Review

Diet and lifestyle changes as preventive cost-effective strategies of interventions for chronic diseases

Elvis I. Agbonlahor, Richard O. Okaka, Loveth N. Agbonlahor

Department of Physical and Health Education, Ambrose Ali University, Ekpoma

The increase in the occurrence of nutrition related chronic diseases is alarming. It was seen that genetic, environmental, and behavioural factors are primary determinants of chronic diseases such as coronary artery disease, ischemic stroke, diabetes and some specific cancers. Thus, it was therefore concluded that avoiding smoking; pursuing physical activity; consuming healthy types of fats; eating plenty of fruits and vegetables; replacing refined grains with whole grains; limiting sugar intake; limiting excessive calories and limiting sodium intake are dietary and lifestyle factors that could serve as interventions for chronic diseases. It was therefore recommended that a comprehensive national and local plans that would involve health care providers, worksites, schools, media, urban planners, all levels of food production, processing and preparation and governments should be developed to take advantage of every opportunity to encourage and promote healthy eating and active living.

Keywords: Cost-effectiveness, interventions, chronic diseases, diet and lifestyle.

INTRODUCTION

The burden of mortality, morbidity and disability attributable to chronic diseases is currently greatest and is continually growing in the developing countries such as Nigeria. It is on this premise that Sobugwi et al., (2001) estimated that by 2020, chronic diseases associated with diet and lifestyle in Sub-Saharan Africa will constitute almost 50% of the burden of disease. Similarly, Booth (2006) observed that chronic diseases accounts for 50% of death in developing economies and 85% in developed economies. Furthermore, World Health Organization (2005) projected that, by 2020, chronic diseases will account for almost three-quarters of all death worldwide, and that in developing countries 71% of deaths will be due to ischemic heart disease (IHD), 75% due to stroke, and 70% due to diabetes.

Consequently, these striking projections in increases changes within developing countries overtime indicate that the primary determinants of these diseases may not be due to only genetic but environmental factors, including diet and lifestyle. The diets people eat therefore, in all their cultural varieties, define to a large extent their health, growth and development. Also, risk behaviours, such as use of tobacco and physical inactivity modify the result for better or worse

health status. Conversely, these take place in a social, cultural, political and economic environment that can aggravate the health of people. Tuomilehto (2001); Hu (2001) and Key (2002) observed that improved diet and lifestyle changes can reduce the risk of progression to diabetes by 58% over 4years; up to 80% in cases of heart disease and up to 90% in cases of type-2-diabetes. They further stressed that about one third of cancers could be avoided through healthy eating, maintaining normal weight and exercising throughout life.To this end, reducing identified, modifiable dietary and lifestyle risk factors could prevent most cases of CAD, stroke, diabetes and many cancers among developing economies.

Thus, Nigeria, as one of the developing countries, is faced with challenges of Coronary Artery Disease (CAD), ischemic stroke, type-2- diabetes, obesity, colon cancer and probably other cancers. This study is therefore instituted to reveal diet and lifestyle changes as appropriate cost-effective preventive intervention stra-tegies for chronic diseases in Nigeria.

Cost-effective preventive intervention strategies of dietary and lifestyle changes in chronic diseases

Several lines of evidence indicate that realistic modifications of diet and lifestyle can prevent most CAD, stroke, diabetes, colon cancer, and smoking-related

*Corresponding author E-mail: elvisagbon@yahoo.com

Table 1. Relationships between Lifestyle Changes and chronic diseases

Dietary and Lifestyle factors	CVD	Type 2 diabetes	Cancer	Dental disease	Fracture	Cataract	Birth defects	Obesity	Metabolic syndrome	Depression	Sexual dysfunction
Avoid smoking	↓	↓	↓	↓	↓	↓		↑			↓
Pursue physical activity	↓	↓	↓		↓			↓	↓	↓	↓
Avoid overweight	↓	↓	↓		↓	↓			↓		↓

Source: WHO and FAO 2003; Beacon, et al, 2003; Fox 1999; IARC 2002.

Note: ↑ = increase in risk; ↓ = decrease in risk.

Table 2. Relationships between dietary factors and chronic diseases

Dietary and Lifestyle factors	CVD	Type 2 diabetes	Cancer	Dental disease	Fracture	Cataract	defects	Birth	Obesity	Metabolic syndrome	Depression	Sexual dysfunction
Consume healthy types of fats	↓	↓								↓		
Eat plenty of fruits and vegetables.	↓		↓		↓	↓	↓		↓			
Replace refined grains with whole grains									↓	↓		
Limit sugar intake	↓	↓		↓					↓	↓		
Limit excessive calories									↓	↓		
Limit sodium intake	↓											

Source: WHO and FAO 2003; Beacon, et al, 2003; Fox 1999; IARC 2002.

