The African Journal of MEDICINE and Medical Sciences

Volume 11
1982

BLACKWELL SCIENTIFIC PUBLICATIONS
Oxford London Edinburgh Boston Melbourne

women attending antenatal clinic and those admitted in the Muhimbili Medical Centre, Dar es Salaam, on account of anaemia and hypertension. The anaemic women had haemoglobin less than 9 g %. The women whose diastolic blood pressure exceeded 90 mm mercury were considered to be hypertensive. The sera after separation were stored at $-20°C$ and before use were inactivated at $56°C$ for 30 min. The indirect haemagglutination (HA) test (microtitration) was done by using formalinized, tanned turkey red blood cells obtained from Wellcome Research Laboratories, U.K. Sera showing non-specific heterologous antibodies against turkey red cell were adsorbed with normal turkey cells.

Results

The results of HA test for *Toxoplasma gondii* antibodies in 357 serum samples from anaemic, hypertensive and normal pregnant women are shown in Table 1. Table 2 shows the prevalence of *Toxoplasma* antibodies in women who had histories of abortion and no histories of abortion. In Table 3, the distribution of *Toxoplasma* antibodies is shown according to the age of the pregnant women.

Discussion

The results of the present study and those of Bennett *et al.* (1970) and De Roever Bonnet (1972) suggest that *Toxoplasma* infection is widespread in Tanzania. The high prevalence rate of antibodies recorded in this study (41.9%) in normal pregnant women and that of 77.2% reported by Bennett *et al.* (1970) in Hadza tribe, and of 45% recorded by De Roever Bonnet (1972) in normal Tanzanian population could be attributed to the eating habits of Tanzanians and their closeness to cat, the natural host of *T. gondii.* Tanzanians prefer partially cooked or slightly roasted over completely done meat. Some people may also consume raw flesh, blood or milk all of which are potential sources of *T. gondii* infection. Several outbreaks have been reported following

TABLE 1. Shows the results of HA test for *Toxoplasma* antibodies on 357 serum samples from anaemic, hypertensive and normal pregnant women

	Anaemic		Hypertensive		Normal		Total	
	No. examined	%	No. examined	%	No. examined	%	No. examined	%
No. examined	69	–	66	–	222	–	357	–
No. negative	33	47.8	22	33.3	129	58.1	184	51.5
No. positive	36	52.2	44	66.7	93	41.9	163	48.5
1 :64	31	44.9	33	50.0	46	20.7	110	30.8
1 : 256	2	2.9	5	7.6	22	9.9	29	8.1
1 : 1024	3	4.3	5	7.6	13	5.9	21	5.9
1 :4096	0	0.0	1	1.5	12	5.4	13	3.6

TABLE 2. Results of HA test for *Toxoplasma* antibodies in pregnant women who had histories of abortion and no histories of abortion

	No. abortion		One or more abortions		Total	
	No. examined	%	No. examined	%	No. examined	%
No. examined	263	–	94	–	357	–
No. negative	139	52.9	45	48.9	184	51.5
No. positive	124	47.1	49	52.1	173	48.5
1 :64	75	28.5	35	37.2	110	30.8
1 : 256	21	8.0	8	8.5	29	8.1
1 : 1024	12	4.6	4	4.3	21	5.9
1 :4096	11	4.2	2	2.1	13	3.6

Afr. J. Med. med. Sci. (1982) 11, 167–170

PREVALENCE OF *TOXOPLASMA* ANTIBODIES IN PREGNANT AFRICAN WOMEN IN TANZANIA

H. S. GILL AND L. A. R. MTIMAVALYE

Departments of Parasitology and Medical Entomology and Obstetrics and Gynaecology, Faculty of Medicine University of Dar es Salaam, Tanzania

Summary

Three hundred and fifty-seven serum samples from pregnant African women were examined for *Toxoplasma gondii* antibodies with indirect haemagglutination test in Dar es Salaam. Out of these 222 women were normal, sixty-nine had anaemia and sixty-six were suffering from hypertension. Infection rate in normal pregnant women was 41.9%, in anaemic women 52.5%, and in those suffering from hypertension 66.7%. Highly significant relationship was observed between *Toxoplasma* infection and anaemia, and hypertension. Infection rate was significantly high in women who had histories of abortion. The results suggested associations of *Toxoplasma gondii* infection with hypertension and anaemia in African women.

