

Botfly (Diptera: Oestridae) And Cuterebriasis In Dogs (Canine Canine) In Yenagoa Metropolis, Bayelsa State, Nigeria

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Abstract: The study on botfly and cuterebriasis was carried out in Yenagoa, Bayelsa State aimed at checking the prevalence of the disease among dogs and educating dog owners on the symptoms, treatment, prevention and control should there be an epidemic. The methodology was sample survey occasioning the use of questionnaires distributed and retrieved from veterinary professionals as respondents. There was 100% report on the prevalence of cuterebriasis in their clinics at different points in time. 80% reported the insect botfly as the vector and pathogenic organism of cuterebriasis in dogs. Symptoms of the disease are: excessive food intake due ad libitum feeding of larvae on host tissues (40%), weight loss (35%), fever (20%) and fluid bumps on skin (5%). Should there be outbreak of cuterebriasis: consult a veterinarian for prompt diagnosis and treatment (65%) or isolate infested dog (30%). Regarding medication and treatment: use antibiotics (40%), flood infected area with antiseptic (25%), use topical penicillin ointment to debride the infected surface (20%) and the use of anesthesia against the pains (15%). Pet owners can prevent their dogs from being infested by preventing them from rodent habitat (50%) and hunting (40%) or generally cleaning the environment (10%). Life cycle of the infective cuterebra larvae in an infested dog is 30 days (80%), 14 days (15%) and 60 days (5%). Therefore, cuterebriasis disease of dogs can be eradicated through good hygienic sanitary practices, isolation of healthy dogs from infested dogs and prompt visit to the veterinarian in case of an epidemic in Bayelsa State.

Keywords: Cuterebriasis, Botfly, Host tissue, Veterinarian, Antibiotics.

I. BACKGROUND

Botfly commonly called cuterebra fly is a large fly with close semblance to bee and of the insect order Diptera, family Cuterebridae and subfamily Cuterebrinae comprising two subgenera Cuterebra (12 species) and Trypoderma (24 species) respectively (Pape & Thomas 2001; Capcvet.org, 2012; Blondoff-Indelicato, 2013; Ward, 2016). Botflies are cosmopolitan in nature and are primarily but not exclusively found in warm tropical and subtropical regions thus infests animals during warmer months of the year (Helmenstine, 2018). It is a large non-biting fly that lays its eggs near the openings of rabbits and rodents burrows or in garden mulch. The insect is obligate opportunistic parasite of rodents, rabbits, cats, ferrets, mice, dogs, squirrels, chipmunks, livestock, wild animals and even humans, hence parasitic to mammals (Drees & Jackman, 1999; Pape & Thomas, 2001, Jennison *et al.*,

2006; Piper & Rose, 2007; Capcvet.org 2012; Bull, 2013; Moriello, 2013; Sciencedirect, 2017; Helmenstine, 2018). Cats and dogs are accidental or reservoir hosts of the infective developmental stage (precisely larval instar stages 1-3) of botfly called "warbles" or cuterebra which are less host-specific and there is the absence of host to host infection, hence cuterebriasis is not contagious Capcvet.org (2012); Moriello, (2013). Infection only occurs via entrance of newly hatched larva into a susceptible host animal (Capcvet.org, 2012). The female botfly lays 100-400 eggs on the soil, or plants basically grasses during warmer days. When the eggs come in contact with animal body, the eggs attach themselves to the animal fur and egg hatching into larvae is triggered once they are exposed to the warmth from the hosts body due changes in the ambient temperature (that is encountering a warm-blooded organism) (Dunleavy, 2005; Cascade, 2014). The larvae are white or creamy, brown or black larvae with

