Global campaign against epilepsy: assessment of a demonstration project in rural China

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Objective The Global Campaign Against Epilepsy demonstration project in rural China aimed: to reduce the treatment gap and morbidity of people with epilepsy by using community-level interventions; to train and educate health professionals; to dispel stigma; to identify potential for prevention and to develop models of integration of epilepsy control into the local health systems. We report the overall results of the demonstration project, focusing on the prevalence and the change in the treatment gap of epilepsy after an intervention.

Methods Door-to-door epidemiological surveys were carried out before, and 6 months after the end of, an intervention project for epilepsy in rural settings in five provinces of China. The intervention consisted of a treatment programme available to patients without prior appropriate treatment and a public health educational programme about epilepsy. The sampled population in the second survey was 51 644 people.

Findings In the second survey, epilepsy was confirmed in 320 people, yielding a lifetime prevalence of 6.2/1000 and a prevalence of active epilepsy of 4.5/1000. The lifetime prevalence and prevalence of active epilepsy in the first survey were 7.0/1000 and 4.6/1000, respectively. The treatment gap of active epilepsy in the second survey was 49.8%, 12.8 percentage points lower than that of the first survey (62.6%).

Conclusion The results of this study suggest that the intervention measures used were possibly effective and evidently feasible in rural China, contributing to a decrease in the treatment gap of epilepsy.

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Une traduction en français de ce résumé figure à la fin de l'article. *Al final del artículo se facilita una traducción al español.* الترجمة العربية لهذه الخلاصة في نهاية النص الكامل لهذه المقالة.

Introduction

Epilepsy is the most common serious neurological disorder and affects around 50 million people worldwide. The majority of people with epilepsy have a good prognosis if they receive appropriate treatment.[1,2] In resource-poor countries, however, lack of knowledge about epilepsy, inadequate medical resources and scarce supplies of antiepileptic drugs (AEDs) all work against the provision of appropriate treatment. Worldwide, 60–90% of people with epilepsy receive no treatment or are inadequately treated.[3,4]

In cooperation with the International League against Epilepsy (ILAE) and the International Bureau for Epilepsy (IBE), WHO launched the Global Campaign Against Epilepsy[5] in 1997 in an attempt to bring epilepsy "out of the shadows" and to improve the treatment of people with epilepsy in resource-poor countries. Demonstration projects were established to achieve the campaign's goals. Their five objectives were: (i) to reduce the treatment gap and morbidity of people with epilepsy using community level interventions; (ii) to train and educate health professionals; (iii) to dispel stigma; (iv) to identify potential for prevention and (v) to develop models integrating epilepsy control into the health systems of participating countries.[6] One such demonstration project, under the auspices of WHO and the Ministry of Health in China, was implemented in rural areas in six non-contiguous provinces in China. The project included two epidemiological surveys, conducted before and

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after a treatment intervention trial,[7] and an educational programme.[8] The first survey[9] and treatment intervention trial[7] have been previously published. Here we present an overview of the whole project as well as the results of the second survey.

Method

First epidemiological survey

A door-to-door survey was carried out in five provinces (Heilongjiang, Ningxia, Henan, Shanxi and Jiangsu) in 2000[9] and at a later date in Shanghai. The communities studied in this survey were selected by random cluster sampling based on Chinese census units within the intervention areas in the provinces. Participating physicians and health workers, who were trained by a team from the Beijing Neurosurgical Institute to use a standardized technique, screened 55 616 people (94.6% of the population of the census units included in the study) using questionnaires with a specificity of 78.5% and a sensitivity of 100%. Any person with a positive response to any of the questions was seen by a supervising neurologist to confirm or refute the diagnosis. The lifetime prevalence, prevalence of active epilepsy and treatment gap were calculated.

