

A SURVEY OF CUTANEOUS NEOPLASMS AMONG HORSES USED FOR CULTURAL FESTIVALS IN BORNO STATE, NIGERIA

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SUMMARY

A total of 314 Arab horses of ages ranging from 4 to 15 years were examined of which 35(11.2%) were Albino and 279(88.85%) were non albino horses. Nine horses (2.86%) were observed to have cutaneous neoplasm. Gross characteristics of the cutaneous neoplasm found were studied and some biopsy samples collected and processed for histopathology. Four (11.4%) of the Albino horses and 5(1.79%) of the non Albino horses had cutaneous neoplasm. Six (1.9%) of the tumours were papillomas while 3 (0.95%) were squamous cell carcinomas. All the cases of squamous cell carcinoma were observed in albino horses, 2 affected the eye, 1 affected the genitalia, and one case of papilloma of the prepuce. All the non-albino horses were observed to have papilloma only. The papillomas were small projections, generally less than 5mm in diameter observed around the eyelids and external genitalia. The prepuce and penile mass was multilobulated, with a cauliflower appearance and bleeds easily on manipulation. Histologically, the papillomas were deeply subdivided into epithelial lobules with the outer and inner aspects of the epithelium running approximately parallel to each other. Irregular sub-dermal masses or cords of proliferating and atypical epidermal cells separated by connective tissue, and epithelial 'pearls' of mature keratin were also observed in the squamous cell carcinoma.

KEY WORDS: Squamous cell carcinoma, Papilloma, Albino horses.

INTRODUCTION

Horses play very important roles in traditional cultural festivals of Borno state, Nigeria, where they are used as mounts in transport, racing, polo and durbar. (Buvanewar, 1994). Female animals are not used for cultural festivals due to restraint problems associated with aggressive males. The indigenous horses belong to the Arab breed and are usually only brought into Maiduguri town on the eve of the cultural festivals and returned back to their owners in the villages immediately after such festivals (personal observations).

Staples (2007) described the Arab horses as sleek and elegant with characteristic dished faces, level croups, refined short heads, with a tapered muzzle; large nostrils; very large, wide spaced

and low-set eyes; and, small shapely ears set apart. Their bodies are long, and have sloped shoulders with well-defined withers; a short, concave back, with a long, level croup. They are very long from point of hip to point of buttock; with a high set tail.

Squamous cell carcinoma is the most common tumour affecting the skin of horses and is found at the muco-cutaneous junctions, affecting the skin, eyelids, eyeball, orbit, mouth, maxillary sinus and external genitalia (Baker and Leyland, 1975; Junge *et al.*, 1984; Cotchin 1977; Radostitis *et al.*, 1997; Brooks, 2002). The carcinoma may be slow growing or rapidly invasive (Pascoe, 1990).

Squamous cell carcinomas are typically granulomatous, cauliflower growths that could arise from existing papillomas or can develop independently (Cotchin, 1977, Junge *et al.*, 1984; Gatewood *et al.*, 1989). The incidence was reported to be 15.3% (Baker and Leyland, 1975). Brooks (2002) suggested that the prevalence in horses increases with age with the mean age at diagnosis been 11.1 ± 0.4 years. Howarth *et al.* (1991) suggested that the glans penis was the most common site affected (53% of squamous cell carcinoma and 61% of papilloma), the urethral diverticulum, urethral process or urethra (27.6%).

Multiple small papillomas usually occur in young adult horses around the lips and nostrils, whilst larger solitary lesions are seen in older animals (Pascoe, 1990). Histologically, papillomas have been described as deeply subdivided tumours composed of epithelial and fibrous components in approximately equal proportions, the outer and inner aspects of the epithelium running approximately parallel to each other (Baker and Leyland 1975). According to Pascoe (1990), the dermal connective tissues are hyperplastic, and thrown up into finger-like projections covered by numerous layers of well differentiated prickle cells but without evidence of invasion of the connective tissue by isolated cell nests.

