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CLINICAL STUDIES OF OEDAMATOUS SKIN DISEASE AMONG EGYPTIAN BUFFALOES

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SUMMARY

The clinical forms of OSD among examined Egyptian buffaloes are the skin and mixed skin-renal forms. The morbidity, mortality and case fatality rates of OSD among examined buffaloes were 30%, 4% and 13.3% respectively. All infected buffaloes were observed in the summer and death was mostly in the mixed form. Both medicinal and surgical treatments of OSD showed acceptable success rates of 66.6% and 100% respectively.

INTRODUCTION

Oedematous skin disease (OSD) is considered as one of the most important bacterial diseases of Egyptian buffaloes. It causes big economical losses for buffalo breeders due to production drop of milk and meat production, reduction of hide quality and rarely deaths. This disease is caused by *Corynebacterium pseudotuberculosis* (*C.ovis*) serotype II (**Khater et al., 1983** and **Barakat et al., 1985**) and it was firstly recorded in Egypt by **Carpano** (**1934**), as ulcerative dermatitis of ruminants. The disease had been nominated as oedematous skin disease (OSD) of buffaloes by **Soliman et al (1963)** and **Awad (1966) .** Buffaloes get infected with *C. pseudotuberculosis* by intradermal inoculation (**Barakat et al., 1984)** and

Hippobosca equina plays an important role in its transmission as proved by **Ghoneim et al.(2001)** . Phospholipase-D is the most powerful exotoxin of *C. pseudotuberculosis* and it induces inflammation of the skin **(Selim, 2001).** In this study, clinical forms of OSD were epidemiologically studied among Egyptian buffaloes and treatment trials were also adopted.

MATERIALS AND METHODS

I- Materials :

1.1-Animals: A total of 50 Egyptian buffaloes representing both sexes and aged from less than 1.5 year to more than 5 years were examined in Giza governourate for diagnosis of OSD allover one year.

1.2-Samples: Smears and swabs of skin swellings were taken after evacuation of exudates.

1.3-Drugs: Penicillin Streptomycin **(***Streptopenicid® ,chemical industries development co.)*, declofenic sodium (*Declofenile®, produced by A.C.M.P. for El-Hoda pharm co.)*, dexamethasone sodium phosphate (*Dexamethasone®, ADWIA co.*) and metamizol **(*Novacid®, chemical industries development co.),*** and bovidone iodine anti-septic solution **(*Betadine®, Nile company for pharamaceuticals* and chemical industries**).

2. Methods:

2.1-Clinical examinations:

All animals were subjected to clinical examination. Temperature, respiratory rates, pulse , state of skin and lymph nodes were recorded according to **Rosenberger et al.(1979)**.

2.2-Gram staining:

Collected smears were stained by gram staining technique and examined microscopically. Positive result was recorded as *C.pseudotuberculosis* is straight to slightly curved gram positive rods, they have a palisade arrangement with characteristic Chinese letters configuration (**Jawetz et al. , 1982**).

2.3- Treatment Trial:

2.3.1. Medicinal treatment: ***Streptopenicid*®** was given at the dose rate of 20,000 IU of penicillin /kg BW and streptomycin at the dose rate of 12.5mg/kg BW daily for at least 5 successive days by intramuscular injection. Diclofenic sodium, dexamethazone and metamizol were used as anti-inflammatory. One ml of ***Declofenile*®**/25kg BW was injected intramuscularly once daily in infected buffaloes (pregnant animals) until skin swelling subsided. One ml of ***Dexamethasone*®** / 25 kg BW was injected intramuscularly once daily in infected buffaloes (non pregnant animals) until skin swelling subsided. One ml of ***Novacid*®** /20 kg BW was injected intravenously twice daily until fever subsided.

2.3.2.-Surgical treatment (of abscesseated skin swellings): OSD swellings might be invaded by pyogenic bacteria forming abscesses which were treated surgically by the incission and evacuation of the pus and had been dressed by ***Betadine*®.**

2.4. Epidemiological analysis:

Morbidity, mortality and case fatality rates, duration of the epidemic, age and sex susceptibility relationship were estimated according to **Michael (1995)**.

RESULTS

I-Clinical signs and forms of OSD:

All OSD infected buffaloes were observed during summer months and clinical forms and signs were recorded as shown in photos (1-4) :

I-1) Skin form of OSD:

Small swellings appeared in one of buffalo limbs which was consequently enlarged and associated with fever (39.5-41.5 C°). Infected buffaloes showed lameness, depression, anorexia, drop of milk production and recumbency. Affected skin area was hot, painful, swollen and red, then cracked, oozing serosanguinous exudates which got dry forming crusts, and regional lymph nodes were swollen. Aspiration of the red hot painful skin swelling revealed serosanguinous exudates containing pus flakes. Skin swelling was invaded by pyogenic skin bacteria which found very rich media for its multiplication to form skin abscess.

I-2) Mixed form of OSD:

This form is a mixture of skin and renal forms of OSD. The same clinical signs of the skin form was observed beside renal involvement in the form of red (coffee coloured) urine . This form was rapidly ended by death of infected buffaloes.

