Small Ruminant Research 94 (2010) 117–124

Contents lists available at ScienceDirect

Small Ruminant Research

journal homepage: www.elsevier.com/locate/smallrumres

Abattoir survey on caseous lymphadenitis in sheep and goats in Tanta, Egypt

Magdy H. Al-Gaabary[a,1], Salama A. Osman[a,*,1], Mohamed S. Ahmed[b], Atef F. Oreiby[a]

[a] Department of Animal Medicine, Faculty of Veterinary Medicine, Kafrelsheikh University, Kafr El-Sheikh 33516, Egypt
[b] Department of Pathology, Faculty of Veterinary Medicine, Kafrelsheikh University, Kafr El-Sheikh 33516, Egypt

ARTICLE INFO

Article history:
Received 29 November 2009
Received in revised form 21 July 2010
Accepted 23 July 2010
Available online 19 August 2010

Keywords:
Caseous lymphadenitis
Sheep
Goats
Abattoir
Survey
Egypt

ABSTRACT

This study was carried out to determine some epidemiological and histopathological aspects associated with caseous lymphadenitis (CLA) on 962 slaughtered animals (692 sheep and 270 goats) at Tanta abattoir, Egypt. The prevalence of CLA among slaughtered animals was 26.92% and 25.05% on the basis of gross and bacteriological examination, respectively. On the basis of gross examination, the prevalence was 33.23% and 10.74% among slaughtered sheep and goats, respectively. Whereas on the basis of bacteriological examination, the prevalence was 32.65% and 5.55% in sheep and goats, respectively. The prevalence of CLA was significantly higher in slaughtered females than slaughtered males ($p < 0.0001$; OR: 22.93; CI 95%: 15.71–33.46). Statistically, the prevalence of CLA differed among different age groups; the higher prevalence was recorded in animals of the age group over 2 years (51.35%) than those from 1 to 2 years (8.84%) ($p < 0.0001$; OR: 10.98; CI 95%: 7.611–15.58) and under 1 year (7.5%) ($p < 0.0001$; OR: 13.2; CI 95%: 3.944–43.00). Superficial lymph nodes of the anterior half of the body showed higher infection rate than posterior half lymph nodes. Cross section of the affected lymph nodes revealed thick caseated greenish pus surrounded by thick fibrous tissue. Histopathological examination of the affected lymph nodes showed pyogranulomas surrounded by massive infiltration of macrophages and fragmented neutrophils. The experimental injection of CLA pyogenic materials was resulted in death of guinea pigs within 7–9 days with typical gross and histological lesions of CLA. Moreover, *Corynebacterium pseudotuberculosis* could be isolated from the died guinea pigs. In conclusion, CLA is more prevalent in slaughtered sheep than slaughtered goats and in females than males. Also, it was observed the increase of CLA prevalence with the progress of animal age. Therefore, beside early detection and culling of infected animals, strict hygienic care during shearing process is highly recommended.

1. Introduction

Caseous lymphadenitis (CLA) is a chronic infectious disease caused by *Corynebacterium pseudotuberculosis* (*C. pseudotuberculosis*) which is characterized by abscess development in subcutaneous tissues, lymph nodes and internal organs (Paton et al., 1994). The disease is insidious and there is increasing recognition of the involvement of internal nodes in the so-called visceral form of the disease.

The presence of abscesses in superficial lymph nodes is highly suggestive for CLA particularly if several animals in a group are similarly affected. Confirmatory diagnosis of the disease is mainly based on culture and identification of *C. pseudotuberculosis*. It is possible to isolate the organism from lesions of all cases, although the number of viable bacteria present in chronic abscess may be low and apparently sterile lesions are occasionally encoun-

* Corresponding author. Tel.: +20 47 3600273; fax: +20 47 3231311.
E-mail address: salama2068@yahoo.com (S.A. Osman).
[1] These authors contributed equally to this work.

0921-4488/$ – see front matter © 2010 Elsevier B.V. All rights reserved.
doi:10.1016/j.smallrumres.2010.07.011

tered (Baird and Fontaine, 2007). Shearing, abrasions and wounds appeared to play an important role in spreading the disease among animals (Zaituon and Bayoumi, 1994).

Economic losses resulting from CLA are reflected in the increased labor time dedicated to carcass trimming, carcass condemnation, disinfection of infected equipment, decline in wool production, death of severely affected sheep and perhaps decreased reproductive performance resulting from thin ewe syndrome (Standford et al., 1998; Baird and Fontaine, 2007). These economic losses are so severe in the disseminated visceral form due to extensive internal abscesses (Stoops et al., 1984). Subclinical infections should also be considered, because they allow *C. pseudotuberculosis* to disseminate within and among herds (Paton et al., 1994). Also, caseous lymphadenitis can become a public health problem as it is a zoonosis (Peel et al., 1997; Join-Lambert et al., 2006).

