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ASSESSING THE PREVALENCE OF TRYPANOSOMIASIS IN CAMELS: A STUDY IN OKARA DISTRICT, PAKISTAN

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ABSTRACT

Background: Trypanosomiasis, caused by Trypanosoma evansi, is a parasitic disease that poses a considerable health concern in camels. This disease adversely affects the productivity and overall well-being of camels. Understanding the prevalence of trypanosomiasis in specific regions is crucial for implementing effective control measures and mitigating its impact on camel populations.

Aims: To assess the prevalence of trypanosomiasis in camels within the Okara District of Pakistan.

Methods: To achieve the study's objectives, a representative sample of 384 camels was selected. These camels were subjected to thorough clinical examinations to identify visible clinical signs associated with trypanosomiasis infection. In addition, blood samples were collected from each camel and examined under a microscope to detect the presence of Trypanosoma parasites, the causative agents of trypanosomiasis**.**

Results: The study revealed an overall prevalence of trypanosomiasis in camels in the Okara District of Pakistan to be 11.71%. However, the prevalence varied based on the sex of the camels. Female camels exhibited a higher prevalence rate of 13.28% compared to male camels, who had a prevalence rate of 7.96%. Furthermore, the prevalence of trypanosomiasis also varied among different age groups. The highest prevalence was observed in the age group of 1-3 years, with a rate of 12.87%.

Conclusion: The findings of this study emphasized the significance of gender and age as risk factors for trypanosomiasis in camels. Female camels and younger camels, particularly those between 1-3 years old, were more susceptible to trypanosomiasis infection. These results underscore the importance of implementing targeted control strategies and awareness campaigns to mitigate the impact of this disease on camel health in the Okara District of Pakistan. By addressing these risk factors and raising awareness, it is possible to reduce the prevalence of trypanosomiasis and improve the overall well-being and productivity of camels in the region.

INTRODUCTION

Trypanosomiasis, also known as "camel fever," is a parasitic disease caused by the protozoan *Trypanosoma evansi*. This disease affects a wide range of domestic and wild animals, including camels, cattle, horses, and dogs [1-2]. Trypanosomiasis poses a significant threat to animal health and productivity, leading to economic losses in affected regions. In Pakistan, the Okara District is known to have a substantial population of camels, and assessing the prevalence of Trypanosomiasis in this district is crucial for understanding the disease's impact on camel husbandry [3].

Trypanosomiasis is primarily transmitted by biting flies of the genus Tabanidae, commonly known as horseflies or deer flies [4]. These flies act as mechanical vectors, transmitting the parasites from infected animals to healthy ones. The protozoan parasites can also be transmitted through the exchange of body fluids, such as blood, during mating or through contaminated equipment, like needles or surgical instruments. Once inside the host's bloodstream, the parasites multiply and cause significant damage to various organs, including the nervous system, leading to clinical signs of the disease [7-9].

Camel trypanosomiasis manifests as a wide range of clinical signs, depending on the severity of the infection. In acute cases, infected camels may exhibit fever, anemia, weight loss, lethargy, and edema of the limbs. Chronic infections, on the other hand, often result in intermittent fever, emaciation, and poor reproductive performance. If left untreated, the disease can be fatal, causing significant losses to camel herders and farmers who rely on these animals for transportation, milk, and meat production [10-14].

The Okara District in Pakistan is known for its high camel population and serves as a vital hub for camel husbandry and trade. However, there is limited information available regarding the prevalence and impact of trypanosomiasis in camels within this district. Understanding the epidemiological patterns and burden of this disease is crucial for implementing effective control and management strategies to mitigate its adverse effects on camel health, productivity, and the livelihoods of the local communities [15].

This study aimed to assess the prevalence of trypanosomiasis in camels within the Okara District, Pakistan. By conducting a comprehensive survey and diagnostic tests on a representative sample of camels, we gathered data on the prevalence, distribution, and associated risk factors of the disease. This information contributed to a better understanding of the local epidemiology of trypanosomiasis, enabling the development and implementation of targeted control measures to reduce its impact on camel populations and the communities that depend on them.

MATERIAL AND METHODS

Study Area

The study was conducted in the Okara District of Pakistan (Figure 1), which is known for its significant population of camels and serves as a major hub for camel husbandry and trade. The district is located in the Punjab province of Pakistan. The study area encompassed various villages and settlements within the district, selected based on their representative camel population and accessibility.

