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Biomarkers of enteropathy in infants and children with severe acute malnutrition in Nigeria

Submission date
11/04/2016

Recruitment status
No longer recruiting

Registration date
29/04/2016

Overall study status
Completed

Last Edited
22/11/2019

Condition category
Nutritional, Metabolic, Endocrine

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
Severe acute malnutrition (SAM) is defined by the World Health Organisation (WHO) as a very low weight for height, an appearance of wasting away (wasting), or by the presence of nutritional oedema (swelling caused by a build-up of excess fluid in the body). It may be found in as many as 1 in 4 children under 5 years of age who are admitted to health facilities in poorer countries, and a recent analysis showed that malnutrition was present in half of all children admitted with severe disease and half of all in-patient deaths in young children in a Kenyan district hospital. Several studies have reported that children with SAM have an enteropathy (disease of the intestines), caused by inflammation (swelling) in the small intestine. This stops food from being digested properly and nutrients being absorbed from food, and can even mean that bacteria may be able to cross the lining of the gut to cause infection in the body. It has been found that this enteropathy continues even after children have responded well to re-feeding. It is therefore very important to identify the body's natural chemical indicators (biomarkers) of enteropathy in order to understand its significance and also whether or not it improves with different treatments. The aim of this study is to investigate the biomarkers related to enteropathy that occurs in children with SAM.

Who can participate?
Children aged 6-59 months with SAM and non-malnourished children of the same age.

What does the study involve?
At the start of the study, information about the participants is collected from the children's health record and their caregiver. This involves information about their health and characteristics (i.e. age, gender, ethnicity, area of residence) as well as having a physical examination and having a sample of blood taken. The first available stool sample is then collected in a sterile container by a member of the clinical team. In the laboratory, the stool and blood samples from the children with SAM are tested for chemical markers and then the results are compared to the children without SAM. The children with SAM are then followed up 3, 6 and 12 months later, when further stool samples are collected.

What are the possible benefits and risks of participating?
There are no direct benefits to participants taking part in the study. There is a small risk of bleeding, pain or bruising when blood samples are collected.

Where is the study run from?
Federal Medical Centre, Gusau (Nigeria)

When is the study starting and how long is it expected to run for?
June 2010 to February 2016

Who is funding the study?
Yakult (UK)

Who is the main contact?
Professor Stephen Allen
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Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
UI/EC/11/0067

Study information

Scientific Title
Non-invasive biomarkers of enteropathy in infants and children with severe acute malnutrition: A pilot study

Study objectives

The aim of this study is to investigate biomarkers of the enteropathy that occurs in children with severe acute malnutrition (SAM).

Ethics approval required
Old ethics approval format

Ethics approval(s)
Joint Ethical Review Committees of the University of Ibadan/University College Hospital, 03/06/2011, ref: UI/EC/11/0067

Study design
Case-control study

Primary study design
Observational

Study type(s)
Other

Health condition(s) or problem(s) studied
Severe acute malnutrition (SAM)

Interventions
For the participants, demographic and clinical data and a blood sample will be collected at recruitment. Demographic and clinical data will be collected onto standard forms and include information obtained from the child's health record and from the parents/guardians. Demographic data will include the child's age, sex, ethnicity and area of residence (urban/rural) and number of siblings. Clinical details will include feeding history, anthropometry (length/height, weight, mid-upper arm circumference), signs of malnutrition (pedal oedema, dermatitis, thin/sparse hair / easy pluck ability, angular stomatitis, glossitis, oral aphthous ulceration, Bitot's spots, apathy, abdominal distension) and hydration status. The first available stool following recruitment will be collected by a member of the clinical team into a sterile container.

Biomarkers of enteropathy will be assessed using several laboratory methods including an untargeted multi-platform metabolomics approach using gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry applied to stool and plasma samples. GC-MS will also be performed on the headspace gases from stool samples. The composition of the stool microbiota will be assessed by 16S rRNA gene sequencing. Intestinal inflammation will be assessed in stool samples by measurement of calprotectin and lactoferrin by ELISA.

Children with SAM are followed up daily until discharge, when they attend the feeding clinic and at 3 and 6 months. Repeat stool analyses will be done weekly during admission and at the 3 and 6 month follow-ups, as well as nutritional status and presence/absence of diarrhoea in a final follow-up at 1 year.

Intervention Type
Other

Primary outcome(s)

1. Untargeted multi-platform metabolomics (gas chromatography-mass spectrometry and liquid chromatography-mass spectrometry) in stool (first available sample) and plasma sample (at recruitment)
2. Faecal volatile organic metabolites in headspace gas from first available stool sample
3. Intesinal inflammation by measuring stool calprotectin and lactoferrin in first available stool sample

Key secondary outcome(s))
Stool microbiota composition is measured using 16S rRNA gene sequencing in the first available stool sample.

Completion date
29/02/2016

Eligibility

Key inclusion criteria
Patients:
Children aged 6 – 59 months admitted with SAM (WHZ <-3 or MUAC <11.5 cms and/or nutritional oedema)

Controls:
Non-malnourished children aged 6 – 59 months admitted to hospital or attending out-patient clinics (MUAC >12.5 cms or WHZ score ≥ -1 and no nutritional oedema)

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Child

Lower age limit
6 months

Upper age limit
59 months

Sex
All

Total final enrolment
58

Key exclusion criteria
Positive for HIV

Date of first enrolment
01/07/2012

Date of final enrolment
30/09/2012

Locations

Countries of recruitment
Nigeria

Study participating centre
Federal Medical Centre
Gusau
Nigeria
P.M.B. 1008

Sponsor information

Organisation
Swansea University

ROR
https://ror.org/053fq8t95

Funder(s)

Funder type
Industry

Funder Name
Yakult

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Data sharing statement to be made available at a later date

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	01/02/2017	22/11/2019	Yes	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes