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Review Article

Dietary Measures to Addressing Non-Communicable Diseases in Ghana: A Focus on Depression

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ABSTRACT

Nutrition is an important aspect of our daily lives. Poor nutrition can lead to so many illnesses especially Non-Communicable Diseases (NCDs). The burden of deaths from NCDs annually account for about 63% of global deaths. Although mental illnesses are most often left out of NCDs, they seem to have received increased attention recently as they have been found to co-exist with NCDS, exacerbating observed symptoms, and themselves being potent causative agents especially under conditions of malnourishment and lack of vital nutrients in diets. The burden of depression could be reduced by adequate intake of essential nutrients. Targeted nutrition could also serve as a therapeutic measure to depression and other NCDs. By review of literature on existing food and nutrient sources, this paper seeks to elucidate the variety of foods that can be put to good use to help limit the burden of depression and other NCDs amongst high-risk individuals in Ghana. Effective health education and improved socioeconomic states could help change dietary patterns thereby prolonging or eliminating the onset and reducing the burden of some non-communicable diseases in the country.

Keywords: NCDs; Depression; Ghana; Targeted nutrition; Health education

INTRODUCTION

Proper nutrition as depicted in role of diet is crucial in preventing and controlling mental disorders. Dietary Diversity Score (DDS) is associated with depression seen among women in Tehran [1]. With the new paradigm shift in nutrition and health research, enough evidence has been gathered that with high consumption of Ultra-Processed Foods (UPF) are associated non-communicable diseases, overweight and obesity [2]. With the increased consumption of UPF, a higher risk of CVD, a bad cardiometabolic risk profile, depression and cerebrovascular disease have been established based on existing literature. Impaired growth increases the risk for depression and stigma in addition to abnormal bone health, virologic failure, and eventually death [3].

About 63% of the worldwide mortality (Over 36 million people) has been attributed to Non-Communicable Diseases with about 14 million of the death cases occurring in individuals below 70 years. More than 90% of these untimely deaths from NCDs occur in low- and middle-income countries [4]. Diet and nutrition have always been thought of and associated with ill health ranging from mild to chronic conditions such as diabetes, respiratory diseases, cancers and cardiovascular diseases. These are normally of long duration, not spread through infectious agents and are the outcome of a number of factors (genetic, physiological, environmental or behavioral). What most people are unaware of and leave out is the fact that mental illnesses are non-communicable diseases as well and could also be brought about by nutritional factors.

In the developed nations like US, Non-Communicable Diseases (NCDs) are among the top ten causes of death [5]. Among the Rohingya refugees in Bangladesh, non-communicable diseases like hypertension and diabetes are prominent. This somehow was predicted to be due to malnutrition [6]. Although mental illness may not be among the leading causes of deaths, they cause remarkable disability and affect the economy like any other physical illness. Mental illnesses are mostly thought of as the result of biochemical imbalances and in some parts of Ghana, even believed to be spiritual. The World Health Organization's mental health action plan for 2013-2020 stresses that central to reducing the global burden of Non-Communicable Diseases (NCDs) is mental health and wellbeing. In 2017, the scope of NCDs was broadened to encompass mental health disorders by UN member states [4,7].

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By reviewing current literature on depression, this paper reviews practical, local-diet-based public health measures that could be taken to address the disease, socio-economic and death burden associated with depression in a low-income country like Ghana, Shown in Figure 1.

Figure 1: Map of Ghana.

Higher at a particular risk is emerging during this COVID-19 pandemic. With the lockdown restrictions, radical changes in dietary accessibility and lifestyles are limited to the available nutritive supply. In addition to the economics issues of purchasing healthy food items which of no doubt are considerable costly, physical and psychological health are as well impeded [8]. Consequently, malnutrition effects such as obesity and weight gain increase the risk of cardiometabolic risk and may lead to death.

Preexisting health issues such as Chronic Non Communicable Diseases (CNCD) were obvious due to the lockdown measures. These patients could not establish stress management and work performance to maintain energy balance. Food security is actualized with health population. While there are gaps in the definitive reasons, study in the area of HIV and food insecurity, experiences of depression or depressive symptoms among the patients require further attention. Furthermore, anti HIV/AIDS treatment will be influenced by nutritional vulnerability leading to interference of medication [9]. While the risk factors for CVD include poor diet quality and physical inactivity, depression and anxiety also contributes to risk for developing risk [10].

