



CASE REPORT

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Management of Transmissible Venereal Tumour in a 2½-Year-Old Nigerian Indigenous Bitch

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ABSTRACT

This article described the management of transmissible venereal tumor (TVT) in a 2½-year-old Nigerian indigenous bitch presented to the Small Animal Unit of the Veterinary Teaching Hospital, Usmanu Danfodiyo University, Sokoto, Nigeria. The case was managed as detailed in the study. The bitch was presented with a two-month old history of a protruding, bleeding vulval mass and reduced appetite. Clinical examination revealed a cauliflower-like mass occupying the vulva. Hematological findings indicated leukocytosis occasioned by neutrophilia. Surgical debulking was performed followed by histopathological confirmation and adjunct chemotherapy using vincristine sulfate. Progressive clinical improvement and resolution of clinical signs were observed during follow-up. This case highlights the effectiveness of combined surgical and chemotherapeutic management of TVT.

Keywords: *Transmissible venereal tumour, dog, vincristine, vulvar mass, surgical excision*

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Data Availability

Data supporting the findings are available from the corresponding author on reasonable request.

Introduction

Canine transmissible venereal tumour (CTVT) is a contagious neoplasm affecting mostly the external genitalia of dogs and is primarily transmitted during coitus, although non-sexual transmission through licking, sniffing, or biting of affected areas has also been reported (Das and Das, 2000; Mukaratirwa and Gruys, 2003). It is considered the oldest known somatic cell lineage, originating approximately 11,000 years ago from a single founder dog, and represents one of the few naturally occurring transmissible cancers in mammals (Murchison, 2009). The condition is more common in tropical and subtropical regions, particularly among free-roaming dogs (Batamuzi et al., 1992).

Canine transmissible venereal tumour commonly presents as lesions on the external genitalia. The genital tumours are typically multilobulated, friable, cauliflower-like masses that are bright red, ulcerated, and prone to bleeding (Ganguly et al., 2016). These masses may range from small nodules to large proliferative growths up to 13 cm in diameter and are often associated with haemorrhagic discharge, excessive licking of the affected area, and deformity of the vulva or prepuce (Mukaratirwa and Gruys, 2003). In males, penile or preputial involvement may result in paraphimosis, whereas vaginal masses in females may cause vulval protrusion or urinary disturbances (Das and Das, 2000).

TVT exhibits a characteristic biological behaviour involving progressive growth, stabilization, and, in some cases, spontaneous regression in immunocompetent hosts (Hsiao *et al.*, 2002). During the progressive phase, tumour cells evade host immune responses by downregulating major histocompatibility complex (MHC) class I and II expression and secreting immunosuppressive cytokines such as transforming growth factor-beta (TGF- β) (Hsiao *et al.*, 2002; Ganguly *et al.*, 2016). Regression is associated with restoration of MHC expression, infiltration of tumour-infiltrating lymphocytes, particularly CD8⁺ T cells, and increased production of pro-inflammatory cytokines including interferon-gamma (IFN- γ), resulting in tumour cell apoptosis (Mizuno *et al.*, 1989).

Diagnosis of TVT is based primarily on history, signalment, and tumour location, with cytology regarded as the gold standard for genital forms because of its rapidity and diagnostic accuracy (Ganguly *et al.*, 2013). Fine-needle aspiration or impression smears typically reveal a uniform population of round to ovoid cells with scant to moderate vacuolated cytoplasm, round nuclei, coarse chromatin, prominent nucleoli, and frequent mitotic figures (Mukaratirwa and Gruys, 2003).

Chemotherapy remains the treatment of choice for canine transmissible venereal tumour because of its high efficacy and minimal invasiveness compared with surgery or radiotherapy (Pimentel *et al.*, 2025). Vincristine sulphate is considered the first-line chemotherapeutic agent and is commonly administered intravenously at a dose of 0.5–0.75 mg/m² weekly for four (4) treatment cycles until complete regression is achieved (Ganguly *et al.*, 2016). Alternative therapeutic agents for vincristine-resistant cases include doxorubicin and lomustine, while radiotherapy may also be employed in refractory cases (Das and Das, 2000). The prognosis for CTVT is generally excellent following chemotherapy, with recurrence being uncommon after complete remission (Pimentel *et al.*, 2025).