The aetiology of squamous cell carcinoma is unknown, but recent studies in humans suggest that exposure to ultraviolet light is the major risk factor (Stulberg *et al.*, 2004). The ultraviolet light targets and alters the tumour suppressor gene in equine squamous cell carcinoma (Brooks, 2002). It has also been suggested that smegma may be carcinogenic, resulting in penile carcinomas in horses (Gatewood *et al.*, 1989; Pascoe, 1990) and uncircumcised humans (Stulberg *et al.* 2004). The particular agent and its role in tumour development are not yet identified (Cotchin 1977; Gatewood *et al.* 1989). Papilloma viruses have however been associated with the development of the disease in humans (Stulberg *et al.* 2004). The aetiology of these tumours in old animals is unknown, but multiple papillomas in young adult horses have been associated with a host-specific papova

virus (Pascoe, 1990).

Histologically, the squamous cell carcinoma consists of squamous epithelial cells and dense fibrous stroma, which is frequently heavily infiltrated by inflammatory cells, and which separates irregular foci of malignant prickle cells of the epidermis which penetrate the stratum germinativum and invade the underlying connective tissues. Epithelial columns extend into and out of the neoplastic mass in a disorganised manner appearing as epithelial 'pearls' when examined by histologic section (Jones and Hunt 1972; Pascoe, 1990; Stulberg *et al.* 2004).

Genital squamous cell carcinomas commonly affect the glans penis or body and prepuce, and may cause fatal metastasis unless amputation is performed early in the development of the disease (Baker and Leyland, 1975; Cotchin, 1977; Anderson, *et al.*, 1990; Pascoe, 1990; Mac fadden and Pace., 1991, Howarth *et al.*, 1991; Bedford *et al.*, 2000; Stulberg *et al.*, 2004).

Treatment of the well-differentiated squamous cell carcinoma in horses by radical surgery of the affected organ, including penile amputation and urethrostomy, prepuce ablation and proximal urethrostomy or local excision have been described (Pascoe, 1990; Howarth *et al.*, 1991; Knottenbelt, 2003).

Cryosurgery, hyperthermia and radiotherapy procedures have also been described for the treatment of squamous cell carcinoma affecting the eye, genitalia or skin (Baker and Leyland, 1975; Cotchin, 1977; Anderson, *et al.*, 1990; Pascoe, 1990; Mac fadden and Pace, 1991; Howarth *et al.*, 1991; Akinrinmade *et al.*, 1992; Stulberg *et al.* 2004). A series of intralesional injections using 5-fluorouracil resulted in complete regression of oral squamous cell carcinoma in a Malayan Tapir with no recognized adverse effects (Miller *et al.*, 2000). 5-fluorouracil has also been successfully used for the treatment of squamous cell carcinoma in humans (Stulberg *et al.*, 2004). Plummer *et al.* (2007) evaluated the effectiveness of postoperative beta-irradiation with strontium-90 as an adjunctive treatment to superficial keratectomy and permanent

bulbar conjunctival graft for removal of equine corneo-limbal squamous cell carcinoma and suggested that it was effective in at least 83% of the horses and recurrence occurred in about 17% of the horses.

Squamous cell carcinoma of the eyelid of Arab stallions in Nigeria was reported (Akinrinmade *et al.*, 1992; Rabo *et al.*, 2000). There is however, paucity of information on the occurrence of ocular and genital papilloma and squamous cell carcinoma in Nigerian horses. The aim of this study was therefore, to determine the incidence of ocular and genital squamous cell carcinoma among stallions used for cultural festivals in Borno State, Nigeria.

MATERIALS AND METHODS

A total of 314 Arab stallions of ages ranging from 4 to 15 years were examined. The horses were selected and brought from all over Borno State to Maiduguri to participate in cultural festivals between January and December; 2005, two hundred and fifty (250) of which participated in the first Abuja carnival durbar held on 25th November, 2005. All the horses examined were classified as Arab horses as described by Staples (2007).

General clinical examinations were made for any gross lesions suggestive of external benign or malignant neoplasm and the growths were classified based on gross characteristics according to Baker and Leyland (1975), Cotchin (1977) and Pascoe (1990). Excision biopsy was performed on some suspected cases where permission could be obtained. The horses were tranquilised with chlorpromazine at 1mg/kg body weight intravenously and general anaesthesia was induced by intravenous injection of Thiopentone sodium at 10mg/kg body weight. The growths were excised and samples placed in 10% buffered formalin for 48 hours, dehydrated in graded alcohols, cleared in xylene, and embedded in paraffin. The tissues were then serially sectioned at 7 micrometre thick sections on a rotatory microtome. The paraffin wax sections were mounted and stained with haematoxylin and eosin (H&E) as described by Banks (1986). The

neoplasms were then examined using an Olympus® light microscope and classified according to Cotchin (1977). Photomicrographs of the sections were taken using an Olympus® 4.0 Mega pixels digital camera.