black spines covering them which can penetrate host skin under 10 minutes (enter through the mouth, nose or external wounds of the host, migrating to subcutaneous sites typically the head, neck, trunk, nostrils, pharynx, eyelids and even brain (Moriello, 2013, Sciencedirect, 2017). The larvae possess rows of spines they used for boring through the host's tissue as well as for attachment. Mouth hooks are also present used for feeding continuously from the host tissues. A cocoon, cyst or thick capsule called "warbles" (earning the larva its name) is created under the skin as the larva grows, while a circular hole (lesion/ulceration) (for breathing and escape root of fully matured larva) with matted hair appears, fluid exudate drains from the openings (Blondoff-Indelicato, 2013; Cascade, 2014). The larva molts thrice to become the fully matured larvae that eventually falls unto the ground, metamorphose into pupa and emerge as adult which becomes sexually active almost immediately (Blondoff-Indelicato, 2013) and looks for another host to commence its life cycle all over again. The adult botfly does not feed. The developmental cycle of the botfly larva in an infested dog ranges between 3-8.5 weeks (19-60 days), pupation lasts 14-28 days in favorable warm environmental condition or overwinters for about 7-11 months depending on specie of botfly while adult botfly has a life expectancy of about 9-14 days that is about 2 weeks (Ward, 2016; Helmenstine, 2018).

II. STATEMENT OF THE PROBLEM

The diagnostic features of cuterebriasis in dogs include direct visualization of cuterebra larva within the lesion created by its presence and the presence of breathing holes on the skin of an infested dog signifying its presence Ward (2016).

Dogs (Canine) and cats (Felines) serve as accidental hosts to cuterebra fly called *Trypoderma* specie or *Cuterebra* which causes the parasitic skin disorders in the animal termed "cuterebriasis" (Drees *et al.*, 1999). The disease condition cuterebriasis in dogs manifest with symptoms of subcutaneous lesions, ulcerations such as lumps or bumps on the skin called warble or cuterebra cysts with small circular/central breathing holes usually in the middle of about 0.5cm in diameters (Freed *et al.*, 1986, Ondrak & Julie, 2009) which is commonly observed by the owner. Erythema and fibrosis surrounding the breathing hole of the cuterebra and purulent exudate from ulcerative lesion is typical of infection. Others include matted hairs with fluid exudates around holes, loss of hair strands making the dog looks malnourished, pains, aggression, isolation, circular motion, voracious appetite, anorectic, fever, shortness of breath, cough, paralysis, fatigue, dehydration, lameness, blindness, seizures and even shock (Moriello, 2013; Cascade, 2014; Sciencedirect, 2017).

Botfly cannot complete its life cycle in a dead host, thus it needs a living host to attain maturity. The larvae can be transferred to other dogs through process such as grooming or during body contact with other dogs when mating. The larva also causes the disease known as Myiasis which is parasitic infestation on the body of a live animal by the botfly larva (maggot) that grows inside the host while feeding on the host tissue. The forms of disease include furuncular myiasis (subcutaneous cysts with mature 3rd instar larvae in skin of

infested dog), neurological and other disease manifestations from the migration of young botflies through deeper tissues of the body and thirdly, respiratory distress or upper respiratory disease from migration of young botflies through the host animal trachea and diaphragm (Boggliid *et al.*, 2002; Bhandari *et al.*, 2007; Capcvet.org, 2012; Pet.com, 2019). There are different species of botfly hence its economic importance through the losses they cause in livestock operations such as cattles, sheep, goats, reindeers, horses and also produce a bacteriostatic secretion as they develop (Bordelon *et al.*, 2009). Complications arising from cuterebriasis infestation in dogs include allergic reactions, anaphylaxis shock and secondary bacterial infections by *Clostridium* species Cascade, if dogs are not well treated (2014).