Case Management

Case Presentation and History

On 28th May 2025, a client from the Tamaje Area of Sokoto State presented a 2½-year-old Nigerian indigenous bitch to the Small Animal Unit of the Veterinary Teaching Hospital, Usmanu Danfodiyo University, Sokoto (Figure 1). The chief complaint was a protruding bleeding mass around the vulva, noticed two months before presentation.

The dog had a reduced appetite for one month and was anorexic a day before presentation. It was fed on food remnants, housed indoors and had never been bred. There was a history of DHLPP vaccination that was up to date. Intermittent vulval bleeding and dysuria was also reported.

Clinical Findings

The dog was alert, weighed 18 kg and had a rectal temperature of 41°C, pulse rate of 60 beats/min and respiratory rate of 20 cycles/min. The ocular mucous membranes were slightly pale with a capillary refill time of less than 2 seconds.

A red nodular, irregular and cauliflower-like mass measuring approximately 5 × 3 cm occupied the vulva (Figures 2 and 3). Differential diagnoses included vaginal prolapse, squamous cell carcinoma and transmissible venereal tumour.

Sample Collection and Laboratory Investigation

At the presentation of bitch to the small animal unit of the Veterinary Teaching Hospital, Usmanu Danfodiyo University, Sokoto, Nigeria, the haematological analysis of the whole blood, including red blood cells, packed cell volume, haemoglobin, total white blood cells, segmented neutrophils, band neutrophils, lymphocytes, monocytes, eosinophils and basophils from the bitch was performed using a Sysmex automated haematology analyzer (KX-21, Japan). The blood sample was collected according to the method outlined by Shabir *et al.* (2013). The differential leucocyte counts were performed using a cell counter and viewed under an Olympus light microscope (Shinjuku-ku, Tokyo, Japan) at 1000x magnification with oil immersion after staining the thin blood smear with Giemsa stain (Sigma-Aldrich, Germany).

Cytological Procedure

The tumour was restrained aseptically, and the surface was gently shaved and cleaned with sterile normal saline to remove blood and debris (Figure 4). The surgical site was draped and exposing only the tumor mass for surgery (Figure 5). The tumor was excised using an improvised cauterization (Figure 6). Ligatures were placed in the bleeders to occlude blood vessels and prevent blood loss so as to reduce the risk of post-operative haemorrhage (Figure 7). The surgical area post-surgery was well apposed (Figure 8). Cytological samples were obtained by fine-needle aspiration (FNA) using a 22–25-gauge needle attached to a 5 mL syringe. Alternatively, impression smears were prepared by gently pressing a clean glass slide against the freshly exposed cut surface of the tumor. The aspirated material was expelled onto clean glass slides and spread evenly using another slide held at approximately a 30–45° angle to produce a thin smear. The smears were air-dried and stained with Giemsa stain according to the manufacturer's instructions. The stained smears were examined under a light microscope using low power (x10) to assess smear quality and cellular distribution, followed by high power (x40) and oil immersion (x100) for detailed cytomorphological evaluation (Raskin *et al.*, 2021).

Histopathological evaluation

Following surgical excision, the tissue from the tumor mass was immediately fixed in 10% neutral-buffered formalin (BHD Chemicals Ltd., Poole, England) for 24–48 hours, to preserve tissue architecture. After fixation, the tissues were further trimmed into appropriate sizes (approximately 3–5mm thick) and processed using an automated tissue processor. The processing involved dehydration through graded concentrations of ethanol (70%, 80%, 90% and 95%, and absolute ethanol), cleared using xylene, impregnated in bakery that contained paraffin wax incubated in vacuum air oven at 60°C, embedded in plastic embedding rings, sectioned at 5µm

using a microtome, deparaffinized with xylene, rehydrated in graded concentrations of alcohol (100%, 95%, 80% and 70%) stained with haematoxylin and eosin (H&E; BDH Chemicals LTD Poole, England) and examined using a light microscope according to the method outlined by Baker *et al.* (1998). The stained slides were examined under a light microscope at low (x100) and high (x400) magnifications. Histopathological evaluation focused on the cellular morphology, including tumour cell arrangement, cell shape, nuclear characteristics, mitotic activity, degree of cellular pleomorphism, presence of inflammatory cell infiltrates, congested blood vessels, necrosis, haemorrhage, stromal response, and evidence of tissue invasion (Figure 9). The histological findings were compared with established diagnostic criteria for CTVT (Martins *et al.*, 2005). The dog was followed-up after recovery and the vulva showed proper healing of the surgical site (Figure 10)

Results

Haematology revealed PCV of 36 %, haemoglobin 11.8 g/dL, RBC $6.48 \times 10^6/\text{mm}^3$ and WBC $27.9 \times 10^3/\text{mm}^3$ with marked neutrophilia (85 %) (Table 1). Numerous round cells with marginal chromatin material, compacted and mild lymphocytic infiltration of the protruding vaginal tumour mass, consistent with TVT (Figure 9).