Résumé

Le sérum de 357 femmes africaines enceintes a été á Dar es Salaam, par hémaglutination indirecte pour rechercher les anticorps de *Toxoplasma gondii*: soixante-six femmes étaient hypertendues, soixante-neuf femmes étaient anémiques et 222 femmes étaient normales. Les résultats positifs suivant ont été trouvés dans cet echantillon 41.9% femmes normales, 52.2% femmes anémiques et 66.7% femmes hypertendues. Le pourcentage des tests positif élevé d'une manière significative chez les femmes qui ont eu des avortements. Ces résultats montrent une association significative entre l'infection *Toxoplasma gondii* et l'anémie ainsi que l'hypertendues arterielle chez la femme enceinte africaine.

Correspondence: Dr H. S. Gill, Department of Parasitology, Faculty of Medicine, P.O. Box 65011, Dar es Salaam, Tanzania.

0309–3913/82/1200–0167 $02.00

Introduction

Toxoplasma gondii, a very versatile organism, is regarded as an important opportunistic parasite. In man, it causes chiefly lymphadenopathy, abortion, congenital deformities and chroidoretinitis. Incidentally, much study has not been done on this parasite in East Africa. Of the few reports available, Mas Bakal, Khan and Goedbloed (1968) were the first to report on the occurrence of *Toxoplasma* antibodies at the rate of 48% amongst healthy Kenyan women. Robinson and Lewis (1969) reviewed five cases of congenital toxoplasmasis from Uganda. Bennett *et al.* (1970) recorded an incidence of 77.2% amongst the Hadza tribe in Tanzania. De Roever Bonnet (1972) reported infection rates of 40 and 45% in normal population from Kenya and Tanzania respectively. Present study was undertaken to find out the infection rate of *Toxoplasma gondii* in normal pregnant African women and those suffering from anaemia and hypertension.

Materials and methods

Blood samples were collected from pregnant

reported by Weatherhall and Bradly (1974). It is therefore concluded that *Toxoplasma* infection could be one of the factors responsible for hypertension in the African women.

Anaemia in pregnancy occurs due to several causes. *Toxoplasma* is known to cause anaemia and bone marrow hyperplasia in children (Hoppeler *et al.*, 1960) and adults (Kalderon, Kikkawa & Bernstein, 1964). The present findings also supported the fact that toxoplasmosis was linked with anaemia in African women because in them the antibody rate observed was significantly high ($P<0.001$). Abortion in toxoplasmosis occurs only in those women who pick up *Toxoplasma* infection during pregnancy only and in about 60% such cases, the foetus is uneffected (Desmonts, Couvreur & Ben Rachid, 1965). The antibody rate in women with histories of abortion was slightly higher (51.6%) as compared to those who had no abortions (47.3%). Although the difference was significant at 1% level ($P<0.1$), it appeared that *Toxoplasma* did not play a big role in causing abortion in African women apparently because of the customs and eating habits, the majority of women appear to pick up the infection during early life much before puberty.

References

Bennett, F.J., Kagan, I.G., Barnicol, N.A. & Woodburn, J.C. (1970) Helminth and protozoal parasites of the Hadza of Tanzania. *Trans. Roy Soc. trop. Med. Hyg.* 64, 857–880.

De Roever Bonnet, H. (1972) Toxoplasmosis in tropical Africa. *Trop. geogr. Med.* 24, 7–13.

Desmonts, G., Couvreur, J. & Ben Rachid, M.S. (1965) Le toxoplasmose, la mere, et l'enfant. *Arch. fr. Pediat.* 22, 1183–1200.

Dhall, D.P. (1977) Pattern of vascular diseases in Kenya. *E. Afr. med. J.* 54, 233–241.

Finnerty, F.A. (1977) Hypertension and pregnancy. In: *Hypertension* (Eds J. Genest, E. Koiw and O. Kuchel) pp. 866–873. McGraw-Hill Book Co. New York.

Hoppeler, A., Brison, J., Papillon, A. & Chardac, R. (1960) Anémie hémolytique aigue chez un enfant de cinq ans: découverte de toxoplasmes dans le sang circulant. *Arch. fr. Pediat.* 17, 1250–1254.

Kalderon, A.E., Kikkawa, Y. & Bernstein, J. (1964) Chronic toxoplasmosis associated with severe hemolytic anaemia. Case report and election microscopic studies. *Arch. Intern. Med.* 114, 95–102.

Kean, B.H., Kimball, A.C. & Christenson, W.N. (1969) An epidemic of acute toxoplasmosis. *J. Amer. med. Assoc.* 208, 1002–1004.

Kimball, A.C., Kean, B.H. & Kellner, A. (1965) The risk of transmitting toxoplasmosis by blood transfusion. *Transfusion*, 5, 447–451.

