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

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ABSTRACT

A clinical study on chemical immobilization with blow dart was conducted on 40 stray bulls. Xylazine was administered intramuscularly @ 0.1 mg/kg b.wt. {Group I-A, n=10}, and @ 0.2 mg/kg b.wt. {Group I-B, n=10}, while Xylazine and Ketamine (XK) mixture was administered @ 1.0 ml/bull {55.55 mg Xylazine and 44.44 mg Ketamine, Group II-A, n=10 younger and lighter bulls} and @ 1.5 ml/bull {83.32 mg Xylazine and 66.66 mg Ketamine, Group II-B, n=10 adult and heavier bulls}. Group I-A bulls showed complications like increased chase time, rapid breathing, tachycardia, either hyperthermia or hypothermia and hypersalivation. Despite completely sedated, Group I-B bulls could move or kick, produced prolonged sedation time, unreliable immobilizations, rumen stasis and tympany. XK mixture (Group II) produced marked synergistic effect, reduced dosages, thus minimizing the antagonistic reactions and other hazards involved with, faster and smoother induction and sedation. Results of the present study indicated that Xylazine @ 0.2 mg/kg b.wt. or XK mixture @ 1.0-1.5 ml per bull for chemical immobilization at an approximately 4 meters darting distance is effective for its uneventful capture.

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

INTRODUCTION

Wandering stray cattle is 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. Their indiscriminate breeding leads to further increase in their population over a period of time. It is very difficult to capture, restrain and rehabilitate such bulls uneventfully as they are uncontrollable and mischievous (Maradia, 2009). It is difficult to restrain them with human power alone without involving the risk, as bulls may damage vehicles and assets. Xylazine has the wide margin of therapeutic safety (Tyagi and Singh, 1993). The Xylazine and Ketamine (XK) mixture has a marked synergistic effect, presents less risk to field staffs, is economical and easy to administer via an intramuscular injection by blow dart or manually (Athreya and Belsare, 2007). Neither Xylazine (Carruthers et al., 1979) nor Ketamine (Kreeger et al., 2002) is lethal to humans in small dosages, but there have been no published reports of its use in wandering stray bulls in India and abroad. A clinical study for capture and rehabilitation of stray bulls was undertaken to evolve and standardize an easy, safe, effective and humanitarian method for immobilization by using Xylazine alone or in combination with Ketamine.

MATERIALS AND METHODS

The study was conducted in Rajkot city of Gujarat as a collaborative project of Veterinary College, Anand and Rajkot Municipal Corporation. Initially, a pilot study was conducted on 19 individual bulls (4 HF cross, 6 Gir, 9 Non-descript) to approximate body weight by looking at the body of bull and comparing with weighing on Weighbridge to categorize as younger and lighter bulls having less

than 500 kg body weight, and adult and heavier bulls having more than 500 kg body weight. Ten bulls among 40 bulls {Group I-A} were administered Xylazine @ 0.1 mg/kg b.wt., i.e., 0.89±0.04 ml, IM, whereas another 10 bulls {Group I-B} were administered @ 0.2 mg/kg b.wt., i.e., 1.33±0.07 ml, IM. Xylazine-Ketamine mixture was prepared by mixing 5.0 ml Xylazine and 4.0 ml Ketamine (each 100 mg/ml), so that 1 ml mixture contained 55.55 mg Xylazine and 44.44 mg Ketamine. Xylazine and Ketamine (XK) mixture {Xylazil-100 (Xylazine Hydrochloride), 100 mg/ml, 50 ml vial, and Ketamil (Ketamine Hydrochloride), 100 mg/ml, 50 ml vial, Troy Lab. Pvt. Ltd., Australia} was administered to 10 younger and lighter bulls @ 1.0 ml/bull {55.55 mg Xylazine and 44.44 mg Ketamine, i.e., 1.03±0.04 ml, IM, Group II-A}, whereas 10 adult and heavier bulls were administered @ 1.5 ml/bull {83.32 mg Xylazine and 66.66 mg Ketamine, i.e., 1.50±0.10 ml, IM, Group II-B} manually or by a blow dart. Response to drug-dosage was studied. The percentages of bulls with different rumen stasis, behavioural & breeding status, health and emotional status, darting convenience etc were classified to study the variation in dose required complication, if any, etc.

RESULTS AND DISCUSSION

All the 40 (100%) bulls were found with full stomach, i.e., eaten recently and overall 39 (97.50%) bulls were found with normal rumen. Similar findings were recorded by Scott et al. (1988). It was observed that early morning, late evening and night time darting yielded with good quality induction and sedation as compared to mid-day darting, as during early morning and night time, bulls were generally calm and cool, lower traffic disturbances, and most importantly ambient temperature was most compatible, which support earlier observations of Chakrabarti (2006) and Athreya and Belsare (2007).

