Echinococcosis in Bhutan

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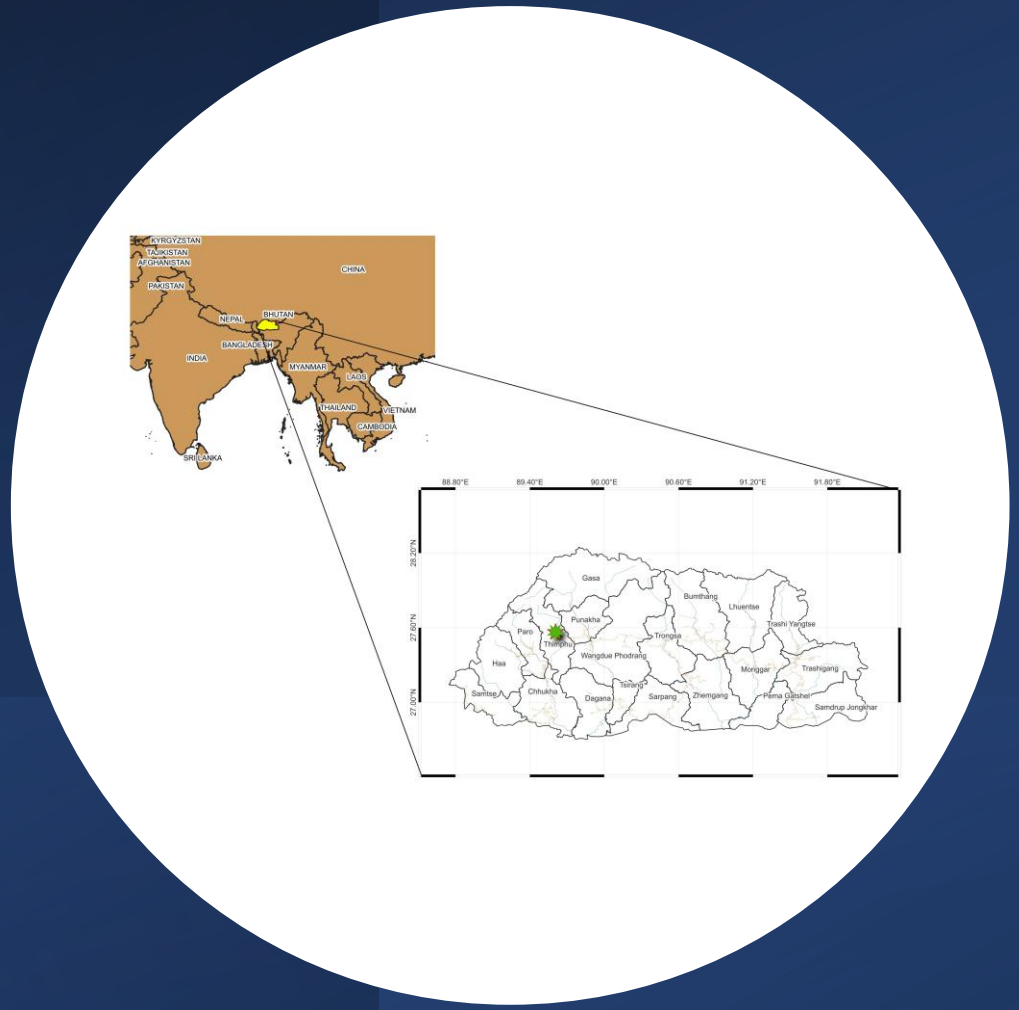