GHANA AT PERSPECTIVE

Ghana is a West African country currently with a population of approximately 31 million people. In Ghana, the major NCDs are Cardiovascular Diseases (CVD), endocrine disorders chiefly diabetes, haemoglobinopathies including sickle cell disorders, cancers, chronic respiratory diseases particularly asthma, and injuries. Other special NCDs are either managed under separate programs in the Ghana Health Service (e.g. tobacco control, oral health, mental health) or do not have any established program (e.g. hearing impairment)[11].

In the Ministry of health's strategy for managing NCDs and communicable diseases, it is mentioned that an estimated 86,200 NCD deaths occur each year in Ghana with persons below 70 years accounting for about 55.5% of the cases. The proportion of deaths occurring under 70 years is 69% among males and 59% among females. In 2008, NCDs resulted to about 2.32 million disability-adjusted life years (DALYs). Also, about 13% of the adult Ghanaian population suffers various forms of mental health disorders [12]. Globally, disease burden of mental health disorders stands at 14% of the total burden of diseases [13].

Studies such as reports from the World Mental Health Surveys have shown significant relationships between cardiovascular diseases and common mental disorders; a 2.1 odds ratio exists between heart diseases and mood disorders, 2.2 for anxiety disorders, and 1.4 for onset of heart disease and common mental disorders [14] as well as between early childhood hardships and adult onset heart disease [15]. Vancampfort et al. also found relationship between diabetes and mental illnesses, including bipolar disorder, schizophrenia, post-traumatic stress disorder and depression as well as between diabetes and cognitive impairment [16]. Other studies have also linked NCDs like cancer and respiratory diseases with mental disorders. Caruso et al. in their work, demonstrated a relationship between Depressive spectrum disorders and cancer [17]. Some reviews have also shown that anxiety disorders and post-traumatic stress disorder have associations with specific cancers [18, 19]. Reports have also recorded 8-12% mortality among people with common mental disorders via complications from other habits and conditions such as hypertension, smoking, myocardial infarction and diabetes [20]. This suggests that mental illnesses need to be considered when tackling NCDs and nutritional management can work to reduce mental illnesses and other NCDs hence the need for an integrated management to help reduce related disability.

DEPRESSION

Depression is often characterized by loss of interest, withdrawal, persistent low moods and hopelessness. Physical symptoms like chronic pain or digestive issues could also be presented. Diagnostic and Statistical Manual of Mental disorders-5 (DSM-5) outlined that the diagnostic criteria must be present for at least two weeks and the symptoms must also not be a result of drug/substance abuse or another medical condition. The connection between Depression and nutrition might not be common knowledge to a lot of people. It is however important to note that nutrition plays an important role in the onset, duration and severity of depression. Lack of appetite, missed meals and addiction to sugary foods are some of the poor dietary behaviors found to be associated with depression [21].

Deficiencies in neurotransmitters like serotonin, dopamine, noradrenaline, and Gamma-Amino Butyric Acid (GABA) are frequently associated with depression [22-25]. Amino acids including tryptophan, tyrosine [26-28] phenylalanine, and methionine have been reportedly employed in the management of depression and other mood disorders [29, 30]. Replenishing depleted serotonin levels have also been found to improve depressive states. Tyrosine is converted into dopamine and norepinephrine [31], implicated in depression.

Dietary supplements containing phenylalanine and/or tyrosine have been implicated in causation of alertness and arousal.

S-Adenosyl Methionine (SAM), which is produced by the combination of methionine and Adenosine Tri Phosphate (ATP) facilitates the production of cerebral neurotransmitters [32, 33]. However, the daily recommended supplementary dosing of these neurochemicals need to be derived and standardized through research. Docosa Hexaenoic Acid (DHA) derived from Eicosa Penta Anoic acid (EPA), an omega-3 fatty acid derived from fish oil has been found to be an antidepressant in human. Epidemiological data and clinical studies have clearly shown that omega-3 fatty acids can effectively treat depression [34, 35]. Some studies have reported mood elevation with daily consumption of dietary supplements of omega-3 fatty acid that contain 1.5-2 g of EPA. Inadequate or lack of folate and magnesium has also been culprits in depression diagnosis [36, 37].

