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Edible Insects Consumption: A Veritable Option to Ameliorate the Deleterious Health Consequences of Kwashiorkor in Nigeria

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Abstract: All over the world particularly in the developing nations including Nigeria more than half of the population are suffering from a situation in which one problem causes another, this problems include ignorance, poverty, malnutrition, disease and early death. Approximately, one third of a life is spent as a result of a struggle for food. A conservative estimate places the daily toll from kwashiorkor at 10,000. A figure indicates that between 800 million and one billion persons suffer from some degree of Protein-Energy Malnutrition (PEM) alone. The resultant effect of protein deficiency kwashiorkor which leads illness, stunted growth, among others. Kwashiorkor and its effect could be mitigated in West African and Nigeria through insect's consumption. Insects are the most successful, biologically, of all the groups of arthropods, and they abound in great numbers in Nigeria because of the large forest and grass land areas, fresh water and wide coastal regions which supports the existence of insects. Insects supply high quality protein which are requiring in children nutrition and they are abundant, cheap, easy to harvest, and are available throughout the year. Therefore, this paper, after reviewing the availability and the nutritional values inherent in insects, recommend that insects be produced and consumed to ameliorate the deleterious consequences of kwashiorkor in Nigeria, and indeed in the developing nations.
Keywords: Insects, Malnutrition, Protein, Kwashiorkor.

INTRODUCTION

Proper nutrition goes beyond mere consumption of food. Food should be available and consumed in the key areas of components of balanced diet which consist carbohydrate, protein, fats and oil, mineral salts, vitamins and water in appropriate content. Ideal diet should include the high quality of nutrients such as unsaturated fats, essential amino acids, potable water, all of which must be available all the year round. For example, provision and consumption of saturated fats may predispose people to health problems such as cardiovascular problems and cancer [1]. Availability of nutrients are not enough, they must reach the table of consumers in sufficient quantities and at affordable prices. Malnutrition contributes significantly to the high under-five year mortality in the world (majorly West and East African) and as an underlying factor it has been estimated that it contributes to over one third of all child deaths [2]. Mortality is very high among children with kwashiorkor [3, 4]. Kwashiorko are characterised by different metabolic response to severe under protein nutrition [5, 6].

Kwashiorkor has been linked to diet since its first description. Williams [7], who introduced the name kwashiorkor, suggested protein under-nutrition as the etiology of kwashiorkor. The association of kwashiorkor with low protein intake has later been questioned. So far no research has demonstrated that children with kwashiorkor consume less protein.

Nevertheless, to enhance the nutritive value of food and to mitigating the effects kwashiorkor among children , consumption of Insects may have some roles to play in West African especially Nigeria. Nigeria is a country with large forest and Savannah area, it has a wide coastal area with fresh water that supports the existence of large numbers of edible Insect species which are available through-out the year.

Also, Insects are the most widely distributed population of living organisms in the world with the ability to survive in any environmental conditions. Perhaps, it is true to say that Insects are found everywhere. The insects according to Segun [8], are the most successful, biologically, of all groups of arthropods. They have been conservatively estimated to number over 800,000 species, with probably many more to be discovered and classified. Although, a relatively few insect species are marine, they are abundant in freshwater, soils, forests deserts and wastelands. These features make insects abundantly available in Nigeria to complement nutritional deficiencies when consumed. Since most of children

suffer from kwashiorkor are most a poor homes, Sequel to the abundance of Insects in Nigeria at no or low cost which will serve as a source of required protein for the children and their potential nutritive values in mitigating the effects of kwashiorkor, their consumption became imperative in enhancing nutrition, food security and public health in Nigeria.

Edible Insects

Insects are consumed worldwide. The type of insects consumed vary from one part of the world to the other, depending on the culture, religion race, availability of the insects, and the socio-economic status of the individual. Geographical location and their ethnicity also play an important role in the type of insects consumed.

Table-1: Showing some edible insects in Nigeria; scientific names; common names; order; family; plant/food host; seasonal occurrence; and consumption stage

Science name	Common name	Order	Family	Plant/food Host	Season occurrence	Consumption stage
Macrotermes nigeriensis	Termite	Isoptera	Termitidae	Timber woods	May-June	Winged adult, queen
Macrotermes bellicosus	Termite	Isoptera	Termitidae	Timber woods	May-June	Winged adult, queen
Macrotermes natalensis	Termite	Isoptera	Termitidae	Timber woods	May-June	Winged adult, queen
Brachytrupes membrannaces	Giant African cricket	Orthoptera	Gryllidae	Yam	July-September	Adult
Gymonogryllus lucens	Cricket	Orthoptera	Gryllidae	Yam	July-September	Adult
Cytacanthacris naeruginosus	Short horned grasshopper	Orthoptera	Acrididae	Grasses	May-October	Adult
Zonocerus variegates	Grasshopper	Orthoptera	Pygomorphidae	Cassava	November-April	Adult
Gryllotal Africana	Mole cricket	Orthoptera	Gryllotalpidae	Rice	Year round	Adult
Analeptes trifasciata	Stemgirdler	Coleopteran	Cerambycidae	Cashew	October-February	Larva
Oryctes monoceros	Rhinoceros Beetle	Coleoptera	Scarabaeidae	Coconut tree	June-July	Larva
Aphodius Rufipes	Dung beetle	Coleptera	Scarabaeidae	Cow dung	June-July	Larva
Rhychophorus Phoenicis	Palm weevil	Coleoptera	Curculionidea	Oil Palm	December-May	Larva
Heteroligus Meles	Yam beetle	Coleoptera	Dynastidae	Yam	November-March	Larva
Nezara viridula	Stink bug		Hemiptera	Soya bean	May-October	Adult
Apis mellifera	Honey bee	Hymenoptera	Apidae	Flowering Plants	Year round	Egg, larva Pupa
Anaphe Venata	African Silkworm	Lepidoptera	Notodontidae	Obeche tree	July-September	Larva
Anaphe Infracta	African Silkworm	Lepidoptera	Notodontidae	Obeche tree	July-September	Larva
Anaphe recticulata	African Silkworm	Lepidoptera	Notodontidae	Obeche tree	July-September	Larva
Bunaea alcinoe	Emperor moth	Lepidoptera	Saturnidae	African Mahogany	June-July	Larva
Lepidoptara litoralia		Lepidoptera		Isoberlina	August-september	Larva
Cirina forda	Pallid emperor	Lepidoptera	Saturnidae	Shea butter tree	June-August	Larva

