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Dietary aflatoxin exposure and impaired growth in young children from Benin and Togo: cross sectional study

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What is already known on this topic

Delay in presentation and assessment of patients with suspected stroke prevents the possible benefits from thrombolysis being achieved

Little is known about the presentation and early management of patients with acute stroke in the United Kingdom

What this study adds

Most patients with suspected stroke in the United Kingdom arrive at hospital within six hours of the onset of symptoms

Not all patients are evaluated by a senior doctor within three hours of arrival at hospital and most do not undergo computed tomography

The potential for thrombolysis in patients with acute stroke can be improved significantly by greater use of emergency services and expediting evaluation and investigations by doctors

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Dietary aflatoxin exposure and impaired growth in young children from Benin and Togo: cross sectional study

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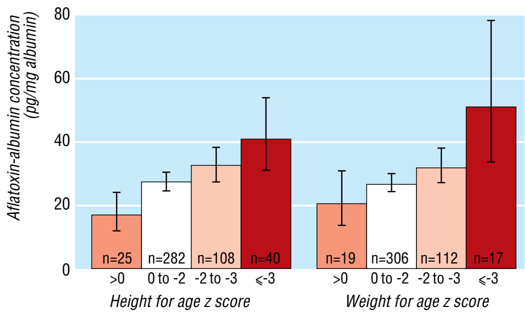
Fetal and early childhood environment, including the nutritional status of the pregnant mother and the infant, are considered critical for growth and risk of disease in later life.[1] Many people in developing countries are not only malnourished but also chronically exposed to high levels of toxic fungal metabolites (mycotoxins). One family of mycotoxins, the aflatoxins, are carcinogenic and immunotoxic and cause growth retardation in animals.[2] Aflatoxins contaminate staple foods in West Africa, particularly maize and groundnuts, as a result of hot, humid storage conditions that promote fungal growth. High exposure to aflatoxins occurs throughout childhood in the region,[3 4] suggesting that growth and development could be critically affected. We assessed exposure to aflatoxins in relation to anthropometric measures in children in Benin and Togo.

Methods and results

We studied 480 children (aged 9 months to 5 years) from 16 villages in four geographic zones (four in each zone): Sudan savannah, north Guinea savannah, south Guinea savannah, and coastal savannah. The Ministries for Health in Benin and Togo gave ethical approval, and parents gave informed consent. We determined



Concentrations of aflatoxin-albumin adduct categorised into four groups for height for age and weight for age z scores on the basis of the WHO classification of malnutrition (z score ≤2) and severe malnutrition (≤3). Geometric mean adduct concentrations are shown, with 95% confidence intervals, adjusted for weaning status, agro-ecological zone, and socioeconomic status. Height for age and weight for age z scores were significantly associated with aflatoxin-albumin concentration (trend test: F=15.19, P=0.0001, r^2 =0.3766; and F=8.48, P=0.0038, r^2 =0.3680).

weight for age, height for age, and weight for height z scores, according to the median value of a World Health Organization reference population. A z score ≤2 is classified as malnutrition, and ≤3 represents severe malnutrition. We also determined weaning status and the socioeconomic status of the mother and family. We assessed aflatoxin exposure over the previous two to three months by measuring aflatoxin bound to albumin in blood.[3]

We detected aflatoxin-albumin adducts in 475/479 (99%) samples (one sample missing), with a geometric mean concentration of 32.8 (range 5-1064) pg/mg albumin. Aflatoxin-albumin concentration increased with age up to 3 years, after which it reached a plateau. In the 302 children aged 3 years or under, the mean concentration was 2.5-fold higher in fully weaned children (45.6 pg/mg; 95% confidence interval 38.8 to 53.7) than in those still partially breast fed (18.0 pg/mg; 15.2 to 21.3). In a multivariable model adjusting for age, sex, socioeconomic status, and agro-ecological zone, weaning status was significantly associated with aflatoxin-albumin concentration (P=0.0001).