Overview

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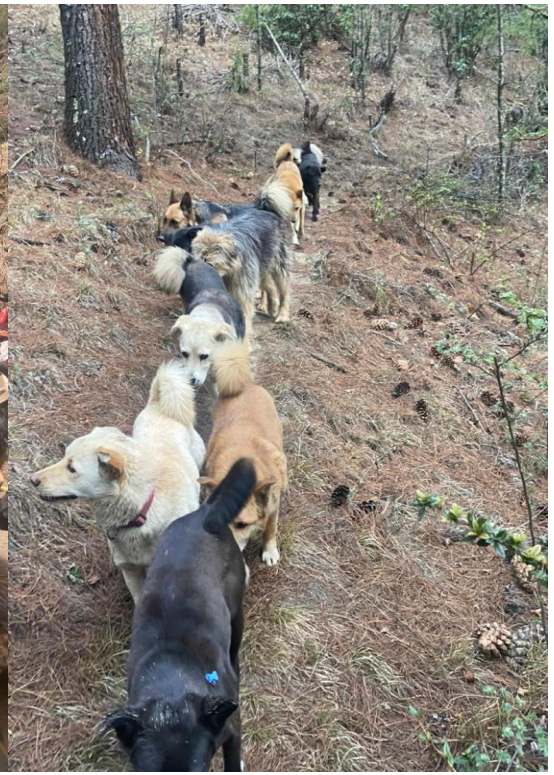
1. Introduction

- Country has large canine populations comprising of 56269 stray dogs and 31622 owned dogs (National Dog Population Management Program 2023)
- Against a total human population of 770,276 inhabitants (Projected population, NSB, 2023)
- It's cohabitation with the human population pose a zoonotic risk in transmitting echinococcosis.

Livestock population 2022	
Cattle	293291
Equine	11665
Pig	33082
Poultry	975152
Sheep	10024
Goats	56004



2. Review of data at surgical department, National referral hospital

- Total of 159 cases was recorded (2015-2019), crude case notification rate 22 hospitalized CE cases/100,000 population or average annual incidence of 4.4 CE/100000 population.
- Regional annual mean case notification was significantly higher in the central part of the country than western and eastern region (7.2, 3.2 and 2.8 cases/100,000 respectively)
- Mean annual incidence in female was also significantly higher (6.11 vs 2.79), annual incidences increased 30-59 and 50.94% were farmers.
- Site of infections were highest in the liver (77.98%) followed by lungs(13.21%) and other sites.
- >82% cases were managed with surgery, of >48% required admission more than 4 days.

3. Methods-Microscopy

a. Microscopic examination

Faecal samples
Environmental samples

↓

Sedimentation/
Flotation
Sequential sieving

↓

Microscopy
PCR with taeniid egg-positive samples only

(Mathis et al, 1996)

