Investigation of Anthrax Outbreak in Sesheke District Western Province of Zambia, December 2023: A Matched Case-Control Study

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Date 25th September, 2024

Background

- Anthrax is a zoonotic disease caused by spore-producing bacterium *Bacillus anthracis*
- Over 1,100 cases and 20 death recorded in East and Southern Africa in the year 2023
- The disease is endemic in western province affecting both animals and humans
- Sesheke District reported cases of anthrax after over five years without recording any case

Objectives

General Objective

- To determine factors associated with humans anthrax outbreak in Sesheke district of western province, Zambia

Specific objectives

1. To assess exposures contributing to the onset of anthrax outbreak
2. To review the surveillance practices for anthrax
3. To make recommendations to prevent future outbreaks

Methods

Study design

- Matched case-control study by age and sex

Study population

- Residents of four affected villages of Sesheke district

Sample size

- Cases: 16 Controls: 48
  - ➢Ratio of 1 case to 3 controls
  - ➢Detectable OR of 5.0 and power of 80%
  - ➢95% confidence level

Methods: Case definition

Cases

- Any person presenting with signs and symptoms consistent with anthrax or
- Any person confirmed positivity for *Bacillus anthracis* by Real-time PCR

Controls

- Any person matched by age and sex within the neighbourhood with no history of symptoms and symptoms suggestive of anthrax

Methods

Data collection

- A questionnaire was administered in KoboToolbox to collect exposures and risk factors on cases and controls

Data analysis

- Data was analysed in R version 4.3.3
- Demographical analysis and conditional logistic regression were performed
- Data was presented with matched odds ratios (mORs)
- A 95% confidence level (CI) was used

Results: Demographic

- We interviewed 13 cases with 39 controls
- All the cases had cutaneous anthrax
- Samples collected confirmed anthrax by PCR
- Majority of the cases/controls were male farmers (85%)
- Median age was 25.5 years (range 10-66 years)

Results: Surveillance Practices

- Poor documentation of surveillance activities
  - ➢Line list and Notification records not available
- Delayed implementation of control measures (18 days instead of 7 days threshold)
  - ➢Burn on stock movement
  - ➢Restrict of sales of meat in butcheries
  - ➢Risk Communication and Community engagement initiation

Bivariant analysis for Anthrax Outbreak in Sesheke District, 2023

Variable	Category	Cases N = 13	Controls N = 39	OR (95% CI)	p-value
Occupation	Farmer	8 (62%)	11 (28%)	4 (1.08-14.51)	0.038
Exposure type	Bovine Carcasses	7 (54%)	11 (28%)	8 (1.83-30.87)	0.005
	Skinning	4 (38%)	1 (2.6%)	16 (1.6-153.0)	0.017

Multi-variable analysis for Anthrax Outbreak in Sesheke District, 2023

Independent	mOR	Lower CI	Upper CI	P-value
Contact with goat and bovine Carcasses	13	1.4	115	0.0230
Skinning of dead Carcasses	14	2.1	98	0.0063
Contact through eating meat	2	0.4	12.0	0.3406

Discussion

Exposures to Contracting Anthrax

- Source of infection was contact with animals carcasses (bovine and goats)
- Skinning carcasses was associated with contracting anthrax
- Male farmers were more affected
  - ➢Head animals
  - ➢Engage in skinning of carcasses

Public Health Action

Activities implemented

- Sensitized communities on danger of handling, opening suspected anthrax carcasses
- 25,000 cattle vaccinated in affected area
  - ➢2,000 above 23,000 target

Conclusion

Future Outbreak Response and Mitigation

- Improved surveillance activities and documentation
- Timely intervention of control strategies
- Continued educational programs to reduce anthrax outbreaks, particularly among male farmers

Reference

1. 5 countries in East and southern Africa have anthrax outbreaks, WHO says, with 20 deaths reported | AP News [Internet]. [cited 2024 Sep 1]. Available from: https://apnews.com/article/africa-anthrax-outbreaks-deaths-world-health-organization-300601a624ca9affec4df5bb9b40624e
2. CDC. What is Anthrax? | CDC [Internet]. 2022 [cited 2023 Oct 25]. Available from: https://www.cdc.gov/anthrax/basics/index.html
3. S. Department of Labor. Anthrax - Control and Prevention | Occupational Safety and Health Administration [Internet]. 2020 [cited 2023 Oct 25]. Available from: https://www.osha.gov/anthrax/control-prevention
4. GCHS. GCHS2023. 2023 [cited 2024 Feb 3]. Zambia Reports 684 Suspected Anthrax Cases, 4 deaths | The Transmission | University of Nebraska Medical Center. Available from: https://www.unmc.edu/healthsecurity/transmission/2023/12/12/zambia-reports-684-suspected-anthrax-cases-4-deaths/
5. CDC. Anthrax (Malignant Edema, Woolsorters' Disease) [Internet]. 2011 [cited 2024 Feb 3]. Available from: https://www.health.ny.gov/diseases/communicable/anthrax/fact_sheet.htm
6. Zambia Statistics Agency. Zambia Demographics at a Glance - Zambia Data Portal [Internet]. 2023 [cited 2023 Oct 18]. Available from: https://zambia.opendataforafrica.org/efhbnl/zambia-demographics-at-a-glance