Note: ↑ = increase in risk; ↓ = decrease in risk.

cancers. Thus, specific changes in diet and lifestyle are presented in Tables 1 and 2: The lifestyle changes that could serve as interventions for chronic diseases are:

Avoid tobacco use

Avoidance of smoking by preventing initiation or by cessation for those who already smoke is the single most important way to prevent CVD and cancer. Avoiding the use of smokeless tobacco will also prevent a good deal of oral cancer.

Maintain a healthy weight

Obesity is increasing rapidly worldwide. Even though obesity – a body mass index (BMI) of 30 or greater – has received more attention than overweight. A BMI of 25-30g/m^2 indicates overweight which is typically even more prevalent and also confers elevated risks of many diseases. For example, overweight people experience a two to threefold elevation in the risks of CAD and hypertension and a more than tenfold increase in the risk of type 2 diabetes compared with lean individuals (BMI less than 23) (Willett et al.,1999). Overweight and obese people also experience elevated mortality

from cancers of the colon, breast (postmemopausal), kidney, endometrium, and other sites (Calle 2003).

In rural China, where the average BMI was less than 21 for both men and women, Hu (2000) found that the prevalence of hypertension was nearly five times greater for those with a BMI of approximately 25 than for the leanest people. For most people, unless obviously malnourished as an adolescent or young adult, body weight should ideally not increase by more than 2 or 3 kilograms after age 20 to maintain optimal health (Willett et al.,1999). Thus, a desirable weight for most people should be within the BMI range of 18.5 to 25.0, and preferably less than 23.

Eating healthy diet

Medical experts have long recognized the effects of diet on the risk of CVD, but the relationship between diet and many other conditions, including specific cancers, diabetes, cataracts, macular degeneration, cholelithiasis, renal stones, dental disease, and birth defects, have only been documented more recently. The following list discusses six aspects of diet for which strong evidence indicates important health implications. These goals are consistent with a detailed 2003 WHO report (WHO and FAO, 2003).

Replace saturated and trans- fats with unsaturated fats, including sources of omega-3 fatty acids.

Replacing saturated fats with unsaturated fats will reduce the risk of CAD (Hu and Willett 2002; Institute of Medicine 2002; WHO and FAO 2003) by reducing serum low-

density lipoprotein (LDL) cholesterol. Also, polyunsaturated fats (including the long-chain omega-3 fish oils and probably alpha-linoleic acid, the primary plant omea-3 fatty acid) can prevent ventricular arrhythmias and thereby reduce fatal CAD. In a case-control study in Costa Rica, where fish intake was extremely low, the risk of myocardial infarction was 80 percent lower in those with the highest alpha-linoleic acid intake (Baylin 2003). Intakes of omega-3 fatty acids are suboptimal in many populations, particularly if fish intake is low and the primary oils consumed are low in omega-3 fatty acids (for example, partially hydrogenated soybean, corn, sunflower, or palm oil). These findings have major implications in the type of oil used for cooking. Changes in the type of oil used for food preparation by the inclusion of unsaturated oil are often quite feasible and not expensive.

Trans fatty acids produced by the partial hydrogenation of vegetable oils have uniquely adverse effects on blood lipids (Hu and Willett, 2002; Institute of Medicine 2002).

On a gram-for-gram basis, partially hydrogenated vegetable oils effects on blood lipids and the relationship with CAD risk are considerably more adverse than for saturated fat. In many developing countries trans fat consumption is high because partially hydrogenated soybean oil is among the cheapest fats available. In South Asia for instance vegetable ghee, which has largely replaced traditional ghee, contains approximately 50 percent trans fatty acids (Ascherio 1996). Independent of other risk factors, higher intakes of trans fat and lower intakes of polyunsaturated fat increase risk of type 2 diabetes (Hu et al., 2001).

Ensure generous consumption of fruits and vegetables and adequate folic acid intake.

Strong evidence indicates that high intakes of fruits and vegetables will reduce the risk of CAD and stroke (Conlin, 1999). Some of these benefits are mediated by higher intakes of potassium, with folic acid probably also playing a role (Hu & Willett, 2002). Supplementation with folic acid reduces the risk of neural tube defect pregnancies. Substantial evidence also suggests that low folic acid intake is associated with greater risk of colon- and possibly breast–cancer and that use of multiple vitamins containing folic acid reduces the risk of these cancers (Giovannucci, 2002). Findings relating folic acid intake to CVD and some cancers have major implications for many parts of the developing world. In many areas, consumption of fruits and vegetables is low. For example, in northern China, approximately half the adult population is deficient in folic acid (Hao, 2003).