Treatment and Management

The tumour was surgically debulked under general anaesthesia using xylazine (0.5 mg/kg IV), atropine sulfate (0.25 mg/kg IV) and ketamine hydrochloride (10 mg/kg IV).

Post-operative therapy included ketoprofen (1 mg/kg IM for 3 days), amoxicillin LA (15 mg/kg IM for 2 days), iron dextran (10 mg/kg IM stat), vitamin B-complex (20 mg/kg IM for 3 days) and vitamin K (1 mg/kg IM stat).

Vincristine sulfate was administered at 0.75 mg/m² IV and repeated after one week for four (4) consecutive weeks. Clinical improvement was observed progressively with normalisation of appetite, cessation of bleeding and stable vital parameters within a week post-treatment (Table 2).



Figure 1: Examination of a 2½-year-old Nigerian indigenous bitch presented to the VTH, Usmanu

Danfodiyo University, Sokoto, Nigeria with Transmissible venereal tumour .



Figure 2: Cauliflower-like protruding vulva mass (arrow) in a 2½-year-old Nigerian indigenous bitch presented to the VTH, Usmanu Danfodiyo University, Sokoto with Transmissible venereal tumour



Figure 3: Tumor size (5cm × 3cm) in a 2½-year-old Nigerian indigenous bitch presented to the VTH, Usmanu Danfodiyo University, Sokoto with Transmissible venereal tumour.



Figure 4: Shaved surgical site in preparation for surgery in a 2½-year-old Nigerian indigenous bitch presented to the VTH, Usmanu Danfodiyo University, Sokoto with Transmissible venereal tumour



Figure 6: Improvised cauterization to excise the tumor tissue in a 2½-year-old Nigerian indigenous bitch presented to the VTH, Usmanu Danfodiyo University, Sokoto with Transmissible venereal tumour



Figure 5: Draping and exposing the surgical site in a 2½-year-old Nigerian indigenous bitch presented to the VTH, Usmanu Danfodiyo University, Sokoto with Transmissible venereal tumour



Figure 7: Ligatures placed on bleeders in a 2½-year-old Nigerian indigenous bitch presented to the VTH, Usmanu Danfodiyo University, Sokoto with Transmissible venereal tumour

presented to the VTH, Usmanu Danfodiyo University
($\times 400$ H&E)



Figure 8: A 2½-year-old Nigerian indigenous bitch presented to the VTH, Usmanu Danfodiyo University, Sokoto with Transmissible venereal tumour post-surgery

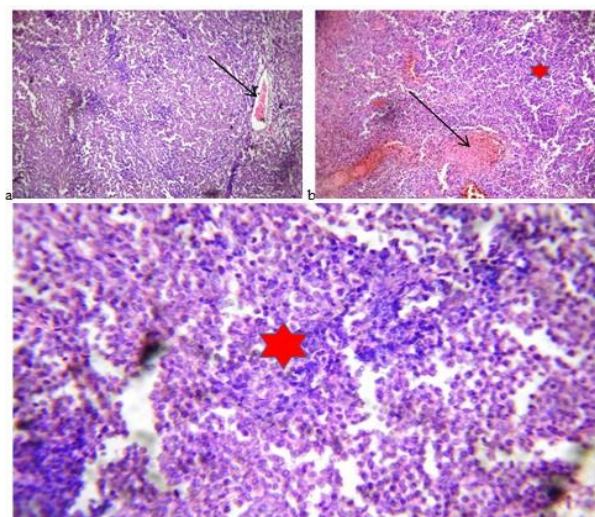


Figure 9: Photomicrograph of vaginal protruding mass tissue showing, congested blood vessels (arrows), numerous round cells with marginal chromatin material (asterisk) in a 2½-year-old Nigerian indigenous bitch



