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IJFNPH
5,1/2/3

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TAILORED FOOD RECIPES-TFR: EMPLOYING THE EUROPEAN PERSPECTIVE ON FUNCTIONAL FOOD SCIENCE (FUFOSE) TO PROMOTE EFFECTIVE DIETARY INTERVENTION IN AFRICA

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Abstract: *Purpose:* Because of increasing interest in the concept of “Functional Foods” and “Health Claims”, the European Union set up a European Commission Concerted Action on Functional Food Science in Europe (FUFOSE). The report takes the position that functional foods should be in the form of normal foods and they must demonstrate their effects in amounts that can normally be expected to be consumed in the diet.

Methodology: Currently, health concerns of communicable and non-communicable diseases have necessitated investigating into options for dietary interventions

International Journal of
Food, Nutrition & Public
Health
Vol. 5 No. 1/2/3, 2012

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including the role of tailored food recipes (*e.g. Amtewa meal*) in HIV/AIDS management. HIV infection increases energy requirements through increases in resting energy expenditure, reduced food intake, nutrient mal-absorption, negative nitrogen balance and metabolic alterations that lead to weight loss and wasting.

Findings: Preliminary evidence indicated that improving nutrition status with *Amtewa meal* might improve some HIV-related outcomes. This perhaps answers the urgent need for renewed focus on and use of resources for nutrition as a fundamental part of the comprehensive package of care at the country level.

Value: The expected outcome of this research will have direct effect on 90% of HIV infected subjects in West Africa *vis-à-vis* slowing down /eliminating the progression of HIV to AIDS.

Keywords: *Functional Food; Tailored Food Recipes; HIV; AIDS; Public Health; Nutrition; Dietary Intervention*

INTRODUCTION

Diet related diseases, including cardiovascular disease, cancer, osteoporosis, and degenerative changes of ageing are a major cause of morbidity and mortality throughout Europe. However, the European view of a function food states that a food can be said to be functional if it contains a component (whether or not a nutrient) that benefits one of a limited number of functions in the body in a targeted way that is relevant to either the state of well-being and health, or the reduction of the risk of a disease, or if it has a physiologic or psychologic effect beyond the traditional nutritional effect (Roberfroid, 2000).

The design and development of functional foods is a key issue as well as a scientific challenge, which should rely on the basic scientific knowledge relevant to target functions and their possible modulation by food component (Diplock et al. 1999). Where are the challenges and future opportunities for functional foods? (Madsen, 2007). The delivery of essential

macronutrients (i.e., kilocalories-generating carbohydrates, protein and fats) and micronutrients is key to the management of under nutrition (USAID, 2010).

Historically, there has been association between foods and health, but for functional foods to have a place in public health it will be necessary to optimise both the nutritional value *and* taste (Madsen, 2007). With increasing knowledge of human genetics tailored food recipes may play a role for the individual needs and predispositions. Also, emerging food technologies can potentially lead to increased safety, convenience, quality and nutritional value, but these new technologies will only be an asset if their application is transparent to the consumer.

Because of increasing interest in the concept of “Functional Foods” and “Health Claims”, the European Union set up a European Commission Concerted Action on Functional Food Science in Europe (FUFOSE). The programme was coordinated by the International Life Sciences Institute (ILSI) Europe and the aim was to develop and establish a science-based approach to the evidence needed to support the development of food products that can have a beneficial effect on an identified physiological function in the body, that can improve an individual’s state of health and well-being and/or reduce the risk of disease. The final document was published in the British Journal of Nutrition, 81(1):S1-S27. The report takes the position that functional foods should be in the form of normal foods and they must demonstrate their effects in amounts that can normally be expected to be consumed in the diet (EUFIC, 2006).

Currently, health concerns of communicable and non-communicable diseases have necessitated investigating into options for dietary interventions including the role of

tailored foods (e.g Amtewa meal) and how to communicate responsible health and wellness claims. The future of tailored food recipes will depend on continued advances in food science and developments of innovative technologies, facilitating regulatory milieu and improved consumer understanding of claims (Madsen, 2007). It is important to keep in mind that the consumer does not need to understand the complex scheme behind the appraisal of a food by using nutrient profiles (Madsen, 2007). However, consumer acceptability is essential for any TFR become successful and effective in such a way that their behavior is actually changed for the better.

JUSTIFICATION FOR TAILORED FOOD RECIPES IN HIV/ AIDS CARE

The number of people living with HIV worldwide has continued to rise, and more than 10 million people aged 15-24 are infected with HIV (UNAIDS, 2010).