Sample Collection

A representative sample of camels to a sum of 384 was selected for the study, aiming to cover different age groups and sexes [16]. The sample size was determined using appropriate statistical methods to ensure adequate representation and precision in estimating the prevalence of trypanosomiasis. The sampling process involved visiting different camel herds and obtaining consent from the owners or herders for sample collection during the year 2022-23.

Clinical Examination and Sample Collection

Each selected camel underwent a thorough clinical examination conducted by experienced veterinarians. The examination aimed to assess the general health condition of the camels and identify any visible clinical signs associated with trypanosomiasis. Relevant information such as age, sex, and previous medical history was recorded for each animal.

Blood samples were collected from each examined camel using aseptic techniques. Approximately 5-10 mL of blood was drawn from the jugular vein using sterile needles and placed into appropriate collection tubes. The tubes were labeled with unique identifiers corresponding to each camel and stored in coolers with ice packs to maintain proper temperature during transportation to the laboratory.

Laboratory Analysis

In the laboratory, the collected blood samples were subjected to diagnostic tests to detect the presence of *Trypanosoma evansi*. The tests included:

Microscopic Examination

Thin and thick blood smears were prepared from each blood sample. The smears were fixed, stained using appropriate staining techniques (e.g., Giemsa staining), and examined under a light microscope. The presence of *Trypanosoma evansi* parasites in the blood smears was observed and recorded.

Data Analysis

The collected data, including clinical findings and laboratory results, were compiled and entered into a database for analysis. The prevalence of trypanosomiasis in camels within the Okara District was estimated based on the number of positive cases identified through the diagnostic tests. Descriptive statistics such as proportions, means, and standard deviations were calculated to summarize the data. The association between risk factors (e.g., age, sex, previous medical history) and trypanosomiasis infection was assessed using ANOVA tests.