Figure 10: Follow up on a 2½-year-old Nigerian indigenous bitch presented to the VTH, Usmanu Danfodiyo University with TVT post recovery

Table 1: Haematological findings in a 2½-year-old Nigerian indigenous bitch with TVT

Parameters	Obtained Values (Absolute Values)	Reference Values
PCV (%)	36	35 – 55
Haemoglobin (g/dl)	11.8	12 - 18
RBC ($\times 10^3/\mu\text{L}$)	6.48	5.4 - 8.5
WBC ($\times 10^3/\mu\text{L}$)	27.9	5.0 – 14.1
Neutrophils ($\times 10^3/\mu\text{L}$)	83% (23.16)	2.9 - 12.0
Lymphocytes ($\times 10^3/\mu\text{L}$)	10% (2.79)	0.4 - 2.9
Monocytes ($\times 10^3/\mu\text{L}$)	5% (1.40)	0.1 - 1.4
Eosinophils ($\times 10^3/\mu\text{L}$)	0% (0.00)	0.0- 1.3
Basophils ($\times 10^3/\mu\text{L}$)	0% (0.00)	0.0 – 0.0
Band cells ($\times 10^3/\mu\text{L}$)	2% (0.56)	0.0 – 0.3

Table 2: Vital parameters post-treatment in a 2½-year-old Nigerian indigenous bitch with TVT

Date	Temperature	Pulse Rate (beats/min)	Respiratory rate (cycles/min)	Observation
29/05/2025	38.9°C	66	26	The patient was alert, appetite had started improving, and urination was normal. Medication continued.
30/05/2025	39.0°C	72	28	The appetite had improved, blood-stained urine was dripping, the area was cleaned, and medication was administered.
31/05/2025	38.3°C	78	24	The patient was alert, feeding well, blood-stained urine had subsided.
1/06/2025	38.0°C	70	25	The patient was alert, feeding well, blood-stained urine had seized.
8/06/2025	38.7°C	70	26	The patient was alert, feeding well and medication administered.

Discussion

Canine transmissible venereal tumour (CTVT) is a naturally occurring contagious round-cell tumor of canine which is primarily transmitted through coitus occurs, however, transmission may also occur through direct contact with tumour lesions during behaviours such as licking, biting, or sniffing of affected genital or extragenital sites. Recognised as one of the oldest naturally transmissible cancers, CTVT is believed to have originated from a single ancestral canine clone that emerged several thousand years ago (Murchison *et al.*, 2014; Murchison, 2008; Strakova and Murchison, 2014). Although the tumour has a worldwide distribution, its prevalence is markedly higher in tropical and subtropical regions, where large populations of free-roaming dogs and uncontrolled breeding practices facilitate disease transmission.

(Das and Das, 2000; Mukaratirwa and Gruys, 2003; Batamuzi *et al.*, 1992). The present case demonstrated classical clinicopathological features of genital TVT consistent with previous reports in the literature (Benda *et al.*, 2022; Chikweto *et al.*, 2019; Kabuusu *et al.*, 2019; Park *et al.*, 2006; Strakova and Murchison, 2014).

The gross appearance of the tumour in this case corresponded with the characteristic presentation of CTVT described in earlier studies. Typically, TVT manifests as friable, cauliflower-like, highly vascular masses affecting the external genitalia, often accompanied by haemorrhagic discharge and ulceration (Ganguly *et al.*, 2016). Such lesions arise due to the highly proliferative nature of neoplastic round cells and their tendency to invade and disrupt local tissues and blood vessels. Vaginal involvement in females may lead to vulvar protrusion and urinary disturbances.

The pathogenesis and biological behaviour of CTVT are unique among mammalian tumours because of their transmissible nature and ability to evade host immune responses. During the progressive phase, tumour cells downregulate major histocompatibility complex (MHC) expression and secrete immunosuppressive cytokines such as transforming growth factor-beta (TGF- β), thereby avoiding immune-mediated destruction. This immunosuppressive mechanism facilitates rapid proliferation and local invasion of neoplastic cells. However, spontaneous regression may occur in immunocompetent dogs following restoration of MHC expression and infiltration of tumour-infiltrating lymphocytes, particularly CD8⁺ T lymphocytes, accompanied by increased production of pro-inflammatory cytokines such as interferon-gamma (IFN- γ) and CCL5 (Mukaratirwa and Gruys, 2003; Ganguly *et al.*, 2016). The immunological events associated with tumour regression explained the variable clinical progression often observed in naturally occurring cases. The slightly pale ocular mucous membranes with capillary refill time of less than two seconds could suggest mild anaemia. Anaemia may occur in dogs with canine transmissible venereal tumour (CTVT), although it is not a consistent or pathognomonic clinicopathological finding. When present, it is typically mild to moderate and is considered secondary to chronic haemorrhage from the friable tumour mass, persistent

