CLINICAL STUDIES ON CHEMICAL IMMOBILIZATION OF STRAY BULLS FOR CAPTURE AND REHABILITATION: PART II

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ABSTRACT

Three selected anesthetic protocols of chemical immobilization found suitable in preliminary Part I study were applied on 203 stray bulls in this study for their capture in the city area. This included intramuscular injections of Xylazine alone @ 0.2 mg/kg b. wt. in Group I (n=66); Xylazine and Ketamine (XK) mixture @ 1.0 ml/bull (55.55 mg Xylazine and 44.44 mg Ketamine) in Group II (n=48), and @ 1.5 ml/bull (83.32 mg Xylazine and 66.66 mg Ketamine) in Group III (n=89). Group I bulls showed complications like tachycardia, either hyperthermia or hypothermia and prolonged sedation time. Despite completely sedated Group III bulls could move or kick, showed rumen stasis and tympany. After capture, total 147 (60.49%) bulls were castrated to prevent indiscriminate breeding. In this Part II study, results found were almost similar to preliminary Part I study, except that the mean per cent of injury, darting failure, redosing and chase time (min) were decreased from 2.50, 70.00, 20.00 and 14.42±0.03 in Part I to 1.48, 26.60, 10.84 and 13.13±0.01, respectively in Part II study, due to increased experience with darting process. Results of present study indicated that Xylazine @ 0.2 mg/kg b.wt. or XK mixture @ 1.0-1.5 ml (55.55-83.32 mg Xylazine and 44.44-66.66 mg Ketamine) per bull for chemical immobilization at an approximately 4 meters darting distance is effective for its uneventful capture and hence is recommended for use to capture and rehabilitate stray bulls from the city areas.

KEY WORDS: Stray bulls, Chemical immobilization, Blow dart, Xylazine, Xylazine and Ketamine mixture.

INTRODUCTION

Stray cattle are the most common problem of urban areas in India. Bull-fighting and bull running behind the cow in estrus interrupts traffic and lead to fatal injuries to denizen(s) and automobile accidents. A preliminary clinical study for capture and rehabilitation of uncontrollable and mischievous stray bulls was undertaken on 40 bulls as Part I study (Joshi et al., 2013) with an objective to evolve and standardize an easy, safe, effective and humanitarian method for immobilization by using Xylazine alone or its combination with Ketamine. Results of preliminary study indicated that Xylazine @ 0.2 mg/kg b.wt. or XK mixture @ 1.0-1.5 ml/bull for chemical immobilization at an approximately 4 meters darting distance is effective for its uneventful capture (Joshi et al., 2013). Hence, in the present Part II study the selected three anesthetic protocols were applied on large number (n=203) of stray bulls of Rajkot city to validate them further.

MATERIALS AND METHODS

This study was undertaken in Rajkot city of Saurashtra region in Gujarat on 203 stray bulls roaming in the streets. Among 203 bulls covered in this study, 66 bulls (Group I) were administered at random Xylazine mean dose @ 0.2 mg/kg b.wt., i.e., 1.45±0.04 ml, IM; 48 younger and lighter bulls (Group II) were administered XK mixture @ 1.0 ml/bull (55.55 mg Xylazine and 44.44 mg Ketamine), i.e., 1.08±0.14 ml, IM; and 89 adult and heavier bulls (Group III) were administered XK mixture @ 1.5

ml/bull (83.32 mg Xylazine and 66.66 mg Ketamine) i.e., 1.55±0.01 ml, IM. Xylazine-Ketamine mixture was prepared by mixing 5.0 ml Xylazine {Xylazil-100 (Xylazine hydrochloride 100 mg/ml), 50 ml vial, Troy Lab. Pvt. Ltd., Australia} and 4.0 ml Ketamine {Ketamil (Ketamine hydrochloride 100 mg/ml), 50 ml vial, Troy Lab. Pvt. Ltd., Australia}, so that 1 ml mixture contained 55.55 mg Xylazine and 44.44 mg Ketamine.

The immobilization process was evaluated based on various physiological and clinical observations for capture and rehabilitation (Christian, 1998) and all bulls were evaluated as pre- and post-medication and post-capture as described in Part I (Joshi et al., 2013) and were inferred suitably. Response to drug-dosage and the percentages of bulls with rumen stasis, different behavioural & breeding status, health and emotional status, darting convenience etc were classified and complications found, if any, were recorded.

RESULTS AND DISCUSSION

All the 203 (100%) bulls in this study were found with full stomach, i.e., eaten recently. Overall 197 (97.04%) bulls were found with normal rumen and only 6 (2.96%) bulls were with enlarged rumen (Table 1), which support the earlier observations of Part 1 study (Joshi et al., 2013).