About 95 per cent of people living with HIV reside in low-and middle-income countries and almost two thirds of them are in Sub-Saharan Africa (SSA). The latter remains the region most heavily affected by HIV/AIDS, accounting for 67% of all people living with HIV and 75% of AIDS deaths in 2007 (UNAIDS, 2008).

HIV/AIDS and under-nutrition form a symbiotic relationship and one increases the prevalence and severity of the other (Bijlsma, 2000; Yale University, 2007). Moreover, intervention programmes, which simply employ antiretroviral drugs, have been found to lack effectiveness particularly when the patient is under-nourished (FAO/WHO, 2002; Yale University, 2007; WHO, 2010).

Micronutrient deficiencies significantly contribute to

HIV progression to AIDS; deficiencies of essential vitamins (A, B-complex, C and E) and minerals (selenium and zinc), are common in People Living with HIV (PLWH) and these micronutrients are required by the immune system to combat infection (WHO, 2005; Barry, et al, 2007). Furthermore, deficiencies of antioxidants (vitamins and minerals) contribute to oxidative stress, a condition that may accelerate immune cell damage and increase the rate of HIV replication (USAIDS, 2004; Piwoz et al., 2004; Paul et al., 2007).

The effects of under-nutrition on the immune system are well documented and include decreases in CD4 T cells (*cells that produces a specific immunity to a particular antigen*), suppression of delayed hypersensitivity, and abnormal B-cell responses (USAIDS, 2004; Paul et al., 2007). Interestingly, the immune suppression caused by protein-energy malnutrition mechanism is similar in many ways to the effects of HIV infection (FANTA, 2004; USAIDS, 2004).

An earlier review by WHO (1988); Piwoz and Preble (2000); WHO, (2009); examined preliminary evidence that improving nutrition status may improve some HIV-related outcomes. HIV infection increases energy requirements through increases in resting energy expenditure (FAO/WHO, 2002; Piwoz, 2004), reduced food intake, nutrient mal-absorption, negative nitrogen balance and metabolic alterations that lead to weight loss and wasting. Asymptomatic HIV-positive individuals need 10% more energy (per day) than HIV-negative individuals of the same age and sex. The Energy needs of symptomatic individuals are 20 to 30% (per day) above normal (Piwoz, 2004; FANTA, 2004). Only few published reliable studies highlighted the use of macro and specific micronutrients in the intervention and management of HIV/AIDS in Nigeria (Piwoz, 2004; Amuna et al, 2004; Zotor and Amuna, 2008). (Figure 1)

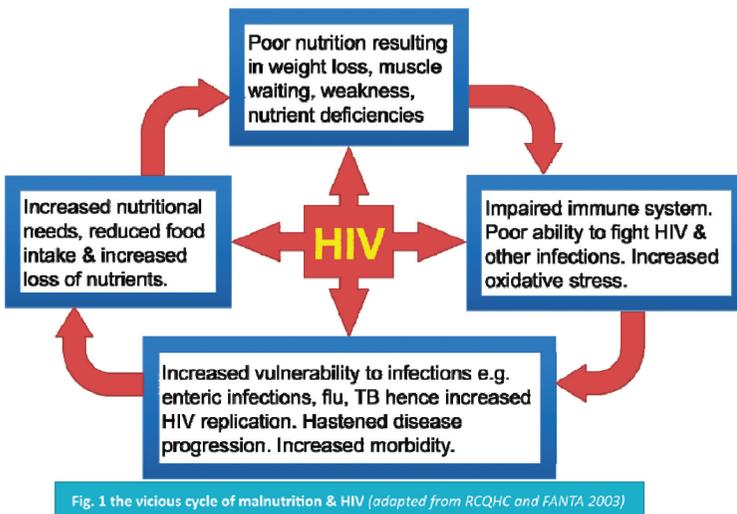


Figure 1:
The Vicious Cycle of
Malnutrition and HIV
(Adapted from
RCQHC and FANTA
2003)

GOAL OF THE STUDY

The goal of the study is to optimize a nutritionally functional meal (*Amtewa*) and to assess the effectiveness of this meal in attenuating the progression of human immuno-deficiency virus (HIV) to AIDS (*acquired immuno-deficiency disease syndrome*) among people living with HIV in Abuja, Nigeria'

VALUE OF THE PROPOSED STUDY TO ATTENUATE HIV PROGRESSION TO AIDS

Development of 'Amtewa meal'

