CLINICAL AND TOXICOLOGICAL EVALUATION OF CALGOPHOS USING AN OFF-LABEL INTRAVENOUS ROUTE IN BUFFALOES

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Post parturient hemoglobinuria (PPH) is one of the major and common diseases in Pakistan; morbidity rate in some areas being as high as 2.69% in cattle and 1.65% in buffalo (Ajmal *et al.*, 1990). In a recent survey mortality due to hemoglobinuria made up 9% of the total mortality in buffaloes and 5% in cattle, which translates into estimated annual losses of Rs. 490.2 millions in buffaloes and Rs. 153.1 millions in cattle in punjab (Anonymous, 1996). It is an acute disease of high yielding buffaloes and cows characterized by hypophosphataemia, intravascular haemolysis, haemoglobinuria, anemia and death. (MacWilliam *et al.*, 1982; Jubb *et al.*, 1985).

The exact pathogenesis of PPH is not known because a variety of etiological factors have been found associated with this disease in different parts of the world. Nonetheless, hypophosphataemia is the biochemical alteration documented consistently by different workers (Madsen and Nielsen, 1940; Parkinson and Sutherland, 1954; Awad and Latif, 1963; MacWilliam *et al.*, 1982; Hassan *et al.*, 1987; Akram *et al.*, 1990; Singari *et al.*, 1991; Joshi *et al.*, 1991)

Different types of therapeutic agents such as blood transfusion, antifibrinolytic drugs such as snake venom (Botropase), epsilon amino caproic acid and para-amino methylbenzoic acid, oxygen releaser (inosine), ascorbic acid, and copper sulphate have been used with variable cure rates in the therapy of PPH. However, parenteral (I.V + S.C) plus oral administration of sodium dihydrgen phosphate (NaH_2PO_4) still remains the most widely used therapy for this condition (Smith, 1990; Hungerford, 1990; Radostits *et al.*, 1994). Response to this phosphorus compound can be described as a variable at best (Nagpal *et al.*, 1968; Samad *et al.*, 1979; Joshi *et al.*, 1991). In addition, there are frequent field complaints on availability of sodium dihydrogen phosphate of spurious nature. As such an alternative to this phosphorus compound is desperately needed. It was against this backdrop that we investigated the tolerability of intravenous administration of a readily available phosphorus preparation (Calgophos; Virbac labs France) in healthy buffaloes.

MATERIALS AND METHODS

Two healthy adult buffaloes belonging to Dept. of Animal Reproduction, University of Agriculture, Faisalabad were utilized. Vital parameters of health including temperature, pulse, respiratory rate, feed intake and general demeanor were recorded and blood samples taken for harvesting serum. One hundered milliliters (100cc) of Calgophos (Virbac laboratories France) was mixed in one liter bag of 10% dextrose and the mixture administered I .V. At 24 hours post treatment, all the above described parameters were recorded again and blood samples taken for serum collection. Clinical obeservations were also taken at 48 and 72 hours of administration of calgophos.

Serum samples were analysed for liver function tests (ALT and AST) utilizing the commercial kits for ALT (Human Gesellschaft fur Biochemica und Diagnostica mbH Silberbachstra βe 9. D-65232 Taunsstein.Germany) and AST (Randox Labortories Ltd., Diamond Road, Crumlin, Co. Antrim, United Kingdom, BT29 4QY).

RESULTS

Neither of the buffaloes showed any untoward effect either during adminstration of the Calgophos or at 24, 48 and 72 hours of its use. The levels of liver enzymes determined on pre and post treatment did not differ considerably (Table 1).

DISCUSSION

Parenteral plus oral administration of sodium dihydrogen phosphate is the standard therapy for PPH (Radostits *et al.*, 1994). The difficulty of getting this inorganic salts in pure form warrants finding an alternative to this chemical. The use of Calgophos (Virbac laboratories, France), a cocktail containing di-acid-phosphate salts of Ca, Mg, Na, Fe, Mn, Zn, Cu, and cobalt holds a promise of such an alternative. This readily available preparation is recommended for the correction of Ca/P imbalance and to treat such problems

of dairy animals as infertility, osteomalacia, dermatitis, alopecia, faded coat colour and hoof deformities. The treatment of an acute haemolytic crisis in the case of PPH would require intravenous administration of phosphorus to tide over the hypophosphataemia.