Sheep production is an important source for meat in most Islamic countries. In Egypt, CLA was found to affect 10% of sheep population and causes severe losses in sheep industry that was estimated to stand for 10 million Egyptian pounds (1.76 million $) annually (Seddik et al., 1983). Little is known about CLA prevalence among slaughtered animals due to limited epidemiological studies on *C. pseudotuberculosis* infection among slaughtered animals at abattoirs. Therefore, this abattoir-based study was carried out to estimate the prevalence of CLA in sheep and goats and also, to describe the histopathological changes associated with this disease in infected animals.

2. Materials and methods

2.1. Study animals

2.1.1. Field animals

A total of 962 animals (692 sheep and 270 goats) of different ages and sex slaughtered at Tanta abattoir, Egypt were used in this study. The abattoir is simple in construction where, the slaughtering and deskinning are carried out manually on the ground. Some of the examined animals showed lesions in the superficial lymph nodes while others showed visceral lesions. Some epidemiological parameters including prevalence, age and sex predisposition were estimated in this study. Postmortem examination was conducted on the slaughtered animals according to McGavin and Zachary (2007). All sheep and goats slaughtered in the abattoir during the period of study were included in this research. Detection of CLA was based on antemortem examination and postmortem inspection as described by Wilson (2005). Ages of the animals were determined using dentition method as described by Kwantes (1994).

2.1.2. Experimental animals

Eight male guinea pigs of about 250–350 g in body weight were used for isolation of *C. pseudotuberculosis* as well as determination of its pathogenicity. Six of them were injected intramuscularly according to El-Far (1976). The other two male guinea pigs were injected with normal saline (control ones). The injected guinea pigs were checked daily for 9 days.

2.2. Bacteriological examination

Two samples were collected from each lesion either by aspiration from closed lesions or via cotton swabs from opened lesions. All samples were taken under complete aseptic conditions and used for both preparation of direct smear and isolation of the causative agent. The samples were cultured on 10% sheep blood agar, nutrient agar and MacConkey's agar plates then incubated at 37 °C for 48 h aerobically as well as in CO_2 according to the method described by Bailey and Scott (1990). The ability of microorganisms to grow on Hoyle's tellurite media was observed through culturing and incubation at 37 °C for 48 h according to Jellard (1971). The resulting colonies were subjected to catalase, nitrate reduction, urease, gelatin liquefaction tests as well as fermentation of the following sugars: glucose, sucrose, maltose, lactose and xylose according to the method described by Cruickshank et al. (1975).

2.3. Histopathological examination

Affected lymph nodes from CLA infected sheep and infected testicles from Strauss reaction's positive guinea pigs were taken and fixed in 10% neutral buffered formalin solution and used for histopathological examination. Five microns thick paraffin sections were prepared and stained with hematoxylin and eosin, then, examined microscopically according to Drury and Wallington (1980).

2.4. Statistical analysis

Data was analyzed using statistical software program (GraphPadPrism version 5.0, GraphPad software Inc., USA). Chi-square (χ^2) test was used to investigate the association between potential exposure factors (age, species of animals and sex) and CLA prevalence. The strength of association between variables was measured using odds ratio (OR) (with corresponding 95% confidence interval). Association between variables was considered significant at $p < 0.05$.

3. Results

3.1. Descriptive analysis

3.1.1. Disease frequency

Among the 962 slaughtered animals, 259 animals were grossly affected with CLA representing a prevalence of 26.92%: *C. pseudotuberculosis* was isolated from only 241 cases representing a prevalence of 25.05%. The prevalence of CLA among the examined sheep and goats is illustrated in Table 1.

3.1.2. Prevalence of CLA in relation to animal sex

Out of 304 slaughtered females and 658 slaughtered males, 207 females and 52 males were grossly affected representing a prevalence of 68.09% in females and 7.90% in males. *C. pseudotuberculosis* was isolated from 194 females and 47 males representing a prevalence of 63.81% in females and 7.14% in males.

Out of 235 slaughtered ewes and 457 slaughtered rams, 189 ewes and 41 rams were grossly affected with CLA representing a prevalence of 80.42% in ewes and 8.97% in rams. *C. pseudotuberculosis* was isolated from only 185 ewes and 41 rams representing a prevalence of 78.72% in ewes and 8.97% in rams.

Out of 69 slaughtered female and 201 slaughtered male goats, 18 females and 11 males were grossly affected with CLA representing a prevalence of 26.08% in females and 5.47% in males. *C. pseudotuberculosis* was isolated from 9 females and 6 males representing a prevalence of 13.04% in females and 2.98% in males.

3.1.3. Prevalence of CLA in relation to age

Out of the examined 40 slaughtered animals under the age of 1 year, 554 slaughtered animals aged from 1 to 2 years and 368 slaughtered animals over the age of 2 years, 5, 58 and 196 animals were grossly affected with CLA representing a prevalence of 12.5%, 10.46% and 53.26%, respectively. *C. pseudotuberculosis* was isolated from 3 animals of the first group representing a prevalence of 7.5% whereas it was isolated from only 49 and 189 cases of the