Full Length Research Paper

Utilization synergistic effect of plant food consumption in meeting vegetable consumption in South-East (SE) Nigeria

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Survey research design was used in the study of 900 adults from 9 senatorial zones of South Eastern Nigeria that aimed at using the correlation coefficient matrix to evaluate the synergic effect of various plant food diet of South Eastern Nigeria to meet the vegetable consumption requirement of the people. Twenty four hour food recall was conducted using questionnaire while the quantity of vegetable consumed by the individuals were estimated. The correlation coefficient matrix of the diet with vegetables were calculated, the result show that garri, pounded yam and cassava fufu co-relate high with vegetables like bitter leave, ugu and ora (0.82 to 0.86), while food items like yam and rice co-relate poorly with these vegetables (0.24 to 0.12), though yam and rice co-relate high with other vegetables like green amalant and nchuonwu (0.72 to 0.63). Vegetable is incorporated in many plant food items of South Eastern Nigeria diet, yet there is still more room for improvement. It was then recommended that proper planning of meals considering synergistic effect from this incorporation will help in meeting the vegetable needs of the people. The correlation matrix can be of great help to meal planner.

Key words: Synergic effect, diet, vegetable consumption, plant food.

Introduction

Vegetable consumption protect against cardiovascular diseases. World cancer Research Fund and the American Institute for cancer research (2007) stated that some types of vegetables and fruits protect against certain types of cancer. Food and Agricultural Organization/ World Health Organization (FAO/WHO) (2004) recommended 400 g of fruits and vegetables per day. Consumption of raw vegetables seems to show stronger association with mortality than cooked vegetables, including cancer mortality (Bucher, 2010). The indigenous diet of any population is largely governed by available food with potential role of the diet.
in the pathogenesis of diseases. There is considerable
evidence that dietary indiscretion either through ignorance
ignorance, poverty or socio – cultural practices are of
importance in the epidemiology of diseases including
malnutrition (Williams, 1981). Ndie et al. (2013) reported
that availability and cost do not significantly affect the
consumption of vegetable in South Eastern Nigeria. They
also reported that vegetable is available and affordable
round the year in the area but the quantity needed to add
into a particular diet is predetermined by the number of
servings being prepared and taste attached to the diet by
cultural food habit.

Leender et al. (2013) in their work on fruit and
vegetable consumption and mortality in Europe reported
that consumption of fruits and vegetables was inversely
associated with all-cause mortality with a rate
advancement period of 1 to 12 years and with a
preventable proportion of 2.95%. These results supports
the evidence that fruits and vegetable consumption is
associated with lower risk of death driven largely

Bucher (2010) reported that eating five portions of fruits
and vegetables per day is one of the means to reduce the
risk for lung cancer by up to 23%. They stated that in
report from the amount consumed, it is also important to
take into account the variety. A varied vegetable diet
reduces the risk of developing lung cancer. They stated
that eating more than eight sub-groups of vegetables cuts
the risk of lung cancer by 23% when compared with
eating less than four sub-groups. Vegetables are edible
part of plant commonly consumed raw or with the food as
a recipe. They are fresh green, pulses, sprouts, botanical
fruits used as vegetables such as tomatoes, peppers,
cucumbers, eggplants, as well as mushrooms and
seaweed (Agudo, 2004). Common to all vegetables is low
glycermic index.

According to Agudo (2004), the intake of vegetable
should be expressed in numerical terms, so that the
potential public health benefit can be evaluated and to
assess what change to be made if the recommend
actions are to be made. There is a synergistic
relationship existing basically among daily food
consumption. A person who eats a variety of diet with
vegetable is likely to consume large quantity of vegetable
than one who is on restricted diet (Toyokowa, 1981).

Literature on dietary combination to improve vegetable
consumption in Nigeria is rear. This study aimed at
investigating the synergic effect of consumption of varied
diet with vegetable consumption in South Eastern
Nigeria.