Table 1: Pre and post treatment levels of serum enzymes in 2 buffaloes treated with calgophos intravenously.

Buffalo No.	Serum Enzymes	Pretreatment Levels (μ/L)	Post Treatment Lelvels (μ/L)
	SGPT (ALT)	35	40
1	SGOT(AST)	150	160
	SGPT(ALT)	28	37
2	SGOT(AST)	154	168

The manufacturer of Calgophos recommends its administration by per oral route. In the present study, an off-label route (i.e. intravenous) was adopted to administer this drug. The lack of any immediate or delayed toxicity associated with its intravenous use in lieu of the recommended per oral use would strongly argue in favour of using Calgophos as an alternative to sodium dihydrogen phosphate which is frequently not available in pure form. Our preliminary oberservations on two buffaloes demonstrated lack of any deleterious effect associated with the intravenous use of Calgophos. However, the efficacy of Calgophos in the treatment of PPH remains to be tested and this the subject of ongoing investigations.

REFERENCES

Ajmal, M., M. Arshad and M.C. Ahmad, 1990. Epidemiology of major livestock diseases in Pakistan (pillot study). 5th Annual Report 1989-1990. Pakistan Agri. Res. Council, Islamabad, Pakistan. pp: 31.

Akram, M., C. Heuer, M.A. Tayyab, M.H. Amjad and M.A. Bajwa, 1990. Factors associated with phosphorus deficiency syndrome and helminth infestation in dairy buffaloes of rural small holders. Proc, 3rd Int. Cong., Pakistan Vet. Med. Assoc., Islamabad, Pakistan. pp: 91-96.

Anonymous, 1996. Epidemiology survey, Punjab, 1994, Economic Analysis and Survey Planing June 12, 1996. Director of Planning and Evaluation, Department of Livestock and Dairy Development, Ministry of Livestock and Dairy Development, Govt. of the Punjab, Pakistan.

Awad, F.L. and Abd E.L. Latif, 1963. The first record of a disease condition in Egyptian buffalo simulating post-parturient haemoglobinuria. Vet. Rec., 75:298-300.

Hassan, S.R., B. Singh and M.A. Gaffar, 1987. Haemoglobinuria in buffaloes; analysis of feed samples from disease prone areas. Indian J. Vet. Med., 5: 132-134.

Hungerford, T.G., 1990. Hungerford's Diseases of Livestock. McGraw Hill Book Co., Sydney.

Joshi, S., V.P. Vadodaria and D.K. Pethkha, 1991. Hypophosphataemia in buffaloes. Indian Vet. J., 68:873-874.

Jubb, K.V.F., P.C. Kennedy and N. Palmer, 1985. Pathology of Domestic Animals. Academic Press Inc. London. pp:144-167.

Madsen, D.E. and H.M. Nielsen, 1940. The relationship of parturient haemoglobinuria of dairy cows to aphosphorosis. The North Am. Vet. J., 21:81-89.

MacWilliam, P.S., G.P. Searcy and J.C. Bellamy, 1982. Bovine postparturient haemoglobinuria: A review of the literature. Canadian Vet. J., 23:309-312.

Nagpal, M., O.P. Guatam and Gultirl, 1968. Haemoglobinuria in buffaloes. Indian Vet. J., 45: 1048-1059.

Parkinson B. and A.K. Sutherland,1954. Postparturient haemoglobinuria of dairy cows. Australian Vet. J., 30:232-236.

Radostits, O.M., D.C. Blood and C.C. Gay, 1994. Veterinary Medicine, 8th Ed., Bailliere Tindall, London.

Samad. A., B. Singh, M.I. Qureshi, 1979. Some biochemical and clinical aspects of haemoglobinuria in buffaloes. Indian Vet. J., 56:230-232.

Singari, N.A., R.M. Ghardwaj, S.K. Chugh and S. Bhardwaj, 1991. A study of erythrocytic glucose-6-phosphate dehydrogenase (G6PD) in phosphorus deficiency haemoglobinuria of buffaloes. Indian Vet. J., 68:226-230.

Smith, B.P. 1990. Internal Large Animal Medicine, 1st Ed. C.V. Mosby Company. Philadelphia, USA.