Under-nutrition and micronutrient deficiency remains significant contributors to morbidity and mortality in developing countries (Amuna, Zotor & Tewfik, 2004; FAO/WHO, 2002) and in economic terms, remain a major challenge. Food-based approaches need to be innovative, culturally relevant, reliable and requiring low-tech approaches in order to assure compliance, sustainability and cost-effectiveness. It is

possible to improve the nutritive value of local foods through simple but scientific combinations of food ingredient in form of tailored food recipes (TFR). A TFR may be defined as a blend of locally available, affordable, culturally acceptable and commonly consumed foodstuffs mixed proportionately, drawing on the 'nutrient strengths' of each component of the mix in order to optimize the nutritive value of the end-product without the need for fortification (Amuna, Zotor & Tewfik, 2004).

HYPOTHESIS OF THE CONCEPTUAL FRAMEWORK

Selected micro and macronutrients can delay the progression of HIV to AIDS by improving the CD4 counts and reducing the viral load in People Living with HIV with a CD4 count above 200/mm³.

STUDY DESIGN AND METHODOLOGY

Description of study setting

The setting of the study is State House Medical Centre - SHMC, Abuja, Nigeria. SHMC is a secondary health institution recognized by the Federal Government of Nigeria for the care and management of PLWH. Presently, the institution is involved in intervention programmes such as Voluntary Counseling and Testing (VCT), Prevention of Mother to Child Transmission of HIV (PMTCT), Pediatric Antiretroviral Treatment and Adult Antiretroviral Treatment.

Laboratory analysis of macronutrients was carried out in London at University of Westminster and micronutrient analysis at London Metropolitan University. CD4 count, viral load assessments and clinical trial are ongoing Department of laboratory medicine, State House Medical Centre Abuja

(SHMCA) Nigeria, one of the centres in Nigeria recognized for the care and management of HIV/AIDS patients.

Target population

Recruitment of study participants were done by the researcher while the sample collection, CD4 count, viral load assessment and other laboratory investigations are performed by a trained laboratory scientist in SHMCA. The analysis of micro and macronutrients as well as optimization of Amtewa meal was carried out by the researcher in London.

Eligible PLWH were recruited, and given the right to decline participation without jeopardizing receipt of care at the State House Medical Centre, Abuja. Prior intervention, ‘consent form’ was signed and ‘project information’ sheet were given and explained to all participants.

Study design

At the onset of the research, one hundred (100) participants were recruited for the pilot study.

Enrolled participants were subjected to an “interview questionnaire”, which include some variables; *demographic information, specific questions on lifestyle, health habits, nutritional practices and laboratory investigations*. Furthermore, participants were grouped into four groups according to the study design. Nutrition counseling, Highly Active Antiretroviral Therapy (*provided as standard mode of treatment for PLWH by the State House Medical Centre*), vitamin supplements and Tailored Food Recipes (Amtewa meal) were administered to the groups’ accordingly. Re-assessment of all the groups at three (3) months and six (6) months of the research and the analysis of results obtained will be carried out at the end of the pilot study.

Thereafter, a larger scale intervention that will recruit two hundred (200) participants will follow to determine the impact of the research study on a larger population. The justification of the sample size for the pilot study is based on the 95% confidence interval and a precision limit of 0.05 for the study.

Research variables

Anthropometric measurements (*e.g. mid-upper arm circumference (MUAC) body mass index, skin fold measurement, waist circumference*), clinical investigations (*e.g. review of dietary history, dietary intake, blood pressure measurement*) and biomedical indices (*e.g. blood glucose level, lipid profile, CD4 count, viral load*) were conducted at the commencement of the pilot study and will be repeated at third and sixth months of the pilot and larger scale studies respectively.

EXPECTED OUTCOMES AND OUTPUTS

The outcome of the study will have direct effect on 90% of HIV infected subjects in West Africa *vis-à-vis* slowing down / eliminating the progression of HIV to AIDS through:

- I. Decreased functional impairment from undernutrition
- II. Improved immune function
- III. Preserve or increase fat-free mass
- IV. Limit disease specific complications
- V. Improve tolerance to antiretroviral therapy (ART)
- VI. Provide relief from/prevent symptoms of HIV
- VII. Improve quality of life.

Conclusively, from the European perspective, the positive effects of a TFR can be either maintenance of a state of well-being and health or reduction of the risk of pathologic consequences, however, the demonstration of such beneficial effect of TFR must be based on science. Having a science of a TFR such as *Amtewa meal* in HIV management will be necessary to guarantee the credibility of any assertion of benefit.