RESULTS

A total of 314 Arab horses of ages ranging from 4 to 15 years were examined of which 35(11.2%) were Albino and 279(88.85%) were non albino horses (Table 1). Nine horses (2.86%) were observed to have cutaneous neoplasm. Four (11.4%) of the Albino horses and 5(1.79%) of the non Albino horses had cutaneous neoplasm. Six (1.9%) of the tumours were papillomas while 3 (0.95%) were squamous cell carcinomas. No cases of sarcoid were observed. All the cases of squamous cell carcinoma were observed in albino horses, 2 affected the eye, 1 affected the genitalia (PLATE 1 and 2), and there was one case of papilloma of the prepuce. All the non-albino horses were observed to have papilloma only.

Grossly the papillomas were small single or multiple projections, generally less than 5mm in diameter that were observed around the eyelids and external genitalia. The prepuccial and penile mass was multilobulated with crusts on the surface, with a cauliflower appearance and bleeds easily on manipulation, (PLATE 1 and 2). Only proliferative squamous cell carcinomas were observed on the eye, prepuce and penis of the albino stallions. Histologically, the papillomas were deeply subdivided into epithelial lobules the outer and inner aspects of the epithelium running approximately parallel to each other (PLATE 3). Irregular masses or cords of proliferating atypical epidermal cells separated by connective tissue, with dermal invasion were observed in the squamous cell carcinoma (PLATE 4). The epithelial 'pearls' consisted of mature keratin (PLATE 5). There was recurrence six weeks after surgical excision of the genital squamous cell carcinoma in one of the albino stallions studied and the owner sold it off.

TABLE 1: Types of cutaneous neoplasm among Arab stallions used in cultural festivals in Borno State

Coat colour	Type of neoplasm	Area affected	Number of stallions affected	Approximate age of stallions(years)
Albino (n=35)	papilloma squamous cell carcinoma	genitalia	1	12
		eye	2	10
Non-albino (n=279)	papilloma	genitalia	1	12
		eyes only	5	15
Total 314	-	-	9	Mean=12.25

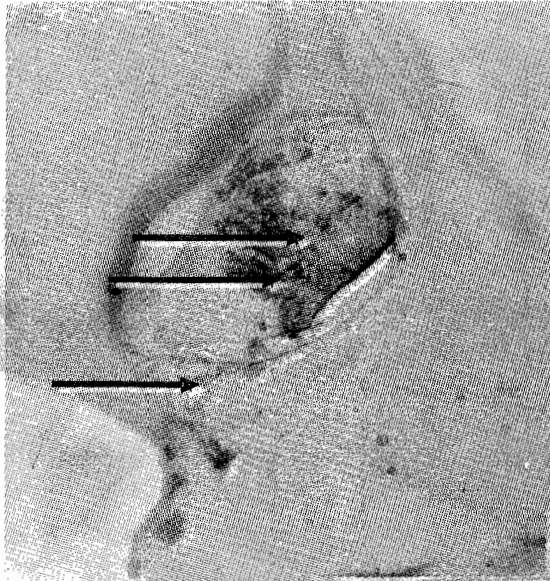


PLATE 1: Gross appearance of papilloma and squamous cell carcinoma on the prepuce of an albino stallion. Note the papilloma on the prepuce (arrows)

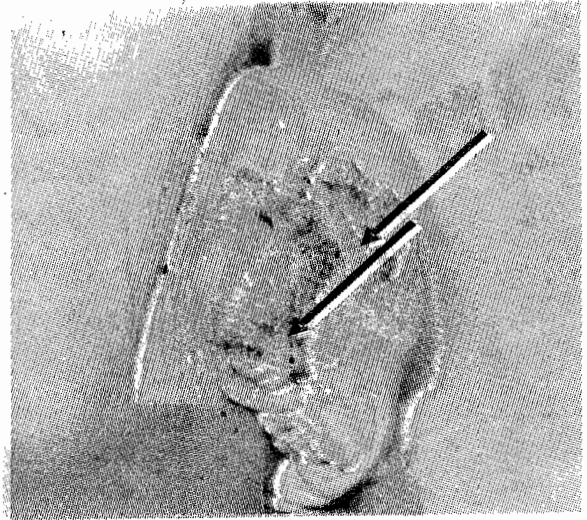


PLATE 2: Gross appearance of penile and prepuce squamous cell carcinoma in an albino stallion. Note the multi-lobulated cauliflower appearance on the penis (arrows)