Treatment of infested dogs should be done by the veterinarian and include the followings: use of anesthesia at the site of cyst, cocoon or capsule; enlargement of breathing holes with hemostats to remove larvae using forceps; remove cuterebra larvae through surgical procedures; flush cuterebra from its tract with hydrogen peroxide, saline water or iodine which causes warble to poke out of the hole hence facilitating the removal; debride the necrotic tissue, wounds/lesions and use topical antibiotic preparations with or without systemic antibiotics to prevent or treat secondary bacterial infections; administer systemic antibiotics for 10-14 days to kill the warbles; administer systemic macrocyclic lactones to kill larvae during migration; also the use of dewormers such as dichlorvos and trichlorfon and allow wounds to heal by second intention (Pariser, 2006; Ondrak & Julie, 2009; Orfanous *et al.*, 2011; Cascade, 2014; Sciencedirect, 2017; Helmenstine, 2018; Capcvet.org, 2019; MSPCA-Angell, 2019; Pet.com, 2019; Tarantino, 2019; Turner, 2019a). Antibiotics for the treatment of cuterebriasis in dogs are ivermectin, canvenia, doxycycline, proxcide and corticosteroids to kill the larvae in the dogs during migration (Cascade, 2014; Mariello, 2017; Sciencedirect, 2017; MSPCA-Angell, 2019). The use of trimethoprim-sulfa to treat secondary bacterial infection and the use of alcohol, antibiotic ointment like penicillin and silver sulfadiazine (silvadene cream) applied topically to clean up surgical site Ondrak & Julie, (2009).

For the prevention and control of dogs from the incidence of cuterebriasis, dogs should be kept indoors to avoid exposure especially during warmer period which is the breeding season of botflies. Dogs should be groomed by regularly brushing their coats or furs to remove eggs or larvae in early stage of development (Cascade, 2014). Also, general cleaning and good hygiene is paramount Helmenstine, (2018); Turner, (2019b). Furthermore, fly control and protective screens should be provided dog kennels (Sciencedirect, 2017). Finally, the use of topical insecticides such as fipronil and imidacloprid are beneficial as they provide dogs protection from infestation (Capcvet.org, 2012, Pet.com, 2019).

Cuterebriasis in dogs has posed great disadvantage to pet lovers who find it difficult to keep dogs given that they've experienced their pets die out of this disease infestation at other times, hence the reason for this study to throw light on the causes, signs, symptoms, treatment, control and prevention of the incidents of cuterebriasis in dogs so as to give them healthy lives and reduce the fear of pet lovers from breeding them. Also the research seek to provide answers to questions

that are been posed by pet lovers as to when and where to take their dogs to in order to receive prompt medical attention should there be an outbreak of disease upon their pets. This in the long run would save the lives of the dogs and reduce economic loss by the owners of the dogs eventually. Hence, this research is aimed at carrying out a survey on the prevalence of cuterebriasis in dogs living in Yenagoa metropolis of Bayelsa State with the intent of educating pet owners and care givers on the diagnosis, signs/symptoms and treatment of the disease condition in dogs. Finally this study seeks to educate pet owners on the best preventive control practices against cuterebra infestation and cuterebriasis in their dogs.



Source: Helmenstine, (2018)

Plate 1-2: Warble fly *Hypoderma lineatum*



Source: Hill & Roxanne, (2008)

1-3rd larval instar stages of Botfly *Cuterebra*

III. THEORITICAL ANCHORING OF STUDY

Sample survey method of Nodu *et al.*, (2013); Turner, (2019b) employing the use of descriptive open ended questionnaire was adopted for this research. About 20 open ended questionnaires bounding on the study of “botfly and cuterebriasis in dogs (*Canine canine*) in Yenagoa metropolis of Bayelsa State were distributed to veterinary health professionals in veterinary service centers in Yenagoa, Bayelsa State. The questions covered knowledge of subject matter on insect associated with cuterebriasis, mode of transmission of cuterebra larva, symptoms of infestation, diagnosis, treatment, prevention and control. The questionnaires were retrieved after a period of 3 days.

RESEARCH HYPOTHESIS

There is no statistical significant relationship between non infested healthy dogs and dogs that lay down in dirty rodent infested areas while hunting for food in gardens in a bid to eliminate the incidence of cuterebriasis in Bayelsa State.

STATISTICAL ANALYSIS

The retrieved questionnaires were collated appropriately based on answers provided by respondents. Results were calculated and analyzed statistically in percentages using Microsoft excel version for windows 2010. All charts were plotted using Microsoft excel and by the authors.