PET bottles modified as funnel for F/S- By Peter Deplazes

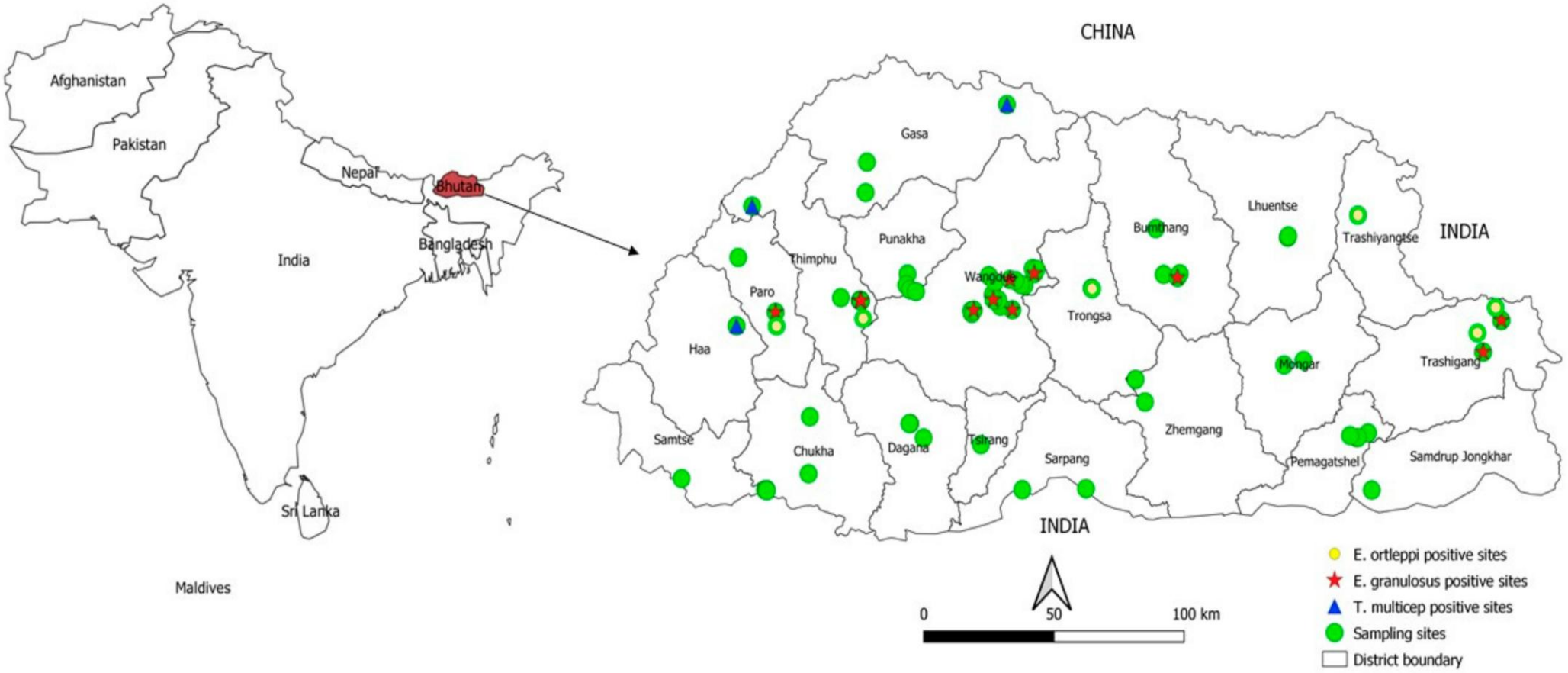
c. Molecular Analysis

- DNA extraction was carried out as described by Stefanic et al, (2004)-commercial kit (Qiamp DNA mini kit)
- Sequencing as described by Trachsel et al, (2007) – multiplex PCR kit (Qiagen, Hilden, Germany)-(small subunit of ribosomal RNA) for identification of Echinococcus species and other cestodes, including Taenia spp.
- Carried out at Institute of Parasitology, Zurich, Switzerland.

4. Findings

Year	Areas	Taeniid +ve eggs/samples (microscopically)	Taeniid species (PCR)	References
2011	Impounded stray dogs	18/338(5.3%)	4 E. granulosus s.l.	Thapa et al., 2013
2012	Thimphu city	20/138 (14.4%)	10 E. granulosus s.s. 1 T. hydatigena	Thapa et al., 2017
	Carnivores around farm, central Bhutan	14/28(50%)	1 E. granulosus s.l. 6 T. hydatigena 1 Hydatigera taeniaeformis	
2016-2018	Nation wide (Urban & rural)	40/670(7%)	22 (3.3%) E. granulosus s.s. 4 (0.5%) E. ortleppi (G5) 2 (0.2%) T. multiceps	Sharma et al., 2021
	Yak grazing areas	27/283(9.5%)	8 (2.8%) E. granulosus s.s. 4 (1.4%) E. ortleppi	
	Mithun cyst	1/1	E. granulosus s.s.	