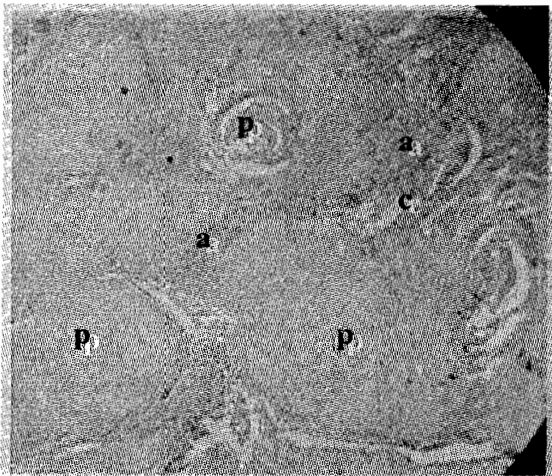


PLATE 4: Photomicrograph of a cross section of penile squamous cell carcinoma in an albino horse. Note the irregular masses or cords of proliferating atypical epidermal cells (a) separated by connective tissue (c) and the 'horn pearls' (p). H&E X 50

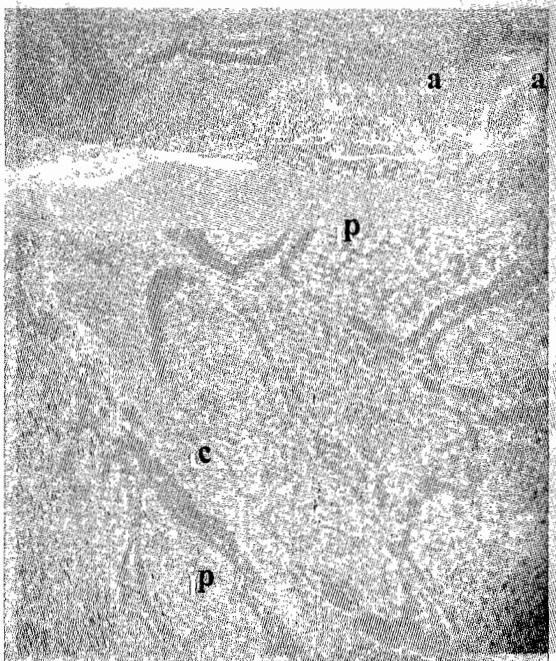


PLATE 3: photomicrograph of a cross section of prepuce papilloma in an albino horse showing poorly differentiated epithelial cells (a) and papillary projections that were subdivided into epithelial lobules, the outer and inner aspects of the epithelium running approximately parallel to each other (p) separated by connective tissue (c). H&E X 100

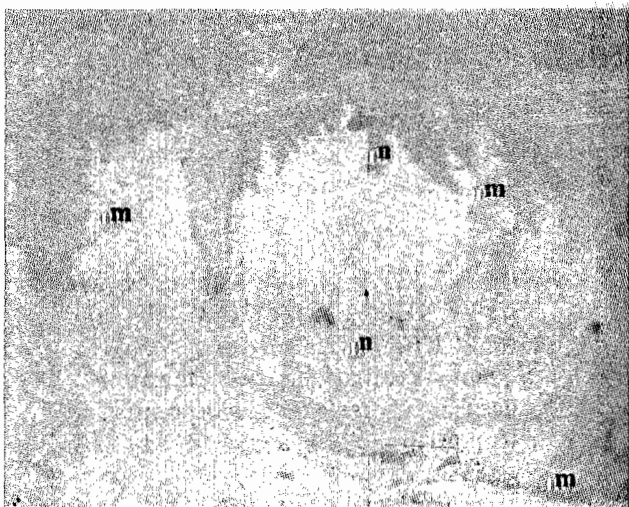


PLATE 5: Photomicrograph of prepuce squamous cell carcinoma in an albino stallion, showing a nest of mature keratin or 'horn pearl'. Note prominent nucleoli (n) and cells surrounding whorls of keratin material (m). X 250