Interventions

The educational programme and treatment intervention[7] ran in parallel and covered eight counties from the same six provinces. The total population of all eight counties was more than 3 million.[7] Prior to these programmes, most primary-care physicians in the area, including all those involved in the treatment intervention, were trained in the diagnosis and management of epilepsy. After the first epidemiological survey was completed, an educational programme about epilepsy was introduced throughout the area. This programme covered the intervention areas within the six provinces via several media channels, such as television and newspapers, and aimed to show the general community that epilepsy is a treatable disorder (Table 1). Lectures and group discussions for patients and their families were arranged during this time, and community leaders and teachers were also presented with information about epilepsy, its causes and its treatment. Again, the aim was to emphasize that epilepsy is treatable. Patients were encouraged by the media and by community leaders to come for free diagnostic assessment and management when appropriate. As a result of the training of most physicians in the area, people with suspected epilepsy could be treated in the epilepsy clinics running the treatment intervention or in other epilepsy clinics.

Subject recruitment to assess the efficacy of treatment intervention commenced in December 2001 and this study continued until the end of June 2004. Details of the treatment intervention have been reported previously.[7] Briefly, free treatment with phenobarbital was offered at clinics held at local health centres and patients were followed up by primary-care physicians who had received basic training in the diagnosis and management of epilepsy.[7] Treatment was offered to those identified from the first survey and to those already known to local primary-care physicians, as well as to any who presented to the clinics as a result of community awareness programmes or by the suggestion of community leaders or teachers. Patients were eligible to participate in the treatment intervention trial if they were aged more than 2 years and had convulsive forms of epilepsy, had had at least two convulsive seizures in the previous 12 months, and were either untreated or on irregular treatment. Eligible patients were treated with phenobarbital monotherapy and were followed up regularly to monitor treatment efficacy and adverse events. Dosage of phenobarbital was adjusted as clinically indicated. A total of 2455 patients were included in the treatment intervention trial.[7]

Second epidemiological survey

The second survey was carried out between September and December 2004 after completion of the interventions to see whether the treatment gap had changed. To avoid reporting bias, a census unit adjacent to the original unit was selected from within each intervention area in the second survey. The estimated total sample population in 2004 was 53 796, and 51 644 (96.0%) of these individuals were surveyed.

The screening questionnaire and methodology used in 2004 were the same as in the 2000 survey.[9] After completion of the questionnaires, neurologists visited each area and checked the history of each person who had a positive response to any of the questions to determine the final diagnosis.

The Institutional Ethics Committee of the Beijing Neurosurgical Institute scrutinized the protocol for the intervention and provided full ethical approval. All aspects of the study were monitored and supervised by an international steering committee.

The following definitions were used in both the first and second surveys:

Active epilepsy: Anyone who had suffered two or more unprovoked seizures in the 12 months immediately preceding identification was defined as having active epilepsy.

Untreated epilepsy: Any patient with active epilepsy who had not received appropriate AED treatment in the week preceding identification was defined as having untreated epilepsy.

Appropriate treatment: Appropriate treatment of active epilepsy included diagnosis and treatment of underlying causes, as well as treatment of recurrent seizures according to international standards using AEDs and surgery where feasible.

Treatment gap: This was the difference between the number of people with active epilepsy and the number whose seizures were being appropriately treated in a given population at a given point in time, expressed as a percentage.

Statistical analysis

Analysis was performed using Epi Info, version 2.0 (CDC, Atlanta, GA, United States of America) and SPSS version 10.0 (SPSS Inc., Chicago, IL, USA).

Results

The sample characteristics for the two surveys are shown in Table 2. The results of the epidemiological surveys for Shanghai are not presented here as the first survey was carried out later in that province than in the other five.

Prevalence

The first survey found a lifetime prevalence of 7.0/1000 population. From a population of 51 644, the second survey identified 320 people with a definitive history of epilepsy, yielding a minimum lifetime prevalence rate of 6.2/1000 (95% confidence interval, CI: 5.5 to 6.9). While this is slightly lower than that of the previous survey, the difference (0.8/1000, 95% CI: −0.2 to 1.7) is not statistically significant. The lifetime prevalence across the different

provinces is shown in Table 3. As found in the previous study, the prevalence was lowest in Henan, while it was higher in Heilongjiang and Ningxia. The numbers of men and women with epilepsy were similar.

Seventy two percent (231) of 320 patients with epilepsy had had seizures in the past year. The prevalence of active epilepsy was 4.5/1000, which is similar to that found in the survey in 2000 (4.6/1000). Table 4 shows the prevalence of active epilepsy in both surveys.

