CURRENT STATUS OF FOOD-BORNE PARASITIC ZOONOSES IN SOUTH AFRICA AND NAMIBIA

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Abstract. Epidemiological data on food-borne parasitic zoonoses in countries of southern Africa are sporadic. In a study of toxoplasmosis in South Africa, there was an overall prevalence of 21% (2, 147/10,228). Prevalences vary between the different cultural groups and from one geographical region to another. The prevalence rate for the San (Bushmen) people of Namibia and Botswana was 9% (65/725) compared to the 30% (190/635) found in the Indian and Black communities of Kwazulu-Natal province, South Africa. These variations are probably linked to the dietary habits of the different cultural communities. Cysticercosis appears to be most prevalent in the Eastern Cape Province (former Transkei), where pigs roam freely and sanitation facilities are inadequate or non-existent. Segments of tapeworms often feature as an ingredient of concoctions prepared by traditional healers and are suspected sources of many of the cases of cysticercosis in South Africa. *Trichinella nelsoni* has been identified in wild game in South Africa: so far no cases of infection in humans have been recorded. Cases of *Sarcocystis* have been identified in some instances but infection is probably underdiagnosed in the country.

INTRODUCTION

Economically and sociologically the Republic of South Africa represents a mixture of third world and first world situations. This is reflected in the disease profiles and epidemiological patterns of diseases such as zoonoses occurring in the country. The epidemiology of many of the parasitic diseases, particularly the intestinal helminths and tissue invading protozoa occurring in the country have received relatively little attention. Recent changes to the health policies of the country have, however, focused attention on some of the important gaps in our knowledge.

The rapid influx of large numbers of migrants from the former self-governing Black homelands into urban areas and the resulting squatter problem around all major cities, such as Cape Town, has strained health infrastructure and caused enormous health problems. Cities expand in a disarranged manner toward areas which have an insufficient water supply and inadequate sanitation facilities. Poor housing structures, disrupted social condition and a rapidly expanding population merely compound the problem. Many of the new immigrants are heavily parasitized and infections are disseminated among the local poverty - stricken population. Furthermore, hundreds of thousands of refugees from neighboring countries such as Mozambique, Angola, Namibia, Zimbabwe, Swaziland, Lesotho and even further north (Zaire, Zambia, Nigeria, Malawi) have flocked into the country and worsened the problem.

Prevalence studies on various zoonotic diseases in southern Africa have been carried out, but most of them were limited to either a particular region or ethnic group. Epidemiological study data on these infections in southern Africa are therefore fragmentary.

This paper presents the status of parasitic zoonoses occurring in the Republic of South Africa with reference to some of the adjacent countries in which, as far as can be ascertained, there were also very few studies of this nature conducted in the past.

TOXOPLASMOSIS

Results of several serological surveys on the prevalence of toxoplasmosis in southern Africa have been published. In the most comprehensive survey, Jacobs (1978) investigated a total of 10,228 serum samples collected form widely different geographical areas and ethnic groups by the indirect fluorescent antibody (IFA) test. The results of the survey are given in Tables 1 and 2.

Table 1

Prevalence of *Toxoplasma* antibodies in southern Africa according to region. (Data taken from Jacobs, 1978).

Region	% Positive	Sample Size	% Conversion	
			< 20 yr	> 30 yr
Kwazulu Natal	30	635	2,0	1,0
Eastern Cape	24	970	0,8	0,5
Transvaal				
Gauteng				
Mpumalanga				
Northern province	23	6,268	1,0	1,0
Western Cape	18	683	0,7	0,1
Namibia and Botswana	11	1,063	0,5	0,3
Free State*	10	609	0,5	0,5
Total	21	10,228	1,0	0,5

* Figures for the Free State from Brink *et al*, 1975.

Table 2

Prevalence of *Toxoplasma* antibodies in southern Africa according to ethnic group. (Data taken from Jacops, 1978).

Ethnic group	% Positive	Sample size	% Annual Sero-Conversion
White	16	3,294	0.5
Black	25	4,015	1.0
Colored and Indian	28	2,194	1.0
San (Bushmen)	9	725	0.3
Total	21	10,228	0.5-1.0

In a series of 6,705 maternity cases studied by Jacobs (1978) in 3 hospitals in Transvaal (Gauteng) only 20 mothers (0.3%) of acute toxoplasmosis were detected. Two of the babies born to these mothers were infected. This transmission rate was lower than those reported in Europe and North America. These results led the author to speculate that the difference in transmission rates might reflect a difference in virulence rates between different strains and that the South African strains result in lower transmission rates than in most other areas in the world. These results are adequately supported by anecdotal evidence obtained by us from pediatricians in other large hospitals in Gauteng Province (former Transvaal) and in the Western Cape.