inflammation, poor nutritional status, or concurrent disease rather than a direct consequence of the neoplasm itself (Das and Das, 2000; Rogers *et al.*, 1998; Kabuusu *et al.*, 2019; Mercadante *et al.*, 2000; Madu and Ughasoro, 2017).

Cytological evaluation remains the diagnostic method of choice for CTVT because of its rapidity, affordability, and high diagnostic accuracy. The cytological findings described in this case are comparable to those commonly reported for TVT, characterized by sheets of round to ovoid cells with distinct cytoplasmic vacuolation, centrally placed nuclei, coarse chromatin, and prominent nucleoli. Frequent mitotic figures usually indicate the highly proliferative nature of the tumour (Das and Das, 2000). Histopathology may further confirm the diagnosis and assist in differentiating TVT from other round-cell tumours such as lymphoma, mast cell tumour, and histiocytoma.

Chemotherapy remains the gold standard for the treatment of CTVT because of its high efficacy, minimal invasiveness, and excellent prognosis. Vincristine sulphate administered weekly is regarded as the first-line therapeutic agent and reportedly achieved complete remission in most cases after a few treatment cycles. Alternative therapeutic options including doxorubicin, lomustine, surgery, and radiotherapy may be considered in resistant or recurrent cases (Ganguly *et al.*, 2016). The favourable response to vincristine therapy observed in many reports has been attributed to the high mitotic activity of neoplastic cells, which makes them particularly susceptible to microtubule inhibition. Prognosis is generally excellent when early diagnosis and complete treatment are achieved, with recurrence being uncommon following successful chemotherapy.

The present case further emphasizes the continued occurrence of CTVT in regions with large populations of free-roaming dogs and highlights the importance of early clinical recognition, cytological diagnosis, and prompt chemotherapeutic intervention in improving treatment outcome and reducing disease transmission.

Canine transmissible venereal tumour (CTVT) remains an important contagious neoplasm of dogs, particularly in Nigeria, tropical and subtropical regions where uncontrolled breeding and free-roaming dog populations are common. The present case demonstrated the characteristic clinical and pathological features of genital TVT, including proliferative genital masses and typical cytological features of a round-cell tumour. The findings further support the usefulness of cytological examination as a rapid, reliable, and cost-effective diagnostic tool for CTVT. Early diagnosis and prompt institution of chemotherapy, especially vincristine sulphate, remain essential for successful management and favourable prognosis.

In conclusion, combined surgical and chemotherapeutic management is effective in treating transmissible venereal tumour in dogs. Early diagnosis and intervention improve prognosis.

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Conflict of Interest

The authors declare no conflict of interest.

Authors' Contribution

D.M. Buba: Manuscript preparation and laboratory result interpretation; P.C. Mshelia undertook case management, laboratory analysis and manuscript review; C.U. Godwin carried out literature review, A.A. Abubakar reviewed the manuscript while S. Buhari: Performed the surgery and also reviewed the manuscript