Treatment history in those with a lifetime history of epilepsy

There was no significant difference between the two surveys in the proportion of people who reported receiving no AEDs. In the 2000 survey, 157 of 387 patients (40.6%) with a lifetime history of seizures reported receiving no AEDs compared with 117 of 320 (36.6%) in the 2004 survey (a difference of 4 percentage points, 95% CI: –3.2 to 11.2). However, more people in the 2000 survey were taking irregular treatment. Thus, only 96 of 387 (24.8%) with a lifetime history of epilepsy in the 2000 survey had taken reasonable, regular doses of AEDs in the week before the survey, compared with 125 of 320 (39.1%) with a lifetime history of epilepsy in the 2004 survey (a difference of 14.3%, 95% CI: 7.4 to 21.1).

Treatment gap in those with active epilepsy

In the original survey, only 96 (37.4%) of 257 patients with active epilepsy had received treatment in the week before the survey. In the second survey, 116 (50.2%) of 231 patients with active epilepsy received anti-epileptic treatment in the week before the survey. The treatment gap thus decreased from 62.6% to 49.8% (a difference of 12.8 percentage points, 95% CI: 4.0 to 21.4).

Table 1. **Educational activities about epilepsy for the general public and patients and their families carried out during an intervention trial in five rural provinces of China**

Province	No. of newspaper articles	No. of television programmes	No. of copies of printed materials distributed
Heilongjiang	18	12	2 600
Ningxia	12	1	3 000
Henan	2	3	35 000
Shanxi	7	8	20 000
Jiangsu	3	3	2 500
Total	42	27	63 100

Discussion

In the intervention study, 2455 people over 2 years old with a confirmed diagnosis of convulsive epilepsy were treated. Based on the total population of the sample area and the prevalence of lifetime and active epilepsy found in the first survey, we would expect over 20 000 people to have a lifetime history of epilepsy, with about two-thirds of them having active epilepsy. Thus, it is clear that only a minority of the people with epilepsy in the area were treated as part of the intervention study.

Neither the prevalence of active epilepsy nor that of lifetime epilepsy was uniform over the five provinces; prevalence was lower in Henan and relatively higher in Heilongjiang and Ningxia. The prevalence of active epilepsy has also shown differences in several African countries. The overall prevalence of active epilepsy was 10.2/1,000 in a district of the United Republic of Tanzania, but the prevalence among the 11 villages varied, ranging from 5.1/1000 to 37.1/1000.[10] An epilepsy prevalence of between 7.4/1000 (in urban areas) and 14.8/1000 (in rural areas) in southern Pakistan has been reported.[11] It is of interest that the overall prevalence of epilepsy reported here is not very different from that reported from areas in the developed world.[12–14]

There are few reports on the treatment gap in epilepsy. In 1988 it was estimated that, in some resource-poor countries, 80–94% of patients with active epilepsy were not receiving anticonvulsant therapy.[15] In Pakistan, treatment status was very poor, with only 2% of rural and 27% of urban dwellers with epilepsy receiving AEDs.[11] Based on the number of individuals with epilepsy and the quantity of medication distributed in two cities of south-east Brazil, the treatment gap was estimated as 56% and 59%.[16] Fewer than 10% of people with epilepsy received continuous treatment in rural Gambia.[17]

The treatment gap, defined as the percentage of people with epilepsy who are not being appropriately treated, is the result of many medical, political, social, economic and cultural factors.[4] WHO estimates that approximately 90% of people with epilepsy in developing countries are not receiving appropriate treatment.

The results of the two surveys discussed here suggest that the treatment of patients with active epilepsy has improved in demonstration areas. Although the percentage of people with a history of epilepsy receiving no treatment was not significantly different between the two surveys, this may be because some patients had entered remission spontaneously and therefore did not require treatment. The treatment gap in those with active epilepsy decreased from 63% to 50%, a statistically significant difference. In addition, a greater proportion of patients were taking medication regularly. Within each area, the two community units surveyed before and after the implementation of the intervention trial and the associated education programme were similar in all major sociodemographic parameters.