The result of a survey by Jacobs (1978) of the prevalence rates of toxoplasmosis in different ethnic groups in Namibia are presented in Table 3.

Table 3

Prevalence of *Toxoplasma* antibodies by ethnic groups in Namibia and Botswana. (Data taken from Jacobs, 1978)

Ethnic group	Sample size	
	% Positive	Sero-conversion
San		
Kung - Tsumkwe	6	275
Kung - Dobe	9	186
X‾ & thua	9	82
G/wi and G//ana	12	182
Total San	9	725
Dama	27	77
White	12	261
Total	11	1,063

The prevalence rates obtained for the San people are considerably lower than those obtained for other ethnic groups in Southern Africa. These observations are supported by our own unpublished studies on these people. The reasons for the differences are not entirely clear. The climate of the region is characterized by a low rainfall (<25 cm/year) with marked extremes in temperature (-8 °C to + 30 °C in winter and up to 50 °C in summer) (Jacobs and Mason, 1978). The dry climate and intense summer heat in the region are not conducive to the survival of oöcysts passed by cats.

Most of the San people today have been influenced by the western way of life and follow a sedentary lifestyle to which they are ill-adjusted; very few now congregate in clans, as in the past, and camp close to the more permanent water sources (pans and waterholes) and follow a pristine hunter-gatherer way of life. In some situations they now survive in encampments on the fringes of settlements of other ethnic groups, who often despise and treat them as objects of ridicule and for personal exploitation. Overall, most of them live in dire poverty and struggle to survive. Generally, they have few personal possessions and apart from a few who may own a dog or, rarely, a cat, or donkey, or cattle, they keep no domestic animals. In their nomadic existence they had a dominantly (80%) vegetarian diet and they hunted and ate wild game including felids. The meat is generally well cooked over open fires and surpluses are sun-dried (unsalted) and stored for later use. In recent years the size of the traditional hunting grounds of the San has been reduced, and many of the men have grown up (in work or security force situations) without learning or being familiarized with the skills of hunting game. Meat is eaten less often than in the past and the diet consists mainly of maize (corn) porridge cooked in iron pots. Unfortunately, malnutrition, alcoholism and tuberculosis have become widespread problems and the future of the Bushmen appears bleak (O'Keefe and Lavender, 1989).

CESTODES

Early studies carried out by Elsdon - Dew (1964); Heinz and MacNab (1965) and Heinz and Klintworth (1965) drew attention to the high prevalence of taeniasis in certain parts of South Africa and the significance of cysticercosis as a cause of epilepsy. A serological survey carried out by Heinz and MacNab (1965) using both precipitin and complement fixation tests, located the Transkei (former Black homeland) in the eastern part of South Africa as the area with the highest prevalence of cysticercosis (46/225 = 20.4%) while none (0/78) was found among the Bushmen inhabiting the Kalahari region of Botswana. The absence of taeniasis in the latter population group is easily understandable as these people, who were at the time of the survey largely nomadic, inhabited a semi-arid region and did not keep any domestic animals except dogs. A prevalence rate of 2.4% (2/83) was found in urban Africans, presumably as a result of these people consuming more meat passed by abattoir standards. Heinz and MacNab (1965) also drew attention to the discrepancy between the low prevalence of adult *Taenia solium* and the relatively high prevalence of cysticercosis in the human population, the so-called T. *solium*/cysticercosis paradox. One possible explanation for this phenomenon given by the authors is the use of tapeworm segments as an ingredient of concoctions prepared by traditional healers.

The use of tapeworm segments as a remedy to expel intestinal worms was the subject of several letters to the editor in a recent issue of Transactions of the Royal Society of Tropical Medicine and Hygiene (89: 460-1). The use of night soil for fertilization of vegetables is not practiced by the African and vegetables are usually well cooked before eating.