Forty stray bulls under study were classified according to their (a) behavioural status as excited, seated, standing or walking; (b) breeding status as breedable & non-breedable; (c) 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 6 (15.00%) excited bulls, 3 (07.50%) breedable, 26 (65.00%) healthy and normal, 8 (20.00%) fatty, 24 (60.00%) alert and active, 4 (10.00%) aggressive and ferocious bulls as compared to their counter parts 29 (72.50%) standing or walking and 1 (2.50%) docile bulls, 37 (92.50%) non-breedable bulls, 1 (2.50%) emaciated, 5 (12.50%) weak or debilitated, and 11 (27.50%) calm and cool bulls. Wherever possible 14 (35.00%) seated, docile, calm and cool bulls were injected manually with syringe needles, instead of blow dart, due to poor acquaintance of operators for use of blow dart.

A total of 28 (70.00%) darting failures were reported because of multiple reasons, viz., 8 (20.00%) misdirection, 2 (5.00%) dart broken, 1 (2.50%) injury, 2 (5.00%) low pressure, 3 (7.50%) dart bounced back, 4 (10.00%) under dosage, 2 (5.00%) drug oozed out, 4 (10.00%) bull ran away and 2 (5.00%) s/c route injection etc. as also reported by Fowler (1978), Nigel (2001) and Caulkett and Cattet (2002). A successful darting technique needs special skill, careful planning, experience, knowledge of animal behaviour and biology (Christian, 1998; Maradia, 2009). Six to 12 feet (2 to 4 meters) darting distance was optimal to prevent chances of failure and other relevant procedural hazards.

Redosing was done in 4 (10.00%) under-dosed, 2 (5.00%) drug oozed out and 2 (5.00%) s/c route injected bulls amounting to total 8 (20.00%) bulls. Similar findings were reported by Athreya and Belsare (2007).

The mean induction time was the longest in Group I-A (15.42±0.01 min) and the shortest in Group II-B (12.42±0.00 min). This indicated that the younger and lighter bulls took longer time for induction as compared to the adult and heavier bulls as also reported by Athreya and Belsare (2007). Group I-A bulls showed the higher mean chase time (14.42±0.03 min) as compared to Group II-A bulls

(10.24±0.03 min), which corroborated with the findings of Julia et al. (2006).

The mean respiratory rate per minute was higher in Group II-B (31.60±1.81) and lower in Group I-B (22.00±1.24). Xylazine depressed respiratory rate. Similar observations were reported by Chakrabarti (2006). The mean rectal temperature (°F) was highest in Group I-A (101.8±0.85) and lowest in Group I-B (100.4±0.76) bulls, as has been reported by Yadav et al. (2008). The mean oxygen saturation (SpO2) was the lowest in Group I-(B) (87.70±0.76) and the highest in Group II-A (93.70±1.02) as described by Haigh and Gates (1995).

Sixteen (80.00%) bulls of Group I showed profuse salivation in as compared to 10 (50.00%) bulls in Group II. All bulls showed chances of regurgitation. All bulls were maintained in sternal recumbency by elevating the neck, and head positioned down sloped (mouth end below the level of the larynx) to prevent aspiration and regurgitation and to facilitate drainage of saliva or regurgitants (and also accumulated gas) with cleansing the solid material in the mouth and passing down a stomach tube, as also advised by Lyon (1987). Head should be positioned on a slight downhill angle in hope of keeping the airway clear. In the present study, head pulled method was applied, as head was tied up little (3-5 cm) high, so that bull can't even seat properly or even if bull sat down it stood up on its own after 8-12 minutes, because of uneasiness. If horns were not available, a "head string" was applied to facilitate tying.

Three bulls were injected with higher dose of Xylazine (0.3 mg/kg b.wt.) unknowingly, but no bull showed any serious or adverse effects/condition, except prolong and deep sedation as was also reported by Scott et al. (1988). The highest mean sedation time was observed in Group I-B bulls (3.38±0.01 hrs) with complications like bloat (n=6), chances of regurgitation (n=5), asphyxia (n=5), whereas the lowest mean sedation time was observed in Group I-A bulls (2.47±0.01 hrs) with problems of sudden arousal (n=7) and/or kicking (n=9). Group II bulls showed overall good quality of sedation in comparison with Group I bulls.

Out of 40 bulls, 23 (57.50%) bulls were castrated by close method with Burdizzo castrator to prevent further indiscriminate breeding and nose string was applied to all the bulls for easy handling. Common findings observed were 12 (30.00%) defecation following darting, 18 (45.00%) penis protrusion and 10 (25.00%) anus protrusion after darting or at the time of sedation. Within 22-28 hours of darting all the bulls were found eating bale of hay or forage and drinking water. There were no drug-related mortality when using these compounds and no post-capture complications were noted in immobilized bulls during the study.

Inherent side effects of Xylazine, i.e., hypersalivation, bloat/tympany, sudden arousal, kicking and regurgitation etc. were observed in 70-75 % 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 resolved many of these eventualities. Younger and lighter bulls required longer time for induction and produced short duration of sedation as compared to the adult and heavier bulls.

Results of present study indicated that Xylazine @ 0.2 mg/kg b.wt. or Xylazine Ketamine mixture @ 1.0-1.5 ml/bull (55.55-83.32 mg Xylazine and 44.44-66.66 mg Ketamine) for chemical immobilization at an approximately 4 meters darting distance is effective for its uneventful capture.

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