Prevalence of malnutrition was 33% for stunting (height for age z score ≤2), 29% for being underweight (weight for age z score ≤2), and 6% for wasting (weight for height z score ≤2). Children with stunting or who were underweight had 30-40% higher mean aflatoxin-albumin concentrations. After adjustment as above, the negative correlation between individual aflatoxin-albumin concentration and each of the three growth parameters was highly significant (P=0.001 for height for age, P=0.005 for weight for age, and P=0.047 for weight for height). In a categorical analysis, the association with aflatoxin-albumin concentration was again significant, with clear dose-response relations with height for age and weight for age z scores (figure).

Comment

This study reveals a striking association between exposure to aflatoxin in children and both stunting (a reflection of chronic malnutrition) and being underweight (an indicator of acute malnutrition). In West Africa, people are chronically exposed to high levels of aflatoxins starting in utero and continuing throughout life.[4] In this study, children still partially breast fed had lower exposure, almost certainly reflecting lower toxin levels in milk than in weaning and family foods. Thus growth faltering occurs at a time of change to solid foods, when there is co-exposure to aflatoxin and a plethora of infectious hazards (for example, malaria, diarrhoea, respiratory infections). Whether the association between aflatoxin exposure and impaired growth is a direct result of aflatoxin toxicity or reflects consumption of fungus affected food of poor nutritional quality cannot be confirmed from the cross sectional design. However, these observations emphasise the need to investigate this question and to develop strategies to reduce exposure to aflatoxin, possibly involving interventions targeted at the post-weaning period in African children.[5]

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private practice. Top merit awards are awarded for national and international standing within the specialty and can more than double a consultant's basic salary. Any time that a hospital doctor devotes to computing does not lead to increased income potential.

Conclusions

Over many years, general practice computing has prospered, whereas hospital clinical computing has not. Differences in leadership and economic incentives partially explain this. In general practice the government and the profession worked together to remove barriers and provide incentives to computerisation. In hospitals the opposite happened. Changes are needed to provide professional leadership and economic incentives in both primary and secondary sectors. An early step would be to establish united stakeholder organisations for clinical users and information technology professionals in health care, covering all aspects of healthcare computing

The NHS is now planning to deploy integrated patient record systems across both primary and secondary care.[20] The examples of Kaiser Permanente and the Veterans Administration suggest that such systems may play a critical part in improving effectiveness and efficiency.[21] However, such a project faces several technical obstacles, mainly associated with scalability. It is much easier to computerise small general practices than large complex hospitals, let alone provide integrated services across an organisation as large as the NHS. These technical issues—which include patient record architecture, terminology, interoperability standards, security, and developments in computer technology—are the subject of my second article.

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Competing interests: I have participated in many of the events described and have provided consultancy services to various NHS organisations

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Corrections and clarifications

UK senior doctors' career destinations, job satisfaction, and future intentions: questionnaire survey
A lapse in concentration as we processed this paper by Jean M Davidson and colleagues (28 September, pp 685-6) led to the omission of an authors' amendment at proof stage. The paragraph that starts, "We asked respondents to score five statements about job satisfaction" was misleading. It should have read: "We asked respondents to score each of five statements about job satisfaction on a five point ordered scale from 'strongly agree' to 'strongly disagree.' The statements were 'I find enjoyment in my current post'; 'I am doing interesting and challenging work'; 'I feel dissatisfied in my current post'; 'Most days I am enthusiastic about my work'; and 'I am often bored with my work.'[1] We calculated a job satisfaction score for each respondent over all five statements, by assigning a value of 1 to 5 for the responses, from the least to most positive answer, and totalling them: 20 or more represented a positive response, on average, to all statements, and we suggest that this shows a high level of satisfaction."

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An error crept into this paper by Y Y Gong and colleagues (6 July, pp 20-1). Unfortunately, < -2 and < -3 (referring to z scores) were inadvertently replaced with ≤ 2 and ≤ 3 in both the text (methods and results section) and the figure caption. The correct symbols appeared in the figure.

Mental health campaigners cancel march because of fears of backlash
In this news article by Zosia Kmietowicz (14 September, p 562), we wrongly referred to Rampton as a prison. It is of course a high security hospital.