METHODOLOGY

A survey research design was used to elicit information on plant
food consumption using food intake study. A simple random
sampling method was used to select Anambra State, Enugu State and
 Ebonyi State from five SE states of Nigeria. The population of
Anambra, Enugu and Ebonyi States are 4,019,471, 4,533,899 and
3,480,622, respectively (National Population Commission,
2005). Convenient sampling method was used to select 100 adults
age of 20 to 60 years from each of the 9 senatorial zones of the 3
states (each state has 3 senatorial zones), these 900 adults
representatives samples were living in private households, not
pregnant or breastfeeding at the time of the doorstep sift. A 24 h
food recall method was conducted using questionnaire and
interview schedule to collect data on plant food eating within 24 h.
The questionnaire was constructed based on Nnanyelugo (1982),
Action Against Hunger (2002), United States National Health and
Nutrition Examination Survey (US NHANES) (2005) and National
Diet and Nutrition survey (UK NDNS) (2000) and Labadorios et al.
(2000). The questionnaire was use for pilot study at Abia State and
split half method was used to find the co-relational coefficient which
is 0.79. Students of Department of food Science and Technology
of Enugu state University of Science and Technology, Enugu, and
Department of Nursing Science, Ebonyi State University Abakaliki,
were trained on how to administer the questionnaire and the
interview schedule. The questionnnaire were administered to literate
subjects who filled it while the interview schedule were used for the
illiterates. Each participant was assured that the information
collected will only be used for statistical analysis and informed
consent were obtained from each of the subject. Statistical Package
for Social Sciences (SPSS) was used to determine the co-relation
coefficient of the diet consumption.

RESULTS

The food items/vegetable consumption correlation matrix
of South Eastern Nigeria is shown in Table 1. The results
show that vegetables are incorporated into varieties of
SE Nigeria diet. The results show that yam, rice and
beans have co-relational coefficient of 0.712 to 0.736
which is high and these three food items are consumed
highly in the area. The common vegetable spices in the
area like nchuonwu, curry leaf and uziza also co-relate
well positively with yam, rice and beans with co-relation
coefficient ranging from 0.612 to 0.909, this is also high.
The results also show that garri, pounded yam and
cassava fufu co-relate well with ugu leave, bitter leave,
okra, ora and okazi, with co-relation coefficient ranging
from 0.626 to 0.851. Those whose correlation coefficient
are significantly positive form a synergistic combination in
the daily vegetable consumption while those that are
negatively correlated significantly are mutually exclusively
and may not be consumed together in the same diet. A
close study of the correlation matrix, show that vegetable
food items are incorporated mainly into the following diet
soup, boiled yam, rice, beans and tapioca. There are
some diet of the zone that do not have vegetable
incorporated into them, not because they are not tasty
with vegetable but because they were not traditionally
prepared with vegetable, such food include okpa and
beans.
### Table 1. Food item/vegetable consumption correlation matrix of SouthEast, Nigeria.

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**DISCUSSION**

The results show that though vegetables are incorporated in many food items of S.E Nigeria diet, the utilization the synergy will improve vegetable consumption in the area. Pounded yam, garri and cassava fufu co-relate highest with vegetables when compared with boiled yam, rice and beans. This result agree with Ndie et al. (2013) who stated that S.E Nigerian soups are high in vegetable and these food items are swallowed with soups. The implication of this is that meal planners include these swallows more often in the menus of the people to help increase their vegetable consumption. Vegetable leaves used as spices like curry leaves, uzuzu and nchuanwu co-relate well with most of the food items but their handicap in meeting the vegetable needs is that they are added in little quantity, yet the synergic effect with the other vegetables in the diet will go a long way in increasing vegetable consumption in the area. These results indicate that proper planning of diet is needed for individuals on typical S.E Nigerian diet to meet their vegetable requirement. In this planning, food/vegetable correlation matrix could be of help. The matrix indicates other food items where vegetable could be incorporated like okpa, which currently do not have significant correlation with vegetable. Vegetables are not incorporated into some food items not because they are not tasty but because traditionally vegetables are not incorporated into them.

**CONCLUSION AND RECOMMENDATION**

It was concluded from the study that if meal planners put into consideration of synergic effect in food consumption in South Eastern Nigeria, it might be easier to meet the vegetable requirement of the population and that there
is room to incorporate more vegetables in the diet of the people since it is available as well as affordable. Home makers (mothers) should be educated on how to utilize the synergic effect of foods/vegetables in order to improve vegetable consumption in the area.

LIMITATION OF THE STUDY

This study focused on consumption of vegetable without considering the actual weight consumed per meal.

Conflict of interest

Author has none to declare.

REFERENCES