Table 2. **Sample characteristics for surveys carried out in five provinces of rural China before and after epilepsy treatment and educational interventions**

Characteristic	2000 survey		2004 survey	
Sampling population	58 806		53 796	
Surveyed	55 616	94.6%	51 644	96.0%
Screened positive	869		653	
Lifetime history of epilepsy	387	7.0/1000 (95% CI: 6.3–7.7)	320	6.2/1000 (95% CI: 5.5–6.9)
Active epilepsy	257	4.6/1000 (95% CI: 4.1–5.2)	231	4.5/1000 (95% CI: 3.9–5.0)

CI, confidence interval.

Table 3. **Lifetime prevalence of epilepsy in five provinces of rural China before and after epilepsy treatment and educational interventions**

Province	2000 survey				2004 survey			
	Sampling population	No. of patients	Prevalence per 1000	95% CI	Sampling population	No. of patients	Prevalence per 1000	95% CI
Heilongjiang	10 151	82	8.1	6.4–9.8	11 158	77	6.9	5.4–8.4
Ningxia	11 622	99	8.5	6.8–10.1	10 049	69	6.9	5.3–8.5
Henan	12 452	59	4.7	3.5–5.9	10 017	47	4.7	3.4–6.0
Shanxi	10 273	60	5.8	4.3–7.3	10 285	61	5.9	4.4–7.4
Jiangsu	11 118	87	7.8	6.2–9.4	10 135	66	6.5	4.9–8.1
Total	55 616	387	7.0	6.3–7.7	51 644	320	6.2	5.5–6.9

CI, confidence interval.

These results render further support to the demonstration project as an effective and feasible method of treatment for active epilepsy in rural China.

The aim of AED treatment of epilepsy is to decrease the number of seizures experienced and to make as many people seizure-free as possible with minimal side-effects.[18,19] This should lead to a decrease in the prevalence of active epilepsy. It could be seen as disappointing that the prevalence of active epilepsy was not decreased after the intervention, but this needs to be understood in the context of the area in which the surveys were taken (which have variable prevalence) and the methods used in the intervention. The intervention protocol excluded patients less than 2 years old or having only non-convulsive forms of epilepsy (6% of patients identified in the first survey).[9] The diagnosis and treatment of epilepsy took place in the context of local, existing primary care, and many local medical personnel were given brief training in the diagnosis and treatment of epilepsy.[7] Phenobarbital was used as the first option AED as it is more affordable than most AEDs and has a broad spectrum of action. Thus, costs were low, and the methods used to reduce the treatment gap can be seen to be affordable as well as effective.

A reduction in the prevalence of active epilepsy can also be seen to be a crude primary outcome. More refined outcomes, such as decreased mortality and morbidity and increased quality of life for people with epilepsy, could not be measured in this study. The study was found to be worthwhile, however, as it improved local understanding of epilepsy, and increased the knowledge that something can be done about it. Many people benefited and may become more productive members of society.

The factors causing inadequate treatment of people with epilepsy are diverse. If people with epilepsy and their family members have no knowledge about its causes and treatment, this may influence health-seeking strategies and compliance. Thus, the reduction in treatment gap may, in part, be due to increased knowledge about epilepsy. Most people with epilepsy and their families in rural China are economically disadvantaged; the provision of free phenobarbital, introduced throughout the study areas after the completion of the intervention trial, may also have contributed to the reduced treatment gap. The lack of neurologists in rural areas was mitigated by the training of most primary-care physicians in the area.

The other difficulty faced by people with epilepsy is the stigma placed on them by the community. Studies in China suggest that people with epilepsy are generally withdrawn from society and feel isolated.[20] The attitudes towards people with epilepsy are mostly negative; about half of the population believes that people with epilepsy should not be employed. Epilepsy is often not seen as a "normal" medical disease but as a mental disorder equivalent to insanity. It is therefore very important to promote public awareness about epilepsy and to educate the community. In the demonstration project education programmes using several different media were conducted to enhance people's understanding of epilepsy. About 70% of patients with epilepsy in the second survey received educational books or attended counselling.

