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Prevalence and risk factors for active convulsive epilepsy in rural northeast South Africa

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KEYWORDS
Epilepsy;
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Summary
Rationale: Epilepsy is among the most common neurological disorders worldwide. However, there are few large, population-based studies of the prevalence and risk factors for epilepsy in southern Africa.

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Case-control;
Risk factors;
Population-based

Methods: From August 2008 to February 2009, as part of a multi-site study, we undertook a three-stage, population-based study, embedded within the Agincourt health and socio-demographic surveillance system, to estimate the prevalence and identify risk factors of active convulsive epilepsy (ACE) in a rural South African population.
Results: The crude prevalence of ACE, after adjusting for non-response and the sensitivity of the screening method, was 7.0/1,000 individuals (95%CI 6.4—7.6) with significant geographic heterogeneity across the study area. Being male (OR = 2.3; 95%CI 1.6—3.2), family history of seizures (OR = 4.0; 95%CI 2.0—8.1), a sibling with seizures (OR = 7.0; 95%CI 1.6—31.7), problems after delivery (OR = 5.9; 95%CI 1.2—24.6), and history of snoring (OR = 6.5; 95%CI 4.5—9.5) were significantly associated with ACE. For children, their mother's exposure to some formal schooling was protective (OR = 0.30; 95%CI 0.11—0.84) after controlling for age and sex. Human immunodeficiency virus was not found to be associated with ACE.
Conclusions: ACE is less frequent in this part of rural South Africa than other parts of sub-Saharan Africa. Improving obstetric services could prevent epilepsy. The relationship between snoring and ACE requires further investigation, as does the relative contribution of genetic and environmental factors to examine the increased risk in those with a family history of epilepsy.
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Introduction

Epilepsy is one of the most common neurological disorders in the world, affecting about 69 million people worldwide, with 90 percent living in low- and middle-income countries (LMICs) (Ngugi et al., 2010). It contributes nearly one percent to the global burden of disease (Murray et al., 2012), and 20 percent of the global burden of epilepsy is in Africa (World Health Organization, 2004).

While these figures suggest a large burden of epilepsy in Africa, they are derived from a limited number of studies that employ different case definitions and methodologies. Studies suggest that utilizing hospital records in LMICs to detect epilepsy under-estimates the prevalence by at least 80 percent due to limited health care utilization by people with epilepsy (PWE) in these settings (Osuntokun et al., 1987). Thus, population-based surveys are frequently used to estimate prevalence, though not without limitations, including the absence of well-demarcated populations and vital statistics registries. This limitation, coupled with the lack of trained medical personnel available to make the diagnosis of epilepsy, makes estimating the burden of epilepsy in sub-Saharan Africa unusually challenging.

A recent systematic review and meta-analysis highlighted the significant variation in the prevalence of epilepsy between high-income countries and LMICs, with a higher prevalence in LMICs, especially in rural settings (Ngugi et al., 2010). The authors suggest that study size and the economic development level of the study country largely explain the heterogeneity, although increases in obstetric injury, head injuries, and infections and infestations of the central nervous system (CNS) (Newton & Garcia, 2012), such as toxoplasmosis and toxocara (Wagner & Newton, 2009), malaria (Carter et al., 2004) and human immunodeficiency virus (HIV) are thought to contribute (Ngugi et al., 2010), but there is little data from South Africa where the prevalence of HIV is very high.

As part of a multi-centre study on the epidemiology of epilepsy in demographic sites (SEEDS) (Ngugi et al., 2013), we conducted a three-stage, population-based survey and a case-control study to determine the prevalence of and risk factors for active convulsive epilepsy (ACE) in rural South Africa. In particular, we were interested in examining the risk factors for ACE in a non-malaria endemic area, particularly HIV since it has a high prevalence in South Africa.

Methodology

Population and study area

The study was conducted in the rural Agincourt health sub-district, in which the Agincourt health and socio-demographic surveillance system (HDSS) operates and is located 500 kilometers northeast of Johannesburg (Fig. 1). The Agincourt HDSS was established in 1992 as a research platform to inform health and development policy through evidence-based research (Kahn et al., 2012). The population has been enumerated through an annual census update, following baseline measurement in 1992 and captures vital statistics including births, deaths, and in- and out-migrations.

In 2008, the population was 83,121 individuals in 15,841 households and 25 villages on 420 km^2 of semi-arid scrubland. The site forms part of a former *bantustan*, or ethnic 'homeland' implemented during the Apartheid era. The population is mainly Xi-Tsonga speaking, with one-third (32.8%) originally from Mozambique.

The leading causes of death ascertained through the Agincourt HDSS are HIV/AIDS, cardiovascular disease and trauma (road traffic accidents, assaults) (Tollman et al., 2008). Six government clinics, one larger government health centre, and one public-private community health centre, with its main focus being HIV and tuberculosis, provide primary health care services for the population. Referrals are to three government district hospitals located 25 to 55 km from the sub-district.

Ethics

Ethical clearance for the study was received from the Human Research Ethics Committee of the University of the Witwatersrand, Johannesburg, South Africa (Clearance number: M080455) and the Mpumalanga Province Department of

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