References

- Baker J, Silvertown RE, and Pallister CJ. Dehydration, impregnation, embedding technique and section preparation. Baker & Silvertown's introduction to laboratory technology. 7th ed. Oxford, Woburn, MA: Butterworth-Heinemann; 1998. p. 199-242. Available at: https://archive.org/details/bakersilvertownsi07edbak_e
- Batamuzi EK, Kessy BM and Kassuku AA, 1992. Epidemiological observations on canine transmissible venereal tumour in Tanzania. *Preventive Veterinary Medicine* 13(1):53–62.
- Bendas, A. J. R., Moreto, P. L. N., Coxo, A. B., Holguin, P. G., & Soares, D. V. (2022). *Intra-abdominal transmissible venereal tumor in a dog: A case report. Brazilian Journal of Veterinary Medicine*, 44, e001422. <https://doi.org/10.29374/2527-2179.bjvm001422>
- Chikweto, A., Kumthekar, S., Larkin, H., DeAllie, C., Tiwari, K. P., Sharma, R. N., & Bhaiyat, M. I. (2019). *Canine transmissible tumour: First report of three clinical cases from Tripoli, Libya. Open Veterinary Journal*, 9(2), 118–122.
- Das U and Das AK, 2000. Review of canine transmissible venereal sarcoma. *Veterinary Research Communications* 24(8):545–556. <https://doi.org/10.1023/A:1006491918910>
- Ganguly B, Das U and Das AK, 2013. Canine transmissible venereal tumour: a review. *Veterinary and Comparative Oncology* 14(1):1–12. <https://doi.org/10.1111/vco.12060>
- Ganguly B, Ganguly I, Das U, Das AK and Chakrabarti S, 2016. Tumour, immunity and infectious agents: a review of the canine transmissible venereal tumour. *Veterinary Research Communications* 40(1):1–11. <https://doi.org/10.1007/s11259-015-9654-2>
- Hsiao YW, Liao KW, Hung SW, Chu RM and Lin CM, 2002. Tumor-infiltrating lymphocyte secretion of IL-6 antagonizes tumor-derived TGF- β 1 and restores the impaired MHC expression of tumor cells in canine transmissible venereal tumor. *Journal of Immunology* 169(3):1508–1515. <https://doi.org/10.4049/jimmunol.169.3.1508>
- Kabuusu, R. M., Kumthekar, S., Tang, J., Alexander, R., Sylvester, W., Lanza-Perea, M., & Sharma, R. N. (2019). *Clinicopathological changes during canine transmissible venereal tumor treatment with vincristine. Indian Journal of Veterinary Pathology*, 43(2), 132–135.
- Martins, M. M., De Souza, F., Ferreira, F., & Gobello, C. (2005). The canine transmissible venereal tumor: etiology, pathology, diagnosis and treatment. *Recent Advances in Small Animal Reproduction*, 25(7), 161-167.
- Mizuno S, Fujinaga T, Tajima M, Otomo K and Koie H, 1989. Outgrowth of canine transmissible sarcoma after transplantation into nude mice. *Japanese Journal of Veterinary Science* 51(5):938–940. <https://doi.org/10.1292/jvms1939.51.938>
- Murchison, E. P. (2008). *Clonally transmissible cancers in dogs and Tasmanian devils. Oncogene*, 27(Suppl. 2), S19–S30. <https://doi.org/10.1038/onc.2009.350>
- Mukaratirwa, S., & Gruys, E. (2003). Canine transmissible venereal tumour: cytogenetic origin, immunophenotype, and immunobiology. A review. *Veterinary Quarterly*, 25(3), 101-111.
- Murchison EP, 2009. Clonally transmissible cancers in dogs and Tasmanian devils. *Oncogene* 27(Suppl 2):S19–S30. <https://doi.org/10.1038/onc.2009.350>
- Ostrander, E. A., Davis, B. W., & Ostrander, G. K. (2016). Transmissible tumors: Breaking the cancer paradigm. *Trends in Genetics*, 32(1), 1–15.
- Park, M. S., Kim, Y., Kang, M. S., Oh, S. Y., Cho, D. Y., Shin, N. S., & Kim, D. Y. (2006). Disseminated transmissible venereal tumor in a dog. *Journal of Veterinary Diagnostic Investigation*, 18(1), 130–133.
- Pimentel, L. M., et al. (2025). Clinical guidelines for canine transmissible venereal tumour treatment: Systematic review and meta-analysis. *Veterinary and Comparative Oncology*. Advance online publication. <https://doi.org/10.1111/vco.13038>
- Shabir MZ, Ahmad A, Zahid MN, Nazir J, Nawaz M, and Akbar H, editors. Sample collection guide: A practical approach. Lahore, Pakistan: Nexus Academic Publishers; 2013. p. 1-6. Available at: <https://www.nexusacademicpublishers.com/uploads/books/20140116135637.pdf>
- Raskin, R. E., Meyer, D., & Boes, K. M. (2021). *Canine and Feline Cytopathology-E-Book: A Color Atlas and Interpretation Guide*. Elsevier Health Sciences.
- Strakova, A., & Elizabeth P. Murchison (2014). The changing global distribution and prevalence of canine transmissible venereal tumour. *BMC Veterinary Research*, 10, 168.