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Short communication

Long-term clinical evaluation of asymptomatic subjects positive for circulating *Taenia solium* antigens

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ABSTRACT

Although presence of cysticercal antigens in serum is presumed to indicate active cysticercosis not all positive persons are symptomatic. The significance of a positive antigen test in asymptomatic individuals, in predicting development of symptomatic cysticercosis on long-term follow up, is unknown. Forty two of 48 persons from Vellore district, India who were positive for circulating serum cysticercal antigens were followed up for four to five years. None of them developed clinical evidence of neurocysticercosis or subcutaneous cysts. We conclude that asymptomatic individuals with circulating cysticercal antigens have a low risk of developing symptomatic cysticercosis within four to five years.

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Introduction

Infection by the larval stage of the pork tapeworm *Taenia solium* can manifest as neurocysticercosis (NCC) and/or extra-neural cysticercosis. Tests for cysticercal antibodies in serum may overestimate the prevalence of cysticercosis in the community as antibodies may be present in the event of either current or past exposure to the antigen.¹ On the other hand, presence of cysticercal antigens in serum is presumed to indicate active disease and not mere exposure to the parasite.²

However, there is insufficient information on the significance of a positive cysticercal antigen test in asymptomatic individuals as there are no prospective or long-term follow up studies of such persons. It is not known if persons who are found to be positive for serum cysticercal antigen develop seizures, other neurological symptoms, extra-neural cysts or remain asymptomatic. To answer this

question we followed up healthy subjects who were positive for serum cysticercal antigens several years earlier and looked for symptoms and signs of cysticercosis.

Materials and methods

A study was conducted in 2004 and 2005 to detect the prevalence of cysticercosis in Vellore district, India. The survey included a population of 50 617 persons (38 105 in the rural areas and 12 512 in the urban areas) between the ages of two and 60 years.³ As a part of this study 1065 randomly chosen persons who were free from epilepsy were screened for the presence of cysticercal antigens in the serum. A sandwich ELISA for the detection of circulating serum *T. solium* metacestode antigen using monoclonal antibodies to excretory/secretory products of *T. saginata* metacestodes was used.⁴ Persons who tested positive for cysticercal antigen were followed up during the period May to July 2009 (follow up of four to five years) for history of seizures, other neurological symptoms or subcutaneous nodules. They also underwent a clinical examination to

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look for the same. Patients with neurological symptoms were advised a CT scan examination of the brain.

Results

Of the 1065 asymptomatic persons who were screened in 2004–2005, 48 persons (4.5%) tested positive for serum cysticercal antigen. Of these 48 persons, 42 were available for follow up. Two subjects had died; two had moved out for work or after marriage and two others were untraceable. Of all those who were followed up, only one person had a history of recurrent headaches. A CT scan of the brain on this individual was found to be normal. The other individuals were clinically free of neurological signs or symptoms and had not developed subcutaneous nodules.

Discussion and Conclusions

The prevalence of circulating cysticercal antigens (4.5%) was lower than that of antibodies to cysticercal antigen (15.9%).⁵ This can be explained by the fact that antibodies are reflective of past exposure to the antigen, while antigen detection indicates the presence of viable cysticerci in positive individuals. A similar antigen prevalence of 5.3% was found in a study in Vietnam.⁴ In that study, clinical and repeat serological testing was performed nine months later in 14 of 16 positive persons. While 12 persons were again found to be positive for circulating cysticercal antigens in the serum, the ELISA ratios were less than at initial testing. Clinical or CT evidence of cysticercosis was found in six (50%) of these twelve persons. One person who was asymptomatic at initial testing developed seizures and three others who did not report any symptoms were detected to have subcutaneous cysticercosis, which was confirmed on biopsy. In these three with subcutaneous cysts it was unclear whether the cysts developed after the initial serum testing or these persons were unaware of the cysts.

In our study the presence of circulating antigen did not predict the development of symptomatic NCC or extra-neural cysticercosis at an interval of four to five years following detection of the circulating antigens. As all except one of the individuals were asymptomatic and did not undergo CT scans, the possibility of them having asymptomatic NCC exists. It is also possible that these individuals who were positive for cysticercal antigens had asymptomatic extra-neural cysticercosis, which is not evident on clinical examination (e.g. cysticercosis of the muscles). Since we did not repeat the serological testing for circulating cysticercal antigens during the follow up examination

it is unclear whether the subjects were still positive, had turned negative or were even false positives at initial testing.²

From our findings we can conclude that asymptomatic individuals who are positive for circulating cysticercal antigens in the serum do not develop symptoms of NCC or subcutaneous cysticercosis on long-term follow up. Therefore, such individuals can be counselled against the need for close follow up and reassured that being positive for cysticercal antigens is unlikely to result in the manifestation of the disease over a period of four to five years.

Authors' contributions: VR, JM and AMA were involved in the conception and design of the study. AMA was involved in the clinical assessment and VP in the laboratory work. VR, VP, PD, JM and AMA were involved in analysis and interpretation of data. VR and AMA were involved in drafting the article. VR, PD, VP, JM and AMA revised the article critically and gave their final approval of the version to be published. VR is the guarantor for the paper.

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Conflicts of interest: None declared.

Ethical approval: The project was approved by the Institutional Review Board and Ethics Committee of the Christian Medical College, Vellore.

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