TRADITIONAL FOODS CONSUMED IN GHANA

Usually, foods are placed into various classes or groups based on their physiological effects when consumed. For instance, carbohydrates (e.g. from cereals, grains, roots and tubers) which make up a large proportion of our daily meals are called energy giving foods. Meat, fish, shellfish, snails, eggs, soya cake, legumes and seeds make up the 'body-building' food group with 'protective foods' including banana, plantain, okra, egg among others. Other fruits and vegetables are given lower priority in the diet, despite being important sources of vitamins, minerals and fiber. Ghanaian meals are often spicy soups and stews cooked with meat or fish. They are served with a large portions of starchy carbohydrate foods; fufu (cassava and plantain), banku (cassava and maize), rice, yam, etc. Palm oil and vegetable oil, high in saturated fat are commonly used in cooking to add color and flavor to dishes.

The Ghanaian diet chiefly depends on starchy roots (cassava, yams), fruit (plantain) and cereals (maize, rice). The roots carbohydrates constitute up to three quarters of the consumed energy giving foods. Although this meets the dietary energy requirement of the population, there is inadequate consumption of proteins and lipids resulting in unbalanced diets and its associated consequences [38]. Docherty, et al. Stated that mostly contributing to iron and zinc intakes are maize and cowpea, green leafy vegetables contribute to iron intake and brown rice to zinc intake [39]. Zinc deficiency especially in children is associated with stunting. Stunting levels are high in Ghana (northern part) and often, multiple micronutrient deficiencies coexist.

CARBOHYDRATES

Carbohydrates are biological molecules comprising carbon, hydrogen and oxygen atoms. Polysaccharides serve to store energy. They have been found to affect mood and behavior in humans. Foods rich in Carbohydrate trigger the release of insulin within the systemic circulation, which ensures appropriate uptake by body cells and also converts excess glucose to glycogen, which are stored and released when needed (gluconeogenesis). The hormone glucagon, mediates the reverse of this process. Furthermore, the glucose moieties made available via these processes, serves as transporters of the essential Tryptophan across the blood brain barrier into the brain, where it up regulates the uptake and levels of neurotransmitters in the brain. It (tryptophan) also binds to serotonin and by so doing significantly influences moods— a function that is crucial in mental health.

From the preceding paragraph, it could be suggested that the consumption of glucose sources with moderate amount of sugar, is herein advised, particularly because it ensures the steady and prolonged release of glucose which makes for a more stable mental state than high-glycemic index foods. Typical examples of the former include sweet potatoes, banana, pineapple, brown rice and many others, which are very common in Ghana.

PROTEINS

A high-quality protein diet contains all essential amino acids. Foods rich in high quality protein include meats, milk and other dairy products, and eggs. Plant proteins such as beans, peas, and grains may be low in one or two essential amino acids. Amino acid intake, especially essential amino-acids, represent an important category of factors contributing to brain functioning, and in-turn, mental health. Cerebral neurotransmitters are largely composed of amino acids. A lack of any of these two tyrosine or tryptophan, reduces synthesis of the respective neurotransmitters (dopamine and serotonin), which are associated with anxiety and depression. Over accumulation of amino acids may also result in retardation and damage to the brain. For example, excessive build-up of phenylalanine in the individuals with phenylketonuria can cause brain damage and mental retardation.

OMEGA-3 FATTY ACIDS

Lipids make up a large proportion of the brain. They constitute the brain membranes mostly as fatty acids. Sufficient evidence has been derived scientifically to attribute a reduction in the development and progression of depression to adequate long chain PUFAs, especially DHA which is obtained from ⍺-linolenic acid (an omega-3 fatty acid), Arachidonic Acid (AA) and docosatetraenoic acid, both derived from omega-6 fatty acid linoleic acid.