IV. FINDINGS

A total of 20 questionnaires were distributed and retrieved from respondents who were veterinary professionals in Bayelsa State making a total of 100%.

Fig.1 below gives the knowledgebility of cuterebriasis in dogs. A total of 100% of respondents reported that cuterebriasis have been prevalently reported in dogs in Yenagoa, Bayelsa State at different points in time.

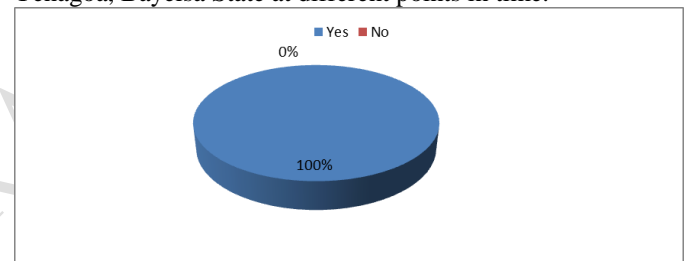


Figure 1: Chart showing the report of incidence of cuterebriasis in dogs in Yenagoa

Fig. 2 provides response as to the causative organism of cuterebriasis in dogs. Total of 80% reported that the insect botfly was the vector and pathogenic organism of cuterebriasis in dogs while 15% vote for rat and 5% for mites respectively.

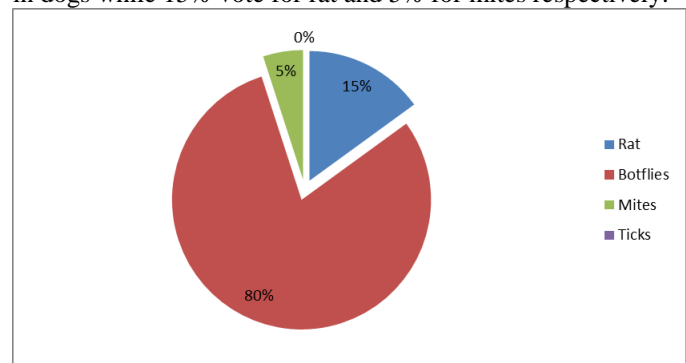


Figure 2: Percentage distribution of vector and causative organism of cuterebriasis in Dogs

Regarding symptoms of cuterebriasis in dogs, a total of 40% respondents reported excessive food intake due adlibitum feeding of larvae on host tissues, 35% supported weight loss while 20% reported fever and 5% accepted fluid bumps on bodies of dogs respectively for symptoms of cuterebra infestation (fig. 3).

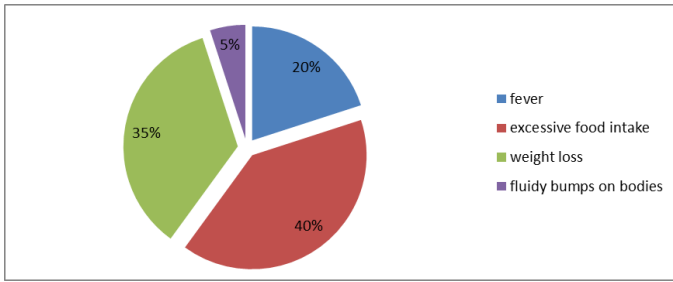


Figure 3: Percentage distribution of symptoms of cuterebriasis in an infested dog

Concerning what should be done in case of cuterebriasis outbreak in dogs, 65% of the respondents recommended consultation of a veterinarian for prompt diagnosis and treatment without delay, 30% demanded isolation of the dog from other pets at home while 5% called for the use of any other means of treatment (fig. 4).

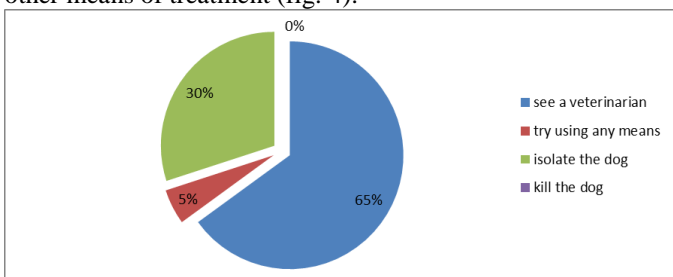


Figure 4: percentage distribution of what a pet owner needs to do in case of cuterebriasis outbreak in his/her dog?