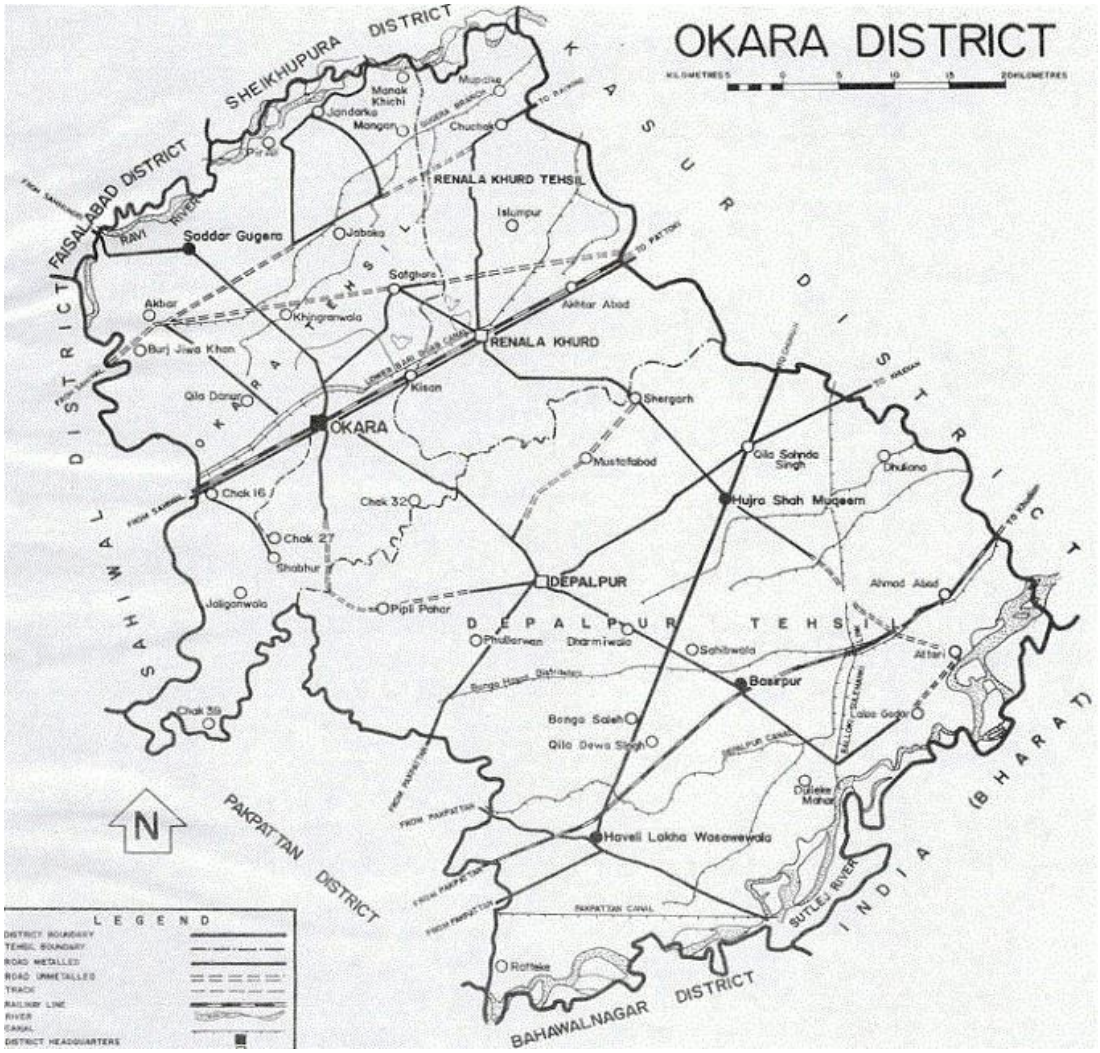
Ethical Considerations

Ethical approval for this study was obtained from the relevant institutional ethics committee or review board at District Okara.

Limitations

It is important to acknowledge some limitations of this study. First, the cross-sectional design provided a snapshot of the prevalence of trypanosomiasis in camels at a specific point in time. Longitudinal studies would provide a better understanding of temporal variations and trends in the disease. Second, the diagnostic tests used in this study have their limitations in terms of sensitivity and specificity. Additional confirmatory tests, such as polymerase chain reaction, could enhance the accuracy of the results.

Figure 1: Map of District Okara Pakistan



RESULTS

The provided results of the prevalence of trypanosomiasis in the collected samples of 384 were tested for trypanosomiasis microscopically. Out of these, 45 samples were found to be positive for the presence of Trypanosoma parasites, while 339 samples tested negative. The prevalence of Trypanosomiasis in the sample population was calculated to be 11.71%. This indicated that approximately 11.71% of the tested samples were positive for Trypanosoma parasites (Table 1).

Sex-wise study of the collected samples revealed that a total of 113 samples from male camels and 271 samples from female. Out of these, 9 samples from males and 36 samples from females were found to be positive for Trypanosoma parasites, while 104 samples from males and 235 samples from females tested negative. The prevalence of Trypanosomiasis in male samples was calculated to be 7.96%, indicating that approximately 7.96% of the tested male samples were positive for Trypanosoma parasites. In comparison, the prevalence of Trypanosomiasis in female samples is calculated to be 13.28%, indicating that approximately 13.28% of the tested female samples were positive for Trypanosoma parasites (Table 2).

Age group <1 year: A total of 29 samples from individuals aged less than 1 year was collected. Out of these, 3 samples were found to be positive for Trypanosoma parasites. The prevalence of Trypanosomiasis in this age group was calculated to be 10.34%. Age group 1-3 years: A total of 101 samples from individuals aged 1-3 years were collected. Among these samples, 13 were found to be positive for Trypanosoma parasites. The prevalence of Trypanosomiasis in this age group was calculated to be 12.87%. Age group 3-5 years: A total of 187 samples from individuals aged 3-5 years were collected. Out of these, 24 samples were found to be positive for Trypanosoma parasites. The prevalence of Trypanosomiasis in this age group was calculated to be 12.83%. Age group >5 years: A total of 67 samples from individuals aged above 5 years were collected. Among these samples, 5 were found to be positive for Trypanosoma parasites. The prevalence of Trypanosomiasis in this age group is calculated to be 7.46%. To assess the significance of the differences in prevalence among the age groups, a statistical test of ANOVA was conducted. The p-value for the age groups was found to be 0.01236, which is significant at the $p<0.05$ level. This indicated that there was a significant difference in the prevalence of Trypanosomiasis between the age groups (Table 3).