The stray bulls under study were classified according to their (a) Rumen stasis normal, enlarged (b) behavioural status as excited, seated, standing or walking; (c) breeding status as breedable & non-breedable; (d) health status as healthy normal, fatty, weak & debilitated or emaciated, and (d) emotional status as alert & active, aggressive and ferocious, docile and calm & cool. The dose rate of anesthetic required was higher for 19 (9.36%) excited bulls, 26 (12.81%) breedable, 175 (86.21%) healthy and normal, 16 (7.88%) fatty, 126 (62.07%) alert and active, 19 (9.36%) aggressive and ferocious bulls as compared to their counter parts, i.e. 165 (81.28%) standing or walking bulls, 177 (87.19%) non-breedable, 5 (2.46%) emaciated, 7 (3.45%) weak or debilitated, 2 (0.98%) docile and 56 (27.59%) calm and cool bulls (Table 1 and 2).

Table 1: Numbers and percentages of bulls with rumen stasis, behavioural and breeding status

Details of bulls	Rumen stasis		Behavioural status			Breeding status	
	Normal	Enlarged	Seated	Standing/ Walking	Excited	Breedable	Non-breedable
Number	197	06	19	165	19	26	177
Per cent	97.04	2.96	9.36	81.28	9.36	12.81	87.19

Table 2: Numbers and percentages of bulls with health and emotional status

Details of bulls	Health status				Emotional status			
	Emaciated	Weak & Debilitated	Healthy Normal	Fatty	Docile	Calm & Cool	Alert & Active	Aggressive & Ferocious
Number	05	07	175	16	02	56	126	19
Per cent	2.46	3.45	86.21	7.88	0.98	27.59	62.07	9.36

Wherever possible, seated, docile, calm and cool bulls were injected manually with syringe needles, instead of blow dart, as has been reported by Julia et al. (2006). It was noted that manually injected 82 (40.39%) bulls were fairly quiet and calm up to their released back, as compared to darted 121 (59.61%) bulls, which support the preliminary observations of earlier Part I study (Joshi et al., 2013).

During the study, injections on the hindquarters and rump region were found to have less than average induction time (12.03±0.40 min) as compared to those injected on the neck region (15.28±1.40 min), as was observed in preliminary study (Joshi et al., 2013). The per cent darting failure decreased from 70.00% in preliminary Part I study to 26.60% in this Part II study, which is suggestive of improvement in darting success, probably due to increased acquaintance with the darting process and paying more attention to darting procedural limitations. A total of 22 (10.84%) re-dosing were done including 16 (7.88%) under-dosed bulls, 3 (1.48%) drugs oozed-out and 3 (1.48%) s/c injections cases, which was lesser as compared to Part I study (20.00%; Joshi et al., 2013).

The mean heart rate was higher in the bulls under Group II treatment (52.26±2.12/min) and lower in Group I protocol (41.32±2.32/min), which corroborated with earlier report (Scott et al., 1988). The mean rectal temperature was higher in Group I bulls (102.5±0.28°F) and lower in Group III bulls (99.5±1.12°F). Rectal temperature was monitored every 10-15 minutes. Group I bulls showed much variation in temperature as compared to Group II and III bulls. Chakrabarti (2006) and Yadav et al. (2008) have also noted similar variation in rectal temperature with Xylazine alone or in combination with Ketamine. In this study, 16 (24.24%) bulls showed rectal temperature between 40°C (104°F), and 41°C (105.8°F), and only 8 (12.12%) bulls showed signs of hypothermia (i.e. temperature lesser than 99°F) in Group I. In the present study, none of the bulls showed signs of hypoxemia (Ramsey, 1968).

Majority of Group I bulls 47 (71.71%) showed profuse salivation as compared to Group II and III bulls, where profuse salivation was observed in 22 (45.83%) and 21 (23.59%) bulls, respectively. The higher mean sedation time was observed in Group I bulls (4.42±1.23 hrs). Within 22 to 28 hours bulls were found eating and drinking water. Similar findings were made by Hawkins et al. (1967). All bulls (100%) were maintained in sternal recumbency and head pulled method was applied as described in earlier study (Joshi et al., 2013), as all bulls showed chances of regurgitation.

In the present study, total 26 (12.81%) bulls were injected with higher dose of Xylazine (0.3 mg/kg b.wt.) in Group I (n=15), and XK mixture (1.2 ml/bull, i.e., 66.66 mg Xylazine and 53.32 mg Ketamine) in Group II (n=11) inadvertently, but no bull (0%) showed any serious or adverse effect, except prolonged and deep sedation. This was because of good post-capture cognizance. One (0.49%) bull died post-capture, which was clinically not related to anesthesia but might be due to old age which could not withstand the stress of capture, loading and sedation (Kock and Berger, 1987).

Inherent side effects of Xylazine; namely hypersalivation, bloat/tympany, sudden arousal, kicking, regurgitation etc. were observed in some of the bulls, however these events were clinically manageable and did not yield any serious morbidity and/or mortality. Use of Ketamine with Xylazine as mixture for chemical immobilization could successfully resolve many of these eventualities as also reported by Hall and Clarke (1991).

Results of present study indicated that Xylazine @ 0.2 mg/kg b.wt. or Xylazine-Ketamine mixture @ 1.0-1.5 ml (55.55-83.32 mg Xylazine and 44.44-66.66 mg Ketamine) per bull for chemical immobilization at an approximately 4 meters distance is effective for its uneventful capture while darting and hence is recommended for use to capture and rehabilitate stray bulls from the city areas.

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