Fig. 5 represents the response of the health officers on why it is not advisable to treat the infected dogs locally at home but by a veterinary health provider. A total of 90% were in support of the motion that dogs who display symptoms of cuterebriasis should not be treated at home for fear that the larvae may not be adequately removed from the dog's tissue which may lead to other secondary bacterial infection while 10% were against the idea and stated the condition can be treated locally at home.

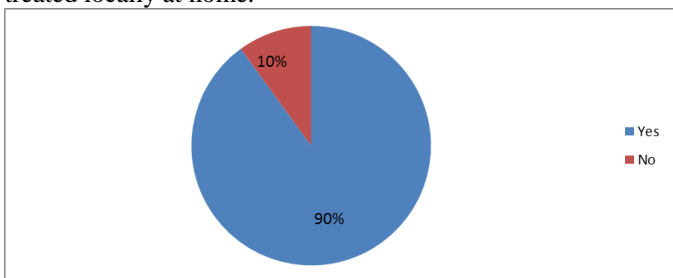


Figure 5: Chart showing percentage distribution of respondents on treatment of cuterebriasis only by veterinary health providers and not locally at home

For possible medication and treatment of Cuterebriasis in dogs, a total of 40% supported use of antibiotics, 25% supported flooding the infected area with antiseptic, 20% voted for the use of Penicillin ointment to debride the infected surface while 15% went for the use of anesthesia against the pains (fig. 6).

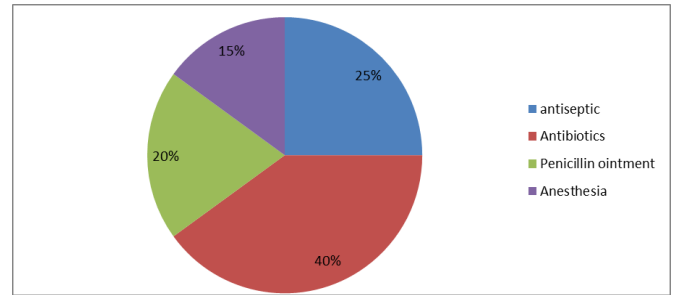


Figure 6: Percentage distribution of possible ways of treating Cuterebriasis in dogs

For diagnosis of cuterebriasis in dogs, 85% supported taking the infested dog to veterinary professional for possible diagnostic test, 10% opted for physical examination of the dog while 5% supported the use of instruments respectively (fig. 7).

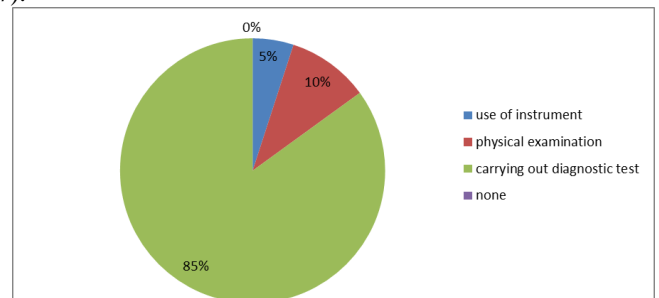


Figure 7: Percentage distribution of diagnosis of Cuterebriasis in dogs

Fig. 8 below gives the ways pet owners can prevent their dogs from Cuterebriasis infestations. A total of 50% supported preventing the dogs from rodent habitat, 40% supported restricting the dogs from hunting while 10% supported preventing them from dirty environment.