Sources: Banjo *et al.*, [13]; Agbidye *et al*., [16]; Ekpo *et al*., [9]; Ifie and Emeruwa [11]; Igwe *et al.*, [14]; Solomon and Prisca [20].

However, twenty-two (22) insect species from six different orders have been recorded with potential for consumption among the three major ethnic groups (Yoruba, Hausa and Ibo) in Nigeria. For example, Yam Beetle (heteroligus meles) and Grasshopper (Zonocerus variegatus) are commonly eaten by some people in the west and south eastern Nigeria, and some parts of Benue State. While Grubs of the Palm Weevil (Rhynchophorus phoenicis) are eaten in several parts of Oyo, Ondo, Osun, Ekiti, Ogun, Lagos (western Nigeria) and in Delta and Edo States [9, 10]. The Larva of Oryctes monoceros is consumed in the Niger Delta regions [11].

The population of Variegated grasshopper (Zonocerus variegatus is high during the dry season in South Western Nigeria, and has been reported eaten in the Akoko area of Ondo State [12]. The winged Termites are known locally in various parts of Nigeria by different names such as "Aku" in Ibo, "chinge" in Hausa and "Esunsun" in Yoruba, and are regarded as traditional delicacies [12]. Macrotermes nigeriensis and Macrotermes bellicosus are enjoyed in all parts of Nigeria, probably because it is present at the onset of the rainy season when livestock is lin, new crops have not yet produced food, and store produced from previuos season is running low [13, 14].

Also, African silkworm larva (Anaphe venata) are commonly found and consumed in Western part of Nigeria [15]. Cirina forda, Bunaea alcinoe, Macrotermes natalensis and Brachytrapes membranaceus are all marketed and, consumed in different parts of Benue State [16]. The larva of Cirina forda are consumed among the Yoruba and Nupe tribes of Kwara and Niger States respectively [12]. In addition, the Dung Beetle (Aphodius rufipes) has been reported as a traditional delicacy of the Gbagyi people in Niger State [17]. The Caterpillar of Bunaea alcinoe, popularly called "Ego" is consumed by the Igbo speaking tribe of Eastern and Southern parts of Nigeria [18, 19]. And the larva of lepidoptera litoralia is common and consumed in the North Central of Nigeria especially in Plateau State [20].

Nutritional Values of Edible Insects

Edible insects provide essential nutrients required for optimum growth, repair and development of the body. Insects have higher protein content, on a mass basis, than other animal and plant foods such as beef, chicken, fish and maize [21]. Protein, being the basis of all organisms activity, constitute many important materials such as enzymes, hormones, and hemoglobin. Protein is an important component of antibodies as it bolsters the immunity function of the body. It has the only material to produce nitrogen for maintaining acid and alkaline balance, transforming genetic information and transporting important materials in the human body. As a nutritive element that produces heat, it can supply energy. The nutritional value of food largely depends on the quality of the protein that it contains. This in turn, is determined to a great extent, by the amino acid composition. In the majority of edible insects, either tryptophan, or lysine is the first limiting amino acid [22]. However, the presence of lysine has been reported in rhychophorus phoenics [10] and erypotaphan in oryctes Monoceros [11]. The inclusion of these insect species, in diet could be of immense benefit complementing lysine poor meals.

CONCLUSION AND RECOMMENDATION

Consequent upon to what has been mentioned, this paper concludes that efforts be made to ameliorate the problem of kwashiorkor through insects consumption. Insect consumption may further enhance provision of essential protein nutrition need by children which will enchance public health in Nigeria.

Therefore, this paper recommends as follows:

- Public nutrition education should be carried out, through available opportunities, to emphasize the nutritional advantages of insect consumption as major source of protein which comes at no or low cost.
- People should Heath educate to disbelief the obnoxious superstition, taboos and age long views against insects consumption by Nigerians, particularly the rural dwellers.
- Awareness should be carried out exogenous and indigenous means to educate the masses on important of insects consumption to prevent kwashiorkor
- Nigerians should be encouraged to breed, produce and harvest insects in commercial quantities in their communities, and to consume them to complement the quality of their diets.

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