Consumption of whole grains and cereal products

Consuming whole grains containing high fiber has double benefits. Firstly, its consumption has consistently been associated with lower risks of CAD and type 2 diabetes (Hu et al.,2001; Hu and Willett, 2002). High consumption of refined starches exacerbates the metabolic syndrome and is associated with higher risks of CAD (Hu and Willett, 2002) and type 2 diabetes (Hu et al., 2001). Secondly, higher consumption of dietary fiber also appears to facilitate weight control (Swinburn 2004) and helps prevent constipation.

Limited consumption of sugar and sugar-based beverages

Sugar, free sugars refined from sugarcane or sugar beets and high –fructose corn sweeteners, have no nutritional value except for calories and thus, have negative health

implications for those at risk of overweight. Furthermore, sugar contributes to the dietary glycemic load, which exacerbates the metabolic syndrome and is related to the risk of diabetes and CAD (Hu et al., 2001; Hu and Willett, 2002; Schulze, 2004). WHO has suggested an upper limit of 10 percent of energy from sugar, but lower intakes are usually desirable because of the adverse metabolic effects.

Limited intake of excessive calories

Given the importance of obesity and overweight in the causation of many chronic diseases, avoiding excessive consumption of energy from any source is fundamentally important. For instance calories consumed as beverages are less well-regulated than calories from solid food hence limiting the consumption of sugar-sweetened beverages is particularly important. Excessive caloric intake is the major cause of overweight and obesity.

Limited sodium (table salt) intake

The principle justification for limiting sodium is its effect on blood pressure, a major risk factor for stroke and coronary disease. WHO has suggested an upper limit of 1.7 grams of sodium per day (5 grams of salt per day) (WHO and FAO 2003).WHO and FAO stressed that vitamin A fortified sodium intake could help to build mental alertness and improved sight for both children and adult.

Maintaining daily physical activity

Contemporary life in developed nations has markedly given peoples opportunities to expend energy, whether in moving from place to place, in work environment or at home (Koplan and Dietz, 1999). This is coupled with dramatic educations on the importance of physical activity. Urbanization with its attendant increased availability of motorized transportation is gradually being replaced by walking and bicycle riding and mechanization of labour. Regular physical activity is a key element in weight control made prevention of chronic diseases (International Agency for Research on Cancer (IARC) 2002; Swinbourn et al., 2004). For example, among middle-aged West African women, more walking was associated with a three-unit lower BMI (Sobugwi et al., 2001). It was also observed in China, that car owners are 80 percent more likely to be Obese (Hu 2002).

In addition to its key note in maintaining a healthy weight, regular physical activity reduces the risk of CAD, stroke; type 2- diabetes, colon and breast cancer, osteoporostic fractures, osteoarthritis, depression, and erectile dysfunction.

Limiting television watching

The number of hours of television watched per day is associated with increased obesity among both children and adults (Hernande et al., 1999) and with a higher risk of type 2 diabetes and gallstones (Hu et al., 1999). This association is likely attributable both to reduced physical activity and to increased consumption of foods and beverages high in calories which are typically those promoted on television. Decrease in television watching reduces weight (Robinson 1999). Hence the American Academy of pediatrics recommends a maximum of two hours of television watching per day.

Conclusion and Recommendations

Developing countries such as Nigeria is witnessing a significant increase of the global burden of chronic diseases such as cardiovascular disease, cancer, diabetes and chronic expiratory diseases. Thus, the increasing epidemic of these diseases relates closely to respective changes in lifestyles mainly in tobacco use, physical inactivity and unhealthy diet.

Based on strong medical evidence however, the most cost-effective preventive interventions strategies for these diseases is through healthy diet and positive lifestyle changes in relation to avoiding tobacco use; maintaining a healthy weight; pursuing physical activity; consuming healthy types of fats; eating plenty of fruits and vegetables, replacing refined grains with whole grains, limiting sugar intake; limiting excessive calories and limiting sodium intake.

It is therefore, recommended that a comprehensive national and local plans that take advantage of every opportunity to encourage and promote healthy eating and active living should be adopted. Thus, these plans would involve health care providers; schools; media; urban planners; all levels of food production; processing and preparation; and government. Hence, the goal is cultural change in the direction of healthy living such as developing transportation policies and a physical environment to promote walking and riding bicycles, developing comprehensive school programmes that integrate nutrition into core curricula and healthy nutrition into school food services, emphasizing the production and consumption of healthy food products in agriculture support and extension programmes, promoting healthy foods at worksite food services and investing in developing locally appropriate health messages related to diet, physical activity and weight control.

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