Several subsequent studies have supported the conclusion of Heinz and MacNab (1965) that the prevalence of taeniasis/cysticercosis is highest in the Eastern Cape (former Transkei). In a survey undertaken by Pammenter *et al* (1987) using an ELISA test for cysticercosis, 22/736 Transkeian children were serologically positive while only 8/677 children from the Ingwavuma area in Kwazulu were positive. These results, when corrected for the sensitivity and specificity of the test, indicated a cysticercosis prevalence of 2.49% in the Transkein children and 0.23% in the Kwazulu group. These results reflect certain differences in the meat eating habits between the two groups. Pork is less commonly eaten in Kwazulu than in the Transkei. Verster (1966) showed that porcine cysticercosis detected at abattoirs in the Transkei is nearly seven times higher than in others study done in the Kwazulu by Pammenter, *et al* (1987). In Transkei, large numbers of free roaming pigs are

common and sanitary conditions are mostly very poor or non-existent.

Thomson (1993) analyzed a series of 239 patients who attended the associated teaching hospitals of the University of Cape Town between 1975 and 1989 and were identified retrospectively as having neurocysticercosis. Of these 212(88,7%) originated from the former areas of the Transkei and Ciskei. This exceptionally high percentage of patients originating from the Eastern Cape Province is probably partly due to the close proximity of the tertiary teaching hospitals where the study was carried out.

The problem of intestinal helminthiasis in Southern Africa must be seen against the background of socio-economic conditions in the country as well as the cultural associations of the different African ethnic groups. Among the North-Sotho for example, the occurrence of intestinal helminths is considered as an integral part of a child's development and not considered as an infection (Kriel, 1992). In many traditional societies, illnesses are sometimes ascribed to supernatural causes. In addition, some societies *eg* the North Sotho, their beliefs also make provision for an elaborate disease etiology which may include natural phenomena such as seasons, phases of life, etc. Educational programs aimed at establishing a positive attitude towards western medical and health services will in future have to take the existing world view and etiological concepts of particular cultural groups into account. Lack of maternal education is a major cause of the high prevalence rates of certain parasitic infections in Southern Africa.(Kriel, 1992).

Less common food-borne parasitic zoonoses

Trichinella nelsoni has been identified in wild game in South Africa and Namibia (Pozio *et al,* 1991) but so far no cases of infection in humans have been recorded in the country. *Armillifer armillatus* is a well known parasite of snakes and several cases of human infection with this parasite are on record. One of the authors (JJ Joubert) has observed such a case at Rietfontein Hospital in Johannesburg, probably caused by the ingestion of raw or undercooked snake meat. Cases of *sarcocystis* have been identified in South Africa (Marcus and Van der Lugt, 1994) but infection is probably underdiagnosed in the country.

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REFERENCES

Brink JD, De Wet JS, Van Rensburg AJ. A serological survey of toxoplasmosis in the Bloemfontein area. *S Afr Med J* 1975; 49: 1441-3.

Elsdon-Dew R. Taeniasis in the Bantu. *S Afr Med J* 1964; 29: 974-6.

Heinz HJ, Klintworth GK. Cysticercosis in the aetiology of epilepsy. *S Afr Med J* 1965; 30: 32-6.

Heinz HJ, MacNab GM. Cysticercosis in the Bantu of Southern Africa. *S Afr Med J* 1965; 30: 19-31.

Jacobs MR. Toxoplasmosis in Southern Africa. Johannesburg: University of Witwatersrand; 1978. (PhD thesis).

Jacobs MR. Mason PR. Prevalence of *Toxoplasma* antibodies in Southern Africa. *S Afr Med J* 1978; 53: 619-21.

Kriel JD. Die siektebegrip van die Noord-Sotho. University of Pretoria; 1992. (PhD Thesis)

Marcus MB, Van der Lugt JJ. Sarcosystosis. In: Coetzer JAW, Thomson GR, Tustin RC, eds. Infectious diseases of livestock with special reference to Southern Africa Cape Town: Oxford University Press 1994; 253-66.

O'Keefe SJD, Lavender R. The plight of modern Bushmen. *Lancet* 1989; 2: 255-7.

Pammenter MD, Rossouw EJ, Dingle CE. Serological detection of cysticercosis in two rural areas of South Africa. *Trans R Soc Trop Med Hyg* 1978; 81: 242-4.

Pozio E, La Rosa G, Verster A. Identification by isoenzyme patterns of two gene pools of *Trichinella nelsoni* in Africa. *Ann Trop Med Parasitol* 1991; 85: 281-3.

Thomson AJG. Neurocysticercosis - experience at the teaching hospitals of the University of Cape Town. *S Afr Med J* 1993; 83: 332-4.

Verster A. Cysticercosis, hydatidosis and coenurosis in the Republic of South Africa. *J S Afr Vet Med Assoc* 1966; 37: 37-45.