DISCUSSION

Genital squamous cell carcinomas affecting the penis and prepuce of aged horses have been reported previously (Mac Fadden and Pace, 1991, Howarth *et al.*, 1991., Valentine, 2006). Rabo *et al.*, (2000) studied clinical accession cases, while this study sampled stallions selected to participate in cultural festivals and this may explain the relatively low occurrence of the cutaneous neoplasm been reported by both studies. Further detailed studies may provide the incidence rates for the general equine population of Borno State. Both studies however identified albino horses as been most frequently affected by cutaneous neoplasm.

The clinical manifestations and gross appearance of squamous cell carcinoma in horses are of great diagnostic significance (Frank, 1976). Bostock and Owen (1975) suggested that squamous cell carcinoma in horses are proliferative rather than crateriform and appear as ulcerated, fungating lesions with poorly defined border. According to Pascoe (1990), the proliferative type of squamous cell carcinomas are papillary masses of varying sizes, many of which have a cauliflower like appearance, and the surface tends to be ulcerated and bleeds easily. These gross proliferative features were similar to those observed in this study.

Treatment of the well-differentiated squamous cell carcinoma in horses is usually by radical surgery and amputation of the entire affected organ i.e. prepuce may result in cure. Cryosurgery, hyperthermia and radiotherapy procedures have been described (Gatewood *et al.*, 1989; Welch and DeBowes, 1989; Anderson, 1990; Howarth *et al.*, 1991). Surgical excision and cryotherapy have also been used in the treatment of ocular squamous cell carcinoma in Nigerian horses with variable results (Akinrinmade *et al.*, 1992; Rabo *et al.*, 2000). According to Akinrinmade *et al.* (1992), there was recurrence of the ocular squamous cell carcinoma lesion six months post surgery which necessitated enucleation. Similarly, there was recurrence of genital squamous cell carcinoma in one of the albino stallions surveyed in this study, 6 weeks after surgical excision under general anesthesia.

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The traditional method of treatment of cutaneous neoplasm in Borno State generally involves excision of the lesion with a sharp knife and subsequent cauterisation of the wound with a red-hot iron. Physical methods of restraint are used. The authors have observed this technique been successfully applied to both cutaneous neoplasm (papilloma) and exuberant granulation of the limbs, thoracic and abdominal wall on previous occasions not related to this study. Neoplasms of the mucocutaneous junction i.e. ocular and genital areas are generally not treated using this traditional technique.

Rabo *et al.*, (2000) observed squamous cell carcinoma in the eyes of albino horses. Both ocular and genital squamous cell carcinomas were observed in albino horses in this study and this agrees with previous studies. (Baker and Leyland, 1975; Strafuss, 1976; Cotchin, 1977; Pascoe, 1990; Anderson *et al.*, 1990; Howarth *et al.*, 1991). Valentine (2006) studied neoplasms occurring in the skin and mucocutaneous sites of horses and suggested that the mean ages of horses with ocular, skin and penis/prepuce, squamous cell carcinoma to be 13, 15 and 21 years respectively. These findings are higher than the mean ages found in this study and could be as a result of the higher number of animals surveyed by Valentine, (2006) on clinical accession (536 horses).

Lack of skin pigmentation in the albino horse predisposes them to cutaneous neoplasms through exposure to ultraviolet radiation from the sun (Knottenbelt, 2003; Valentine, 2006). Rabo *et al.*, (2000) similarly suggested that the lack of skin pigmentation appears to play a major contributing role in the development of the condition in the semi arid part of Nigeria. The intense sunshine and heat characteristic of the region makes shaded housing a necessity for albino horses. Albino horses are culturally valuable in Borno State as show horses (Rabo *et al.*, 2000). Amputation of the prepuce and perhaps the penis would therefore significantly decrease the value of the horses and their cultural acceptance.

It was therefore concluded that ocular and genital squamous cell carcinoma occur among stallions selected to participate in cultural festivals in Borno State and the albino horses appear to be particularly susceptible. Only papillomas were observed in the non albino stallions. Early diagnosis and treatment of squamous cell carcinoma is necessary to decrease the possibilities of reoccurrence or metastasis and subsequent death of affected horses.

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