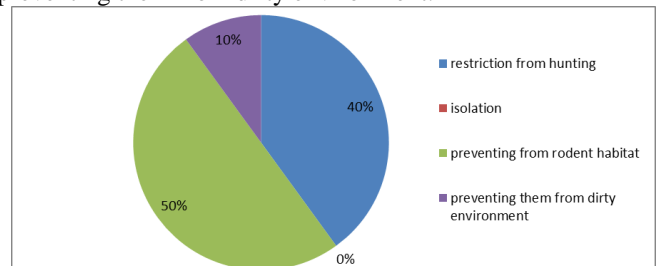


Figure 8: Percentage distribution of methods of preventing dogs from cuterebriasis infestation

Fig. 9 gives the response of the best possible way of removing Cuterebra larvae from an infested dog. A total of 50% supported the enlargement of breathing holes with hemostats to remove larvae using forceps as instruments, 45% reported removal of larvae via surgical procedures while 5% supported the use of medication such as ivermectin and canvenia respectively.

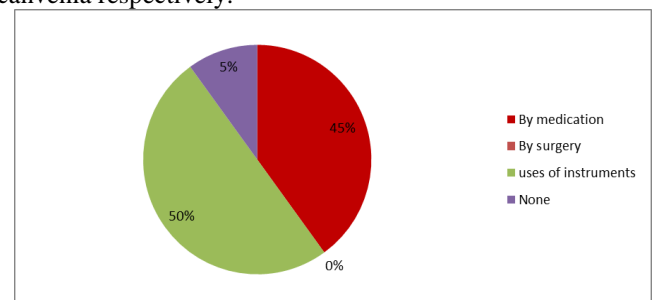


Figure 9: Chart showing percentage distribution of the best practice concerning the removal of *Cuterebra* larvae from an infested dog

Fig. 10 below shows response to the life cycle of the cuterebra larvae in an infested dog. A total of 80% of the respondents stated 30 days (one month), 15% went for two weeks (14 days) while 5% reported two months respectively (60 days).

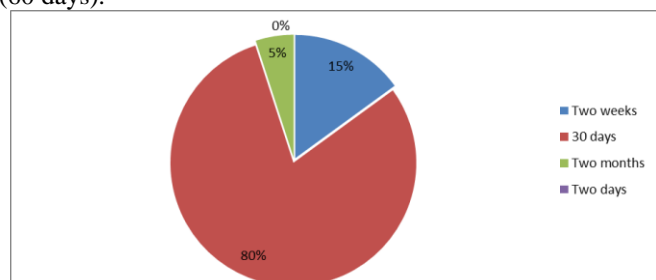


Figure 10: Percentage distribution of respondents on the life cycle of *Cuterebra* larvae in an infested dog

Regarding the possibility of using red palm oil in the treatment of cuterebriasis in an infested dog, 80% respondents affirmed to its possibility in the killing of the cuterebra larvae while 20% were against its ability to produce the needed result of killing the cuterebra larvae (fig. 11).

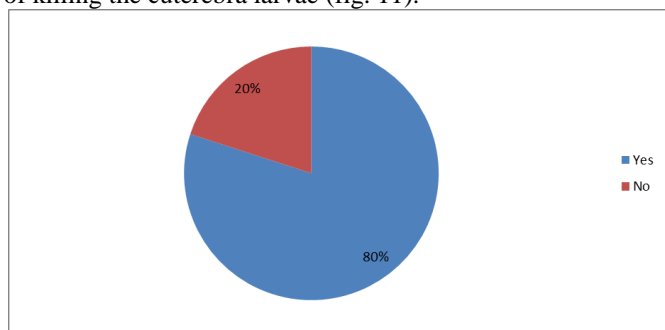


Figure 11: Percentage distribution of respondents on the possibility of using red palm oil in the treatment of cuterebriasis in an infested dog

This research was carried out via the sample survey method employing the use of questionnaire. A total of 20 open ended questionnaires were distributed and the 20 were retrieved from the respondent. A total of 100% of the respondents who are veterinary health service providers reported that they were aware of the prevalence of the opportunistic parasitic disease (cuterebriasis) of dogs in Bayelsa State.