II- Epidemiological findings of OSD : **are illustrated in table (1).**

Table 1:distributionof OSD among Egyptian buffaloes according to age, sex, clinical form and site of skin affected:

A- distribution of OSD among Egyptian buffaloes according to age and sex.

Age	Male			Female			Total
	Total	Infected	Healthy	Total	Infected	Healthy	
less than 1.5 y	5	3*	2	5	3*	2	10
1.5 to 3 years	7	2	5	8	1	7	15
3.5 to 5 years	5	1	4	5	1	4	10
Older than 5 y	8	3	5	7	1	6	15
Total	25	9	16	25	6	19	50

B- Epidemiological data of OSD.

Buffaloes	Number	Percentage (%)		
The OSD infected	15	30	Morbidity rate	30 %
The Dead	2	4	Mortality rate	4 %
The total examined	50	100	Case Fatality	13.3 %

C- distribution of OSD among Egyptian buffaloes according to clinical form.

Clinical form	Number of infected buffaloes	Percentage of infected buffaloes
Skin form	13	86.66
Mixed form (skin and renal)	2	13.33

D- distribution of OSD among Egyptian buffaloes according to site of skin affected.

Site of skin affected	Number of infected buffaloes	Percentage of infected buffaloes
Hind limb	9	60.00
Fore limb	4	26.66
Hind fetlock	2	13.33
Other body parts.	0	0.00

NB: All OSD infected buffaloes were detected in summer (from April to August).

*one of them died, two dead calves were due to mixed form.

III- The results of treatment trials are illustrated in Table (2).

Table 2: Results of treatment trial of OSD among Egyptian buffaloes

Treatment	No. of infected buffaloes	% of infected buffaloes	No. of the cured	% of the cured	No. of the Dead animals
Medicinal	**6**	**40**	**4**	**66.66**	**2***
Surgical	**9**	**60**	**9**	**100.00**	**0**
Total	**15**	**100**	**13**	**86.66**	**2**

* Two calves were dead due to renal form of OSD

Photo 1: OSD in 1.5 year old female Egyptian buffalo calf (swelling at thigh region)

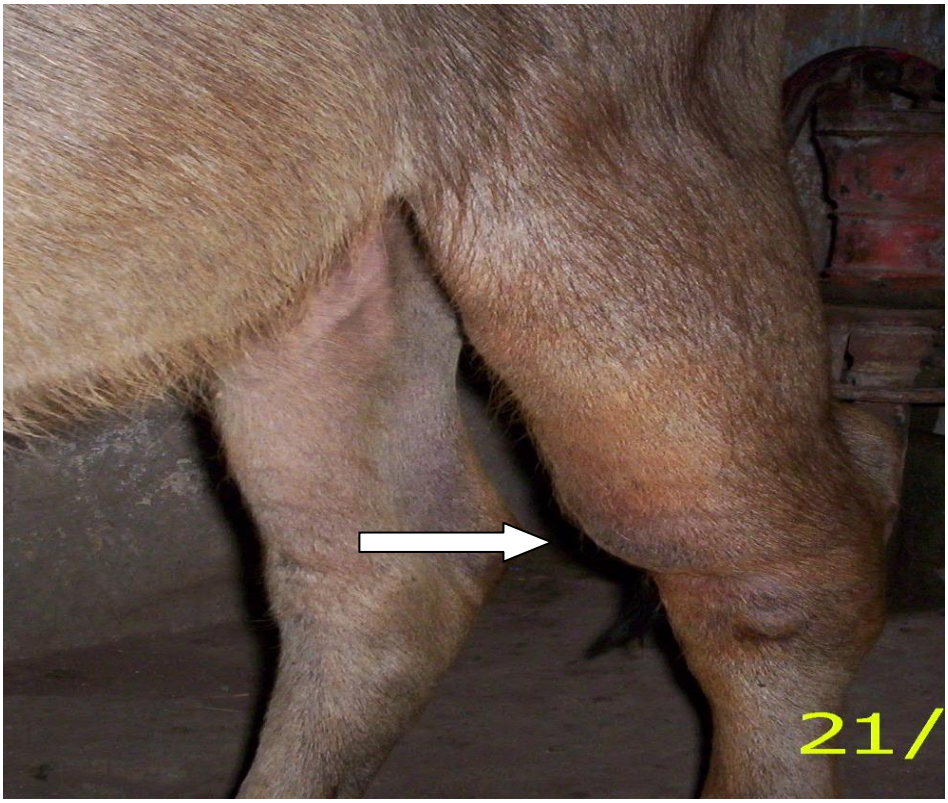

Photo 2: The same animal, oedema and swelling of the left hind limb.

Photo 3: OSD in 1.5 year old male Egyptian buffalo calf (redness and swelling of the right fore limb).