BIOGRAPHY

Dr. Abraham Amlogu is a Consultant Clinical Pharmacist in State House Medical Centre, Aso Rock, Abuja, Nigeria and a PhD Public Health Nutrition research student in the Department of Human and Health Sciences, University of Westminster, London. He holds a Bachelor of Pharmacy degree, Master degree in Public Administration and a Doctor of Pharmacy degree. He is a Fellow, West African Postgraduate College of Pharmacists, a Fellow of Hachioji Pharmaceutical Centre, Japan and a Fellow of the Royal Society of Tropical Medicine and Hygiene, London. His field of research interest is monitoring of clinical use of pharmaceutical and nutraceutical agents against HIV/AIDS, malaria and other infectious diseases. His current research is “assessing the effectiveness of public health nutrition intervention programme to attenuate the progression of HIV to AIDS among people living with HIV in Abuja, Nigeria”.

Dr. Sundus Tewfik is the course leader for Herbal medicinal sciences at Faculty of Life Sciences, School of Human Sciences, London Metropolitan University. As a Pharmaceutical scientist she lectures on conventional and herbal pharmacology. She is qualified as a Biologist. Sundus holds Masters in Applied Microbiology and PhD in Pharmacognosy from University of Westminster. She is registered as ‘Biomedical Scientist’ at the Health Professional Council (HPC) - UK as well as fellow of the Institute of Biomedical Science. Additionally, Sundus

is 'Chartered Scientist' at the Science Council, UK. Sundus has carried out numerous research projects on various aspects of herbal medicine; biochemical analyses, antimicrobial testing, isolation/identification of 'biologically active' components and quality control of herbal products and botanical supplements. Sundus' current research interests include the use of phytochemicals in human nutrition domain, focusing on how functional foods and nutraceuticals influence health outcomes and health risks to individuals and communities.

Professor Charles Wambebe is a Professor of Pharmacology and presently the Chair, Product Research and Development for Africa. He is also the President, International Biomedical Research for Africa. Charles Wambebe pioneered the research and development of the first Nigerian HIV-1 candidate vaccine (1999-2002). Involved collaboration with Centers for Disease Control and Prevention, Atlanta and Institute of Human Virology, Baltimore. He also pioneered the research and development of plant extract (CONAVIL) for the management of HIV/AIDS. Pilot clinical trials have been undertaken with promising data (1999-2002). Controlled comparative clinical trial has been planned and awaiting funding. He developed the Draft Nigerian National HIV Vaccine Plan with support from UNAIDS/ Geneva, 2000. Professor Wambebe is a consultant to the World Health Organization (WHO) and one amongst his numerous awards is the International Directory of Distinguished Leadership, First Edition, 1986. The American Biographical Institute, Raleigh, North Caroline, U.S.A.

Kate Godden is a lecturer in the School of Life Sciences, University of Westminster. She is also a food security and nutrition adviser who has specialized in the humanitarian and development sectors since 1990. Her primary focus is on under-nutrition. She has an MSc from the London School of Hygiene & Tropical Medicine, and is registered with the UK Nutrition Society as a Public Health Nutritionist. Her teaching inputs are to the postgraduate programme running modules

in Food Security; Nutrition & Programme Planning for the MSc International Public Health Nutrition. Additionally she leads an intensive stand alone short course; and Nutrition in Emergencies. Additionally she has worked in the UK and in many countries internationally carrying out consultancy work for DfiD, UN agencies and NGO's largely conducting needs assessment, reviewing proposals and running independent evaluations.

Dr. Ihab Tewfik is the Course Leader for BSc. (Hons.) Human Nutrition, Department of Human and Health Sciences, University of Westminster. Besides his biochemistry background, Ihab holds Master and Doctorate in Public Health, Nutrition department, University of Alexandria in addition to PhD from London South Bank University. Ihab is a Registered Practitioner in Higher Education - UK, as well as Fellow of the Royal Society of Public Health (FRSPH). Dr Tewfik has carried out 11 research projects for UNICEF-UN in aspects of public health nutrition & food safety and has published a number of publications in refereed journals and international conferences. As a Registered Public Health Nutritionist at the Nutrition Society, Ihab has organized several international conferences, workshops, CPD and short training courses on Nutrition related diseases and Public Health. Ihab is member of the Editorial Advisory Board of various international scientific journals.

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