A total of 80% respondent reported the insect Botfly as the vector and causative animal for cuterebriasis in dogs. This report is in conformity with those found in literature that the vector and causative organism of cuterebriasis in dogs is the insect botfly of the order Diptera and family cuterebridae (Bloudoff-Indelicato, 2013; Bull, 2013; Sciencedirect, 2017; Pet.com, 2019). Also, 15% respondent reported rat to be the causative animal, and 5% respondent reported mice which were animals whose habitat only served as breeding ground for the adult botflies to lay their eggs.

Furthermore, in the case of the symptoms associated with cuterebriasis in dogs, a total of 40% respondents reported excessive food intake, 35% affirmed weight loss, 20% reported fever and 5% reported that fluid bumps on bodies as

symptoms of cuterebriasis in dogs. All these are possible symptoms and are in agreement with those of previous authors such as Freed *et al.*, (1986); Ondrak & Julie, (2009); Moriello, (2013); Cascade, (2014); Sciencedirect, (2017).

On the aspect of what to do when cuterebriasis outbreak is noticed in a dog, a total of 65% respondents reported consult a veterinarian, 30% reported isolating the dog and 5% reported using any means possible to get the dog treated. While concerning how advisable it is to treat an infested dog locally at home. A total of 90% respondent reported against treating the disease locally at home while 10% agreed to that. Pet owners are advised expressly to seek medical attention from veterinary hospitals should there be an outbreak of disease condition and not treat them locally since they are ignorant of the particular infection so as to avoid premature dog death. This is in agreement with the report of Piper & Rose (2007); Ondrak & Julie (2009); Bordelon, *et al.*, (2009); Capcvet.org (2012); Bloudoff-Indelicato, (2013); Bull, (2013); Moriello, (2013); Ward, (2016); Sciencedirect, (2017); Helmenstine, (2018); Tarantino, (2019); Pet.com, (2019).

Consequently, on the type of medication effective for treating cuterebriasis in dogs, 40% respondent reported the use of antibiotics, 25% voted for antiseptic, 20% reported penicillin ointment and 15% called out for the use of anesthesia in killing the pains. These methods of treatment are also in conformity with those stated by different authors such as Orfanous *et al.*, (2011); Capcvet.org (2012); Ward, (2016); Helmenstine, (2018); Turner, (2019b).

Regarding the diagnose of cuterebriasis in dogs, a total of 85% respondent reported carrying out diagnostic test to determine the actual cause of disease and the proper medication to administer while 10% reported physical examination using forceps and 5% suggested use of instrument in diagnosing cuterebriasis in infested dogs. Diagnostic tests are required by the veterinarian to determine the actual dog infection, the stage of the disease and the appropriate medication to be administered to the dogs for quick recovery. According to Freed *et al.*, (1986), Ondrak & Julie, (2009); Capcvet.org, (2012); Ward, (2016), diagnosis involve the direct visualization of the cuterebra larva within the lesion and the actual presence of breathing holes of the warbles on the dogs which are also visible to the pet owners. Other diagnostic tools include the use of radiologic imaging which reveals larval migration tracks as well as the larvae themselves and secondly, surgical exploration during which larvae can be removed and examined for identification (Capcvet.org, 2012).

Remarkably on the best method of preventing dogs from cuterebriasis and cuterebra larvae, a total of 50% reported that dog owners should prevent their dogs from playing around rodent habitats, 40% reported restricting dogs from hunting and 10% reported preventing them from dirty environment to avoid cuterebriasis in dogs. These points are in conformity with those of Helmenstine, (2018); Turner, (2019b) who reported personal cleaning and good hygiene as a requirement. Cascade, (2014) stated that dogs should be kept indoors to avoid exposure especially during warmer period which is the breeding season of botflies. Dogs should be groomed by regularly brushing their coats or furs to remove eggs or larvae in early stage of development and spraying them with topical

insecticides like fiprinol and imidacloprid which are beneficial. Sciencedirect, (2017) further stated the provision of dog kennels with fly control and protective screens to prevent botflies from coming around to lay their eggs Helmenstine, (2018); Turner, (2019 a,b).