Photo 4: About 5 years old female Egyptian buffalo showing OSD lesions(crusts, skin cracks and redness of the right limb

DISCUSSION

OSD is a terrifying illness of buffaloes due to a big skin swelling formation, oozing of sanguinous exudate, sharp drop of milk yield, prolonged course of recovery , or death. This disease is endemic among Egyptian buffaloes since 1934 (Carpano) and appears annually especially in hot-wet months of the year. OSD is caused by *Corynebacterium pseudotuberculosis* (*C.ovis*) serotype-II which was detected in gram stained smears.

In this study, the clinical forms of OSD are recorded as skin and mixed skin-renal forms. The skin form was characterized by small swelling appeared in one of buffalo limbs and consequently enlarged and associated with fever (39.5-41.5 C°). Lameness was recorded and it is caused by skin swelling while depression, anorexia, drop of milk production and recumbency were also observed and they are resulted from toxemia where *C.ovis* secrete powerful exotoxins , the most important one is phospholipase-D which is responsible for skin inflammation and oedema as reported by **Selim(2001).** Although buffalo immune response is the strongest among animals but in OSD, virulence of *C.ovis* is more potent than buffalo immune defense mechanism, which is supported by phospholipase-D production, toxic nature of *C.ovis* cell wall structures on the skin and micro-organism ability to remain viable inside macrophage (**Selim, 2001**). Aspiration of swelling content usually reveals serosanguinous exudate at the early stage which shows that *C.ovis*

serotype-II is toxogenic not pyogenic. At the late stage, the serosanguinous exudate is rich media for pyogenic bacteria which invade the weak inflammed skin and forming skin abscess. The mixed skin-renal form was also observed which characterized by skin inflammation and red coffee urine. The red coloured urine is caused by destruction of kidney tissue and red blood cells with release of haemoglobin. This is followed by formation and deposition of immune complex (phospholipase-D antibody complex) in the kidney, this immune complex was also detected circulating in sera of buffaloes by **Ghoneim et al.(1999**). Moreover**,** Hsu(1984) reported that the effects of phospholipase D in vivo include intravascular haemolysis, necrosis , pulmonary oedema and shock.

Epidemiological data of OSD are illustrated in table (1), morbidity, mortality and case fatality rates were recorded as **30** %, 4 %, and 13.3 % respectively. All infected buffaloes (30%) were observed in summer months (April-August), this may return to transmission of *C.ovis* by *Hippobosca equina* which show much more activity in summer months, what support our thought is the mouthpart of this fly can pierce thick buffalo skin during blood sucking and detection of *C.ovis* phospholipase-D gene in DNA extracts of *Hippobosca equina* and aspirate of OSD swelling as proved by **Ghoneim et al.(2001)**. The low mortality rate (4%) was observed only in calves suffering from mixed skin-renal form where two calves died quickly and did not respond to treatment, this may be explained by higher susceptibility of buffalo calves to the mixed form with ill-

development of immune system. The cause of death is thought to be shock due to destruction of kidney and red blood cells by phospholipase-D antibody complex. Regarding the age susceptibility , animals from 6 months to 5 years or more showed high infection rates. Similar results were reported by **Barakat et al.(1984), Hassan (1988)** and **Al-gaabry et al.(2005).**

Medicinal treatment using antibiotic-anti-inflammatory combination regime can subside skin swelling and inflammation at the early stage before pyogenic bacterial invasion whereas it could not prevent death in the mixed form due to shock. The surgical treatment is very simple and effective where skin swelling was treated as an abscess and it is thought to be more common due to delaying of calling Vet. interference by buffalo breeders. These results are coinciding with results of **Abu-zaid (2001), El-sawah (2002)** and **Al-gaabry et al.(2005).** Failure of medicinal treatment in long standing cases may attribute to the intracellular location of the organism together with the antibiotic binding properties of protein in pus and thick capsule that surrounds abscess greatly favor survival of the organism in the face of anti-microbial therapy. Similar results has been released by **Maddy (1953)** and **Al-gaabry et al.(2005).**

From economical point of view, the future aspect of control OSD should be depending on immunization strategies against C.ovis and its toxins and

control of *Hippobosca equina* population to minimize economic losses in buffaloes breeding field.

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دراسات إكلينيكية عن مرض التهاب الجلد الأوديمى فى الجاموس المصرى

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الملخص العربى

بإجراء الدراسات الإكلينيكية وعمل صبغة الجرام للمسحات المأخوذة من الجلد من الجاموس المصاب تبين أن هناك شكلان للمرض وهما الشكل الجلدى والشكل الجلدى البولى . كما وجد ان نسبة الإصابات والوفيات ومعدل الوفيات بين الجاموس المصاب والذى تم فحص جلدة كالأتي على الترتيب: 30 % و 4 % و 13.3 % وأن كل الحيوانات المصابة كانت فى فصل الصيف وان كل الوفيات كانت فى الجاموس الذي يعانى من الشكل الجلدى البولى للمرض. كما أظهرت طرق العلاج بالأدوية والجراحة نسب نجاح مقبولة وهى كالآتي على الترتيب : 66.6 % و 100 % .