stimulation resulted in increase in blood flow over the site of treatment and muscle contraction (Hurley *et al.* 2001, Johnson and Tabassam 2003).The increase in respiration rate in the animals of group I and II (Table 1) after interferential therapy was due to increase blood supply and muscle contractions which boost up the activity of respiratory center of hypothalamus might be responsible for increase in respiration rate after treatment. The increase in circulation and muscle contraction and stimulation to release of endogenous polypeptides have been reported by Bromiley (1991) and Johnson and Tabassam (2003).

There was non-significant change (P>0.05) in hemoglobin in the animals of group I and group II, however, the values recorded on day 14 in the animal of both the groups was non-significantly higher than the base value (Table 2). The higher value of hemoglobin might be due to the improve appetite, increase activity and health condition after recovery of animals. The increase in PCV

was significant (P<0.05) on day 14 as compared to 0 day value in group I and increased level of packed cell volume from day 3 up to day 14 (Table 2) in the present study might be due to electrical sequestration of spleen and subsequently due to recovery of animals. On the other hand Watson (2000) reported little physiological effect and not capable of direct stimulation of nerve. Savage (1987) reported that different tissues will have an optimal stimulation band and found that medium frequency also stimulated the sympathetic nerve. The sympathetic stimulation may be one of causative factor for increasing in the packed cell volume.

A significant leukocytosis in the animals of group I treated with interferential therapy might be due to electrical stimulation of sympathetic and reticulo endothelial systems. Noble *et al.* (2000) claimed its role is stimulating healing and repair besides its use in pain relief, muscle stimulation, increased blood flow and reduction in edema. Neutrophilia was present in this study in the animals of group I from day 10 onwards. While animals of group II showed higher values on day 3 and 7 (Table 2). In contrast to increase in neutrophils, the lymphocyte, were decreased at similar intervals. The interferential therapy resulted in increase vasodilation, therefore, promoted the release of neutrophils from the reticuloendothelial cells. The vasodilation due to effect of interferential therapy is reported by Savage (1987), Bromiley (1991), Noble *et al.* (2000), Johnson and Tabassam (2003). Monocytes and eosinophils did not show any definite changes after interferential therapy.

There was non-significant variation in the total protein, albumin, A:G ratio and globulins in the animals of group I and II treated with interferential therapy (Table 3). However, the values of total protein and globulins decreased initially after treatment might be due to immunosuppressive effects of corticosteroids (Bondy and Cohn 2002) used as a conventional therapy in the present study. However, the value on day 14 was non-significantly higher in both group I and II. This might be due to stimulating effect of interferential current on recticuloendothelial system which promotes the release of ã-globulin. Increase in immune response in animals may be due to activation of opioid mechanisms (Watson 2000, Palmer *et al.* 2004).

The values of glucose in serum were significantly (P<0.05) increased from day 3 up to day 14 which may be due to effect of corticosteroids (Table 3). Corticosteroids raised the blood glucose by increasing gluconeogenesis and insulin antagonism. Corticosteroid induces the synthesis of hepatic enzyme such as glucose 6 phosphatase that catalyzes the synthesis of glucose (Mc Donald 2000). The increased level was maintained up to day 14 might be due to increase in the appetite of animals after interferential therapy and most of the animals recovered after treatment. Overall success rate was recorded to be 75% and 87.5% in group I and II, respectively.

The activity of alkaline phosphatase recorded in animals of group I treated with interferential therapy was significantly decreased at different intervals; however, the value of alkaline phosphatase was non-significantly lower in animals of group II (Table 3). The progressive decrease of alkaline phosphatase might be due to repair of traumatic area. Noble *et al.* (2000) found that the interferential therapy is helpful in stimulating healing and repair. Further this was supported by Bromiley (1991) in view that it causes the vasodilation and resorption of exudates at the injured area.

The percentage of recovery was 75% and 87.5% in group I and II, respectively. More percentage in group II might be attributable with the fact that the owners are showing more attention to bring their animal early for treatment as the animal dragged the limb while walking. The electrical stimulation produces increase in dendritic branching and glia, changes in synaptic size and synaptic transmission thus way interferential therapy was reported to be helpful in control of pain, bladder dysfunction, motor deficit and autonomic hyperreflexia (Illis 1982).

It is concluded that interferential therapy did not produce deleterious effect on the vital organs; hence it can be used safely for the treatment of back pain in dogs.

REFERENCES

Bondy JP, Cohn LA (2002) Physiological effects and Pharmacologic considerations of glucocorticoids. Vet Med 97(11): 836.

Bromiley MW (1991) Therapeutic ultrasound. Physiotherapy in veterinary medicine. Black well scientific Publication Oxford. 76-84.

Hurley DM, Minder PM, Mcdonough SM, Walsh DM, Moore AP, Baxter DG (2001) Interferential therapy electrode placement technique in acute low back pain: A preliminary investigation. Arch Phys Med Rehabil 82: 485.

Illis L S (1982) Rehabilitation following brain damage: some neurophysiological mechanisms. The effects of repetitive stimulation in recovery from damage to the central nervous system. Int Rehabil Med 4(4): 178-184.

Jain NC (1986) Schalm's Veterinary Haematology. 4th edn. Lea and Febiger, Philadelphia.

Johnson MI, Tabasam G (2003) An investigation in to the analgesic effects of different frequencies of the amplitude - modulated wave of interferential current

therapy on cold induced pain in normal subjects. Arch Phys Med Rehabil 84(9): 1387.

Mc Donald JM (2000) Glucocorticoid therapy. In Ettinger SJ, Feldman EC (2000) Text book of Veterinary Internal Medicine, 5th edn. W.B. Saunders Company, Philadelphia, London. 307-317.

Noble JG, Henderson G, Cramp AF, Walsh DM, Lowe AS (2000) The effects of interferential therapy upon coetaneous blood flow in humans. Clin Physiol 20(1): 02-07.

Palmer ST, Martin DJ, Steedman WMR (2004) Effects of electric stimulation of C and A delta fibers mediated thermal perception thresholds. Arch Phys Med Rehabil 85(1): 119.

Savage B (1987) Interferential therapy. Faber and Faber, London. 6: 69-73.

Snedecor GW, Cochran WG (1994) Statistical methods, 8th edn. Iowa State University press, Ames, Iowa 50010.

Watson T (2000) The role of electrotherapy in contemporary physiotherapy practice. Manual Therapy 5(3): 132.

*__Cite this article as:__ Sharma AK, Maiti SK, Pawde AM (2017) Clinical and haemato-biochemical alterations following treatment with interferential therapy in the back pain in dogs. Explor Anim Med Res 7(1): 64- 68.