Concerning the best method of eliminating the cuterebra larva from an infested dogs, a total of 50% respondent reported the use of instruments such as forceps, 45% said by medication such as antibiotics and 5% reported surgical application respectively. These methods are in line with the reports of Bogglid *et al.*, (2002); Cascade, (2014); Ward, (2016); Sciencedirect, (2017); Helmenstine, (2018); Capcvet.org, (2012),

Invariably, regarding the life cycle of cuterebra larva in an infested dog, a total of 80% respondents reported 30 days, 15% reported 2 weeks and 5% gave 2 months which also aligns with the observations of Ward, (2016); Helmenstine, (2018), who stated that the developmental cycle of the botfly or cuterebra larva in an infected dog ranges between 3-8.5 weeks (19-60 days), pupation lasts 14-28 days in favorable warm environmental condition or overwinters for about 7-11 months, while adult botfly has a life expectancy of about 9-14 days that is about 2 week.

Finally observations on the potency of using local red palm oil in treating an infested dog, 80% respondents reported (Yes) which means that they are aware that local palm oil can be used to treat an infested dog while 20% respondents were against its use for the treatment of cuterebriasis in dogs. However Pariser, (2006); Mariello, 2017; Helmenstine, (2018) recommended the topical application of petroleum jelly to seal the holes made by the cuterebra larvae on the dog thus suffocating the larvae with subsequent enlargement of the holes and the larvae is thereby removed with forceps or tweezers. In like manner, the palm oil serves same function as the petroleum jelly when applied topically on the holes lead to widening as the warbles make their way to the surface in the bid to struggle to breath in air and are removed mechanically with hand gloves or by the use of forceps (Personal communication, 2019).

V. SUMMARY

Cuterebriasis is a parasitic disease affecting rodents, livestock and mammals. The etiologic agent is the larval development of botflies of the Cuterebra or Trypoderma genera in the subcutaneous tissues of warm blooded animals. Felines and Canines serve as accidental hosts to Trypoderma species. Cuterebra larvae or warbles which cause Cuterebriasis disease (subcutaneous myiasis) in dogs enters into the body by first-instar larvae which occurs via mucous membranes of natural orifices such as the mouth and nose or open wounds as opposed to direct dermic penetration. The Cuterebriasis comes with symptoms such as bump on the skin, lesion or ulceration with a small hole in the middle, pains, discomfort, fever, partial blindness and others. Failure to treat infested dogs could lead to secondary bacterial infections, shock and eventual death of animals.

VI. CONCLUSION

The problem of cuterebriasis in dogs can be eradicated in Bayelsa State and in any other places in Nigeria. This can be achieved through general cleaning, good hygienic sanitary practices, isolation of healthy dogs from infested dogs and prompt visit to the veterinarian in cases of outbreak of cuterebriasis in dogs. Dogs should be groomed by regularly brushing their coats or furs to remove eggs or larvae in early stage of development. Furthermore, fly control and protective screens should be provided dog kennels while topical insecticides such as fipronil and imidacloprid are beneficial as they provide dogs protection from infestation (Capcvet.org, 2012, Pet.com, 2019). Vaccines and other antibiotics should be provided by dog owners to treat disease outbreak in dogs. Above all, dogs should be taken to veterinary hospitals for routine checks.

VII. RECOMMENDATION

It is recommended that proper sanitation be practiced in the area that we live, and again those that already having pets in their houses should prevent them from hunting for food in gardens and rodent infested areas, lying down in areas that are dirty so as to eliminate the problem of cuterebriasis. Furthermore, vaccines such as antibiotics (Ivermectin), anesthesia and antiseptics, should be produced to eradicate or solve this problem. Finally, the masses especially pet owners and dog owners should be educated on the diagnosis, mode of transmission, symptoms, treatment, prevention and control of cuterebriasis in dogs with the major objective of limiting and or completely eradicating the prevalence of cuterebriasis in dogs in Bayelsa State.

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