We do not yet know whether the benefit of the intervention programme will continue in the longer term and whether it will, for example, reduce the increased premature mortality in people with epilepsy seen in the study areas.[21] In these areas epilepsy has a large impact on individuals with the disease and their families[22]; it remains to be determined whether this intervention reduces this burden.

Conclusion

The results of this study suggest that the intervention measures used were effective and feasible in rural China, contributing to a decrease of the treatment gap of epilepsy in the demonstration areas. Whether it will have an impact in the long term remains to

Table 4. **Prevalence of active epilepsy and care identified in five provinces of rural China before and after epilepsy treatment and educational interventions**

Province	2000 survey		2004 survey	
	Cases identified	Prevalence per 1000	Cases identified	Prevalence per 1000
Heilongjiang	49	4.8	57	5.1
Ningxia	78	6.7	52	5.2
Henan	43	3.5	29	2.9
Shanxi	34	3.3	46	4.5
Jiangsu	53	4.8	47	4.6
Total	257	4.6	231	4.5

be seen. Future studies should explore the underlying factors contributing to the treatment gap, behaviours such as irregular medication-taking, and the elements in the intervention measures that led to improvements in these aspects so that such interventions can be implemented in similar settings of other resource-poor countries. ■

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Competing interests: Josemir W Sander has received honoraria, consultancy fees, grants and travel grants from various pharmaceutical companies including Novartis, Pfizer, UCB, Eisai, Schwarz Pharma, Janssen-Cilag, Sanofi-Aventis and GSK. The National Society for Epilepsy endows his current position. He has been a member of the Management Committee of the International League against Epilepsy and the Executive Committee of the International Bureau for Epilepsy. He is currently a council member of the British chapter of the International League against Epilepsy and of Epilepsy Action (IBE member). Patrick Kwan has received honoraria, consultancy fees, research and travel grants from Pfizer, UCB and Janssen-Cilag. He is currently the treasurer of the Commission of Asian and Oceanian Affairs of the International League Against Epilepsy. The other authors have no competing interests.

Résumé

Campagne mondiale contre l'épilepsie : évaluation d'un projet de démonstration en Chine rurale

Objectif Le projet de démonstration en Chine rurale de la Campagne mondiale contre l'épilepsie avait pour objectifs : de réduire l'écart de prise en charge thérapeutique et de morbidité entre les épileptiques faisant appel à des interventions communautaires ; de former et d'éduquer les professionnels de santé ; de dissiper la stigmatisation ; d'identifier les possibilités de prévention et de développement de modèles d'intégration de la lutte contre l'épilepsie dans les systèmes de santé locaux. Nous rendons compte des résultats globaux de ce projet de démonstration, en nous concentrant sur la prévalence et l'évolution du déficit de traitement de l'épilepsie après une intervention.

Méthodes Des enquêtes épidémiologiques «porte à porte» ont été effectuées avant et 6 mois après un projet d'intervention concernant l'épilepsie dans des zones rurales de cinq provinces chinoises. L'intervention consistait en un programme de traitement proposé aux patients n'ayant bénéficié auparavant d'aucun traitement approprié, et en un programme d'éducation en santé publique concernant l'épilepsie. La population échantillonnée dans la seconde enquête comprenait 51 644 personnes.

Résultats Dans la seconde enquête, l'épilepsie a été confirmée chez 320 personnes, ce qui donne une prévalence sur la durée de vie de 6,2/1000 et une prévalence de l'épilepsie active de 4,5/1000. Dans la première enquête, la prévalence sur la durée de vie et la prévalence de l'épilepsie active étaient respectivement de 7,0/1000 et de 4,6/1000. Le déficit de traitement de l'épilepsie active dans la seconde enquête était de 49,8 %, soit 12,8 % de moins que dans la première enquête (62,6 %).

Conclusion Les résultats de cette étude laissent à penser que les mesures d'intervention utilisées pouvaient être efficaces et étaient à l'évidence applicables en Chine rurale, où elles ont contribué à une diminution du déficit de traitement de l'épilepsie.