VITAMINS

B-complex vitamins

Successful improvements in the mood in humans have been recorded via supplementation of nine vitamins (especially vitamin B2 and B6) within a one-year period. This involved administering ten times more than the recommended dietary allowance for each vitamin. This mood improvement was particularly associated with improved status. In women, baseline vitamin B1 status was linked with poor mood and an improvement in the same after 3 months was associated with improved mood. In the older population, thiamine has proven effective in improving cognitive ability or performance [22-40].

Vitamin B12 (Cynocobalamin)

If administered timely, i.e. prior to manifestation of clinical symptoms associated with dementia and blood disorders, Vitamin B12 has been shown to prolong the onset of these conditions. Cerebral and cognitive functions in the elderly are improved by supplementation with cobalamin; it frequently promotes the functioning of factors related to the frontal lobe, in addition to the language function of people with cognitive disorders. Signs of cognitive impairments have also been detected in adolescents a basal deficiency in vitamin B12.

Chromium

The relationship between chromium and depression has been established by numerous research studies. This indicates the relevance of this micronutrient in the onset and possible

management of depression and other mental health conditions.

Iodine

In Humans, iodine supplied by the thyroid hormone is responsible for energy metabolism and utilization in brain cells. A deficit therefore signifies sub-optimal functioning of the brain with negative impacts on mental health. Iodine supplementation is crucial especially in pregnancy as reduced levels is associated with severe cerebral dysfunction, which may subsequently result to cretinism.

Iron

Iron plays a major role in the formation of structural components of neurons such as the myelin sheath, it is required for the synthesis of neurotransmitters and it is also implicated in oxygenation/ cytochrome oxidase-mediated energy production within the parenchyma of the brain. Iron deficiency is found in children with attention deficit/hyperactivity disorder. In pregnancy, sufficient amounts of iron are required in the umbilical blood supply for good mental development of the fetus. Disruption in the development of cognitive functions in infants has been attributed to with Iron deficiency anemia.

Selenium

Several studies have established the link between inadequate levels of selenium and depression [41]. Selenium has also been shown to effectively reduce depression and anxiety when used to manage patients with such conditions [42,43].

Zinc

Scientific studies have revealed that low level of zinc is commonly detected in patients with clinical depression [44]. Zinc also protects the brain cells against the potential damage caused by free radicals.

MANAGEMENT

To manage those patients with metabolic disorders like diabetes and obesity, isolation in an environment that will enable them to maintain energy balance may save some lives. 'StayHomeStayFit' internet based lifestyle interventions project by the University of Milan provides psychological support, physical activity, nutrition advice for many needy individuals. When projecting the health benefits of lockdown measures against the negative impacts, the policymakers should evaluate the current pandemic experiences to implemented in the future.

Mediterranean diet is studied to improve cardiovascular risk factors such as blood pressure, cholesterol and blood glucose levels and in a long term benefit, to prevent cognitive decline [45]. Working on diet and eating time that involves intermittent fasting is attracting much interest of recent. For instance, skipping breakfast was found to be positively associated with odds of stress, depression and psychological distress. While this is effective in all groups, skipping breakfast impacts anxiety in adolescence]. Family support to individuals with depressed lifestyle will enhance their food consumption and hence improved nutrition. Physical exercise (PE) is associated with reduced depression [46].

Acknowledging the mental health components of food insecurity will be in a right direction to curb the depressive effects. Families would not be able to maintain a healthy mental status with low economic opportunities and access to land that will ensure food security.

CONCLUSION

The disease burden associated with depression as an often-ignored non-communicable disease is not beyond reduction in Ghana. Locally sourced diet-based nutrients and diet-derived anti-oxidants such as polyphenols from green and black tea, as well as trace elements such as selenium, all decrease as a result of aging which in-turn limits their protective effects on the brain and consequently enhances the degree to which an individual is exposed to neurodegenerative and brain diseases such as Alzheimer's disease, Parkinson's disease and Huntington's disease. A combination of targeted nutrition for at-risk populations, effective health promotion/intervention programs and consistent government policy on economic empowerment and job-creation, will greatly reduce the disease and death burden associated with depression and other NCDs in Ghana.

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