Kitai, I.C. & Irwig, L.M. (1979) Hypertension in urban black outpatients who get treated and for how long. *S. Afr. med. J.* 55, 241–244.

Levitt, D. (1977) Hypertension heart disease in the Zambians. *E. Afr. med. J.* 54, 174–180.

Mas Bakal, P., Khan, A.A. & Goedbloed, E. (1968) Toxoplasmosis in Kenya. A pilot study. *E. Afr. med. J.* 45, 557–562.

Riemann, H.P., Meyer, M.E., Theis, J.H., Kelso, G. & Behymer, D.E. (1975) Toxoplasmosis in an infant fed unpasteurized goat milk. *J. Paediat.* 87, 573–576.

Pickering, G.W. (1968) *High blood pressure.* Churchill Livingstone, London.

Robinson, D.C. & Lewis, M.G. (1969) Congenital toxoplasmosis in Uganda. *E. Afr. med. J.* 46, 85.

Siegel, S.E., Lunde, M.N., Gelderman, A.H., Halterman, R.H., Brown, J.A., Levine, A.S. & Graw, R.G. (1971) Transmission of toxoplasmosis by leucocyte transfusion. *Blood*, 37, 388–394.

Uzodike, V.O., Anidi, A.I. & Ekpechi, L.V.O. (1977) The pattern of heart disease in Enugu, Nigeria. *Nigerian med. J.* 7, 315–319.

Weatherhall, D.J. & Bradley, J. (1974) The blood in systemic disease. In: *Blood and its Disorders* (Eds R. M. Hardisty and D. J. Weatherhall) pp. 1377–1480. Blackwell Scientific Publications, Oxford.

(*Received* 9 *April* 1981; *revision accepted* 29 *March* 1982)

TABLE 3. Prevalence of HA antibodies for *Toxoplasma* in pregnant women according to their age

Age (years)	Anaemic			Hypertensive			Normal			Total		
	No. examined	No. positive	%	No. examined	No. positive	%	No. examined	No. positive	%	No. examined	No. positive	%
20 or less	22	16	72.7	13	10	76.9	44	17	38.6	79	43	54.4
21–30	39	20	51.3	42	21	50.0	153	62	40.5	234	103	44.0
31–40	7	0	0.0	10	3	30.0	23	13	56.5	40	16	40.0
41 or more	1	0	0.0	1	0	0.0	2	1	50.0	4	1	25.0
Total	69	36	52.2	66	44	66.7	222	93	41.9	357	173	48.5

eating partially cooked meat (Kean, Kimball & Christenson, 1969). No report is available in literature on the occurrence of toxoplasmosis following ingestion of raw animal blood. Transmission of toxoplasmosis through ingestion of blood can not be ruled out since blood has been known to harbour *T. gondii* organisms (Kimball, Kean & Kellner, 1965) and transmission of toxoplasmosis on blood transfusion has already been reported (Siegel *et al.*, 1971). Transmission of toxoplasmosis through milk was reported by Riemann *et al.* (1975) who described a case of acute toxoplasmosis in a 7-month-old child fed almost exclusively on raw (unpasteurized) goat milk.

The *Toxoplasma* antibody rate amongst women suffering from hypertension was high (66.7%) as compared to that of control (41.9%) and the difference was statistically highly significant ($P<0.0001$).

The prevalence rate of hypertension in African populations is very high particularly in the urban population (Kitai & Irwig, 1979). In Zambia, over half of the subjects in a clinical study, had evidence of hypertensive heart disease the complications of which appeared at a relatively early age and played a significant role in contributing to the morbidity and mortality of hypertensive disease in Africans (Levitt, 1977). The factors responsible for hypertensive disorders of pregnancy may not apply fully in Africans in which coronary heart disease is totally absent (Levitt, 1977) and atherosclerosis is extremely uncommon (Dhall, 1977). The hypertension in the women studied could hardly be due to pregnancy since normal pregnancy has little or no influence on arterial blood pressure (Pickering, 1968). According to Finnerty (1977), true toxaemia in pregnancy is responsible for hypertension in only 6% white women and pyelonephritis in 25%, the aetiology of which is not clear. The high incidence of cardiomyopathy, a common feature in Africans was suspected by Uzodike, Anidi and Ekpechi (1977) to be due to viral and parasitic infections which abound in Africa. This hypothesis is supported by the results of the present findings where a significantly higher ($P<0.001$) antibody rate was observed in hypertensive women. Furthermore, myocardiopathy in protracted recovery period in toxoplasmosis has already been