Resumen

Campaña mundial contra la epilepsia: evaluación de un proyecto piloto en la China rural

Objetivo El proyecto piloto de la Campaña Mundial Contra la Epilepsia en la China rural se propuso los siguientes objetivos: reducir la brecha de tratamiento y la morbilidad de las personas con epilepsia aplicando intervenciones comunitarias; capacitar y educar a los profesionales de la salud; combatir la estigmatización; identificar las posibilidades de prevención, y desarrollar modelos de integración del control de la epilepsia en los sistemas de salud locales. Se informa aquí de los resultados globales del proyecto piloto, haciendo hincapié en la prevalencia y en la variación de la brecha de tratamiento de la epilepsia después de una intervención.

Métodos Se llevaron a cabo encuestas epidemiológicas domiciliarias antes de iniciar y a los 6 meses de finalizar un proyecto de intervención contra la epilepsia en entornos rurales de cinco provincias de China. La intervención consistió en un programa terapéutico ofrecido a los pacientes sin tratamiento previo apropiado y un programa de educación de salud pública sobre la epilepsia. La población muestreada en la segunda encuesta fue de 51 644 personas.

Resultados En la segunda encuesta se confirmó la existencia de epilepsia en 320 personas, lo que indica una prevalencia durante toda la vida de 6,2/1000 y una prevalencia de epilepsia activa de 4,5/1000. La prevalencia durante toda la vida y la prevalencia de epilepsia activa en la primera encuesta fueron de 7,0/1000 y 4,6/1000, respectivamente. La brecha terapéutica en el caso de la epilepsia activa en la segunda encuesta fue del 49,8%, un 12,8% menos que en la primera encuesta (62,6%).

Conclusión Los resultados de este estudio parecen indicar que las medidas de intervención aplicadas fueron posiblemente eficaces y sin duda factibles en la China rural, reduciéndose en consecuencia la brecha de tratamiento de la epilepsia.

ملخص

الحملة العالمية ضد الصرع: تقييم مشروع إرشادي في أرياف الصين

الغرض: استهدف المشروع الإرشادي للحملة العالمية ضد الصرع، المنفَّذ في أرياف الصين: تقليص الفجوة في معالجة المصابين بالمرض والحد من الوفيات الناجمة عنه من خلال مداخلات مجتمعية؛ وتدريب وتثقيف المهنيين الصحيين؛ والقضاء على الوصمة؛ وتحديد إمكانية الوقاية؛ ووضع نماذج لإدماج أنشطة مكافحة الصرع في النُظُم الصحية المحلية. ويورد الباحثون في هذه الدراسة النتائج العامة للمشروع الإرشادي، مع التركيز على معدل انتشار الصرع وعلى التغيُّر في فجوة معالجة المرض بعد المداخلة.

الطريقة: أجريت دراسات مسح وبائي من منزل إلى منزل قبل وبعد 6 أشهر من تنفيذ مشروع لمكافحة الصرع في المناطق الريفية لخمس مقاطعات في الصين. وشمل التدخل برنامجاً لمعالجة المرضى الذين لم يسبق لهم الحصول على المعالجة المناسبة، وبرنامجاً صحياً للتثقيف بالصرع. وبلغ عدد أفراد العينة السكانية في المسح الثاني 51,644 شخصاً.

النتائج: أكد المسح الثاني وجود العدوى لدى 320 شخصاً، مما يعني أن معدل الانتشار مدى الحياة يبلغ 6.2 لكل ألف شخص، وأن معدل انتشار الصرع النشط يبلغ 4.5 لكل ألف شخص. وفي المسح الأول، بلغ معدل الانتشار مدى الحياة 7 لكل 1000 شخص، ومعدل انتشار الصرع النشط 4.6 لكل 1000 شخص. وفي المسح الثاني، بلغت فجوة المعالجة للصرع النشط 49.8%، وهي نسبة تقل بمقدار 12.8% عن مثيلتها في المسح الأول (62.6%).

الاستنتاج: تشير نتائج هذه الدراسة إلى أن تدابير التدخل المتخذة قد تكون فعالة وأنها مجدية في أرياف الصين، وتسهم في تقليص الفجوة في معالجة الصرع.

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