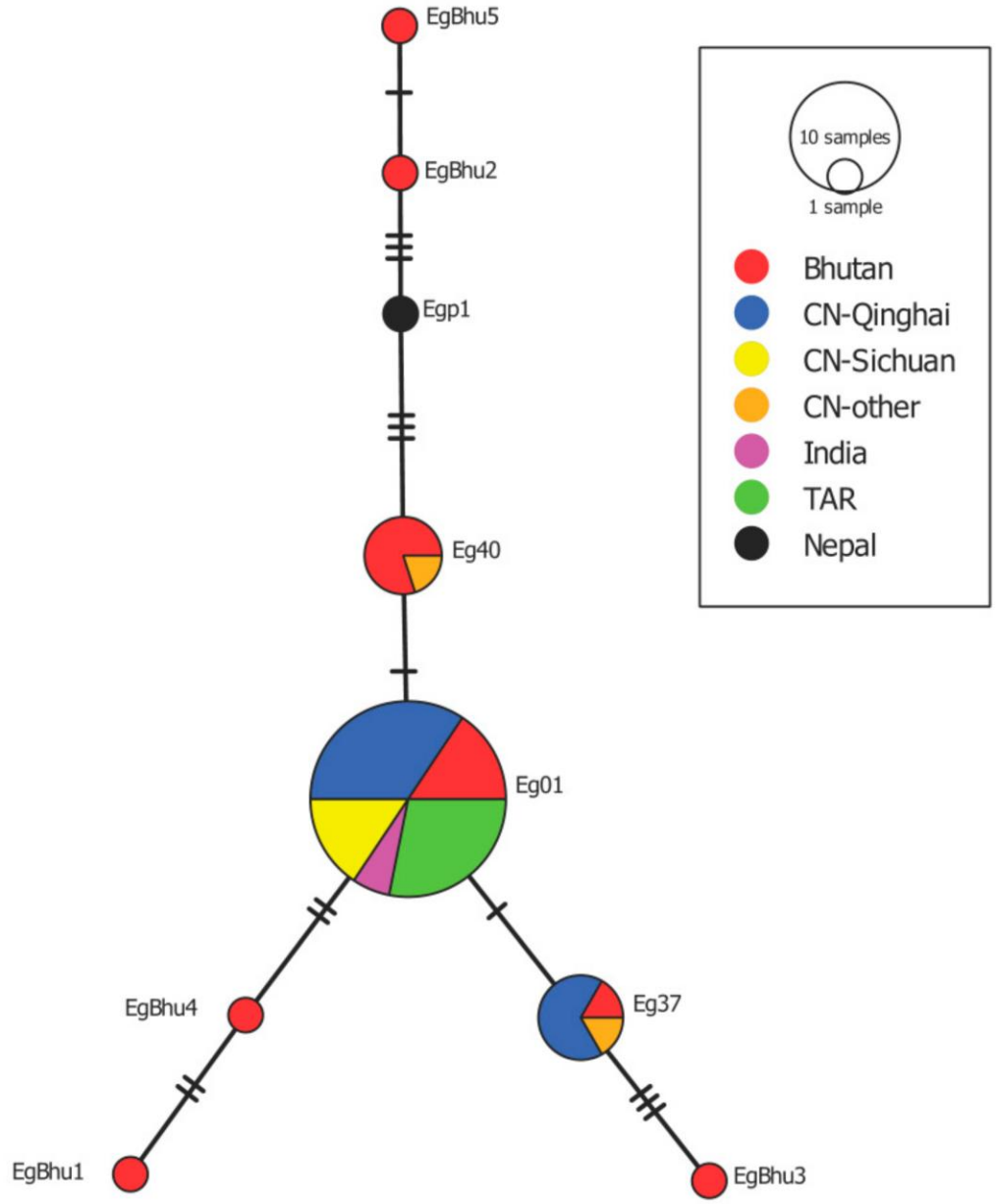
5. Geographic distribution of Echinococcus



Sharma et al., 2021, Occurrence of Echinococcus granulosus sensu lato and Other Taeniids in Bhutan Pathogens **2021**, 10, 330

6. Genetic diversity

- Haplotype network-the sequence of the cox1 gene of E. granulosus s.s. -named EgBhu1-EgBhu5 - accession numbers MW138944-MW138948)
- 15 samples including 2 human samples sequenced
- Haplotype Eg 01(central position)
- Eg 37 and Eg 40



(Sharma et al., 2021, Occurrence of Echinococcus granulosus sensu lato and Other Taeniids in Bhutan Pathogens 2021, 10, 330)

7. Summary

1. Findings suggested, potential dog-human transmission of *E. granulosus s.s.*
2. Hospital records document human cystic echinococcosis in Bhutan
3. Common species detected was *E. granulosus s.s* followed by *E. ortleppi* in the dog population both rural and urban areas including yak rearing areas in Bhutan.
4. There is need to prioritize control of Echinococcosis through one health approach.
5. Further, study especially sequencing is required

Thank You

IPZ

University of Zurich[UZH]

University Hospital Zurich

29th World Congress of Echinococcosis

Kyrgyz Republic

Acknowledgement