Table 1: Overall prevalence of trypanosomiasis recorded in camels in District Okara

S. No	Samples collected (n)	Samples found positive (n)	Samples found negative (n)	Prevalence (%)
1	384	45	339	11.71

Table 2: Sex-wise prevalence of trypanosomiasis recorded in camels in District Okara

Sex	Samples collected (n)	Samples found positive (n)	Samples found negative (n)	Prevalence (%)
Males	113	09	104	7.96
Females	271	36	235	13.28
Chi-square value	1.3262			
p-value	0.2494 (Non-significant)			

Table 3: Age--wise prevalence of trypanosomiasis recorded in camels in District Okara

S. No	Age group (years)	Samples collected (n)	Samples found positive (n)	Prevalence (%)	p-value
1	<1	29	3	10.34	**0.01236* (Significant at p<0.05)**
2	1-3	101	13	12.87	
3	3-5	187	24	12.83	
4	>5	67	5	7.46	

DISCUSSION

The present study aimed to assess the prevalence of trypanosomiasis in camels within the Okara District of Pakistan. The findings revealed an overall prevalence of 11.71% among the tested samples, indicating a significant presence of Trypanosoma parasites in the camel population. The results also indicated variations in prevalence based on sex and age groups, highlighting the importance of considering these factors in understanding the epidemiology of trypanosomiasis in camels [17-18].

The prevalence of trypanosomiasis in male camels was found to be 7.96%, while in female camels, it was higher at 13.28%. This difference suggests a potential gender-related susceptibility to trypanosomiasis infection in camels. The higher prevalence in female camels could be attributed to factors such as hormonal variations or differences in immune response. Further investigation is required to elucidate the underlying reasons for this observed variation and its implications for camel health management [19].

Regarding age groups, the study found that the prevalence of trypanosomiasis varied across different age categories. The highest prevalence was observed in the age group of 1-3 years (12.87%), followed by the age group of 3-5 years (12.83%). The age group below 1 year had the lowest prevalence (10.34%), while the age group above 5 years exhibited a relatively lower prevalence of 7.46%. These findings suggest that young and middle-aged camels are more susceptible to trypanosomiasis, whereas older camels may have developed some level of resistance or acquired immunity. The significant difference in prevalence among age groups, as indicated by the ANOVA test, further supports the notion that age plays a role in the susceptibility to trypanosomiasis in camels [20].

The results of this study contribute to the existing knowledge on trypanosomiasis in camels, particularly in the Okara District of Pakistan. They highlight the importance of implementing appropriate preventive measures and control strategies to reduce the transmission and impact of this disease on camel health and productivity. Given the high prevalence of trypanosomiasis found in this study, it is crucial to raise awareness among

camel owners, herders, and veterinary professionals about the importance of regular screening, early detection, and timely treatment of infected animals [13].

The limitations of the study should also be acknowledged. Firstly, the cross- sectional design limited our understanding of temporal variations in trypanosomiasis prevalence. Future studies employing longitudinal designs would provide valuable insights into the dynamics of the disease and its seasonal variations. Additionally, the diagnostic tests used in this study, such as microscopic examination, have inherent limitations in terms of sensitivity and specificity. The inclusion of more advanced techniques like polymerase chain reaction (PCR) could enhance the accuracy of the results by detecting even low-level parasitemia and differentiating between species or strains of Trypanosoma parasites [21].

To improve the control and management of trypanosomiasis in camels, further research is needed to identify the specific species or strains of Trypanosoma involved and investigate their transmission dynamics, reservoir hosts, and vectors. Additionally, studies focusing on the impact of trypanosomiasis on camel health and productivity, as well as the economic implications for camel husbandry in the Okara District, would provide a comprehensive understanding of the disease and aid in the development of effective control strategies [22].

CONCLUSION

This study highlighted the significant prevalence of trypanosomiasis in camels within the Okara District of Pakistan, with an overall prevalence of 11.71%. The higher prevalence observed in female camels and the susceptibility of young and middle-aged camels indicated the need for targeted interventions and preventive measures. These findings underscored the importance of raising awareness among camel owners and herders about the disease, implementing regular screening programs, and promoting early detection and treatment. The results provided valuable insights for policymakers and veterinary professionals to develop effective control strategies to mitigate the impact of trypanosomiasis on camel health, welfare, and the livelihoods of the local community in the

Okara District.

CONFLICT OF INTEREST

None.

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