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Involvement of Nutritional Epidemiology in Public Health

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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Review Article

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ABSTRACT

The purpose of this review is to demonstrate the significance and involvement of Nutritional Epidemiology in public health. The investigation of solving health issues that are linked to the Nutrition-related Diseases and food intake that are used by Physicians, Nutritionists, Dietitians as well as other Health Providers and Professionals of Public Health Community. Representing applied Researches that show the involvement of Nutritional Epidemiology in Public Health and the accomplishments of Nutritional epidemiology related to nutrient intake and healthy diet. Transformation of the diet-related diseases by Nutritional Epidemiologists into a Platform of Practice to Prevent these Diseases and Raise Individual or Public Awareness by nutritional recommendations. To show the influence and importance of Nutritional Epidemiology on Public Health, with a focus on the impact of the healthy food and lifestyle on diet-related diseases, decrease the risks of Morbidity and Mortality Diseases, identification of the Nutrient deficiencies between Childhood to Adulthood groups.

Keywords: Nutritional epidemiology; public health; diet-related diseases; nutrient intake; lifestyle.

1. INTRODUCTION

The Literature of the Science of Nutritional Epidemiology started to occur and develop in the 1980S based on the many Quantitative sources. The significant difference in diet with individuals and community was computed in numerous populations. Standardized Questionnaires of Dietary were established to be used in the large studies of Epidemiology, the Capability, and

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facility of these dietary questionnaires in the measurement of diet was recognized but many problems related to the Diet and Diseases were not solved [1].

In the 1990s, the first edition of "Nutritional Epidemiology" was published and challenged the connections of the new formulation of study methodologies and started to develop and cover the fields of investigation of new qualities of diet in different communities among the world [1].

The different topics of methodology about Nutritional Epidemiology were developed greatly in detail and cohort studies began to provide data about the association between Diet and Disease and focusing on the significant analysis methods, presentation and interpretation of the "Nutritional Data" that known as the "complex Nutritional Data" [2].

Nutritional Epidemiology has a good implication on Public Health, contributes to the monitoring of the Food Consumption, Nutrient consumption, and Nutritional Status of a Particular Population. formulation of the new hypothesis related to Nutrition and Diseases to give evidence to accept or refuse the hypothesis and to evaluate the risk of diseases related to the Diet. Nutritional Epidemiology involves the prevention of diseases and the improvement of Communities Health [3].

The review aims to represent the role of nutritional epidemiology in the improvement of the nutritional status of public health in the different countries around the world concerning the studies that have been done about various diseases that can be healed by diet.

2. TERMINOLOGY OF EPIDEMIOLOGY AND NUTRITIONAL EPIDEMIOLOGY

The Science of Epidemiology is known as the exercise of hypothesis formulation which is the study of the distribution related to the "frequency, pattern" and causes with risk factors of the diseases related to the health conditions and places in a particular population that determine Natural history of disease within the prognosis of diseases [4].

Epidemiology figures the decision of Policy and Practices that based on evidence by identification of the risk factors and aim of the practices to prevent risk factors and establishment of preventive healthcare and identification of the diseases that found in a community [5].

Nutritional Epidemiology is a new area of Medical Study and a branch of Epidemiology that Study the connection between Health and Nutrition, in addition, provides specific data and knowledge about the science of Nutrition and information about Diseases that are associated with Diet and Malnutrition [6].

3. STUDY DESIGN OF NUTRITIONAL EPIDEMIOLOGY

The study designs of the Nutritional epidemiology need to create an absolute relationship network between diet and disease to have the ability to recognize and improving policies and interventions that can be implemented for the determinations of the Health of the Community and to prevent the spread of diet-related diseases and detection of the aetiology of the various diseases that lead to death [7].

Nutritional Epidemiology has two types of investigation which are experimental and observational investigations that can be applied in the study design following the type of study such as cross-sectional study, cohort study, ecological, clinical, Case-control as well as community trials. The Observational investigation studies that applied have been observed with none-intervention while the Nutritional Epidemiologists have the control in the Experimental studies to assign exposures [8].

Nutritional Epidemiology has more challenges designed for nutritional intervention such as the effectiveness of diet that can be used as an agent of prevention against diseases pattern and amount of intake among a particular population [9].

The studies of retrospective case-control and past diet of recall bias are other issues that should be considered since it is not like smoking or other screening tests where its exposure can be completely prevented and stopped or started such as individuals Diet, Physical Activity and change in weight [10].

4. BIOMARKERS OF NUTRITIONAL EPIDEMIOLOGY

The Biomarkers are one of the indicators of analysis in Nutritional Epidemiology that determine the Nutrient Intake as [11] study

mentioned about the continual errors during assessments of dietary intake but the main challenge is to comprehend and evaluate the using structure of errors through the analysis process and with the capability of using biomarkers.

The Nutritional Epidemiologist can get the biological markers from specimens of blood, hair, and urine which is a good indicator that can guide individuals about the true intake of the Nutrients, Biomarkers based on the traditional methods can substitute the estimated intake of the Nutrients. Intake of Biochemical markers may cause errors that are related to the Dietary Survey Methods [11].

The biomarkers have been developed for the validation of the techniques that are used for evaluating dietary intake. Various and a greater number of dietary biomarkers should be developed to get better characteristics of nourishment. In the validation researches the "doubly labelled water technique" as well as "24-Hour urine, Nitrogen, and potassium" are used mostly and routinely, it has been revealed that loss of Statistic power and focusing on the effectiveness of the Diet can be a significant decrease. The health of the community can be improved by using a suitable biomarker and directing a thorough analysis [12].

5. NUTRITIONAL EPIDEMIOLOGIC INVOLVEMENT IN DEVELOPING POLICY TO IMPROVE PUBLIC HEALTH

The grading systems to evaluate the rate of evidence of specific study types has been used by National Organizations like "American Diabetes Associations, FDA (Food and Drug Administration), AHA (American Heart Association), American College / Cardiology, and American Preventive Services Task Force" to rate the Quality of Strength of Evidence in developing Policy and its effect on the Public Health [13].

In the Randomized Controlled Trials studies that conducted with the endpoint of diseases is recognized as the most strength scales approaching the Cohort Studies that is one step below the RCT, during missing of the large quantities in RCT with the endpoint diseases the Cohort studies considered in authenticating of Nutritional Claim as well as establishing and Developing Policy [7].

In most cases, the "Prospective Cohort Studies" have been used widely as evidence by the Committee of Dietary Guideline Recommendation in developing Policy. however, in the case of RCT Studies, the evidence is used to evaluate and assess the link between specific Dietary issues and the risk of Chronic Diseases that lead to the development of Dietary Recommendations for the communities in developed and undeveloped countries [14].

6. A REVIEW OF CURRENT NUTRITIONAL EPIDEMIOLOGICAL STUDIES

Outlining and representing the review of current Nutritional Epidemiology studies with evidence in disease diagnosis and its contribution in improving health. The effect of lifestyle and diet, especially the intake of vegetable-based meals with restriction of meat, fat, sugar and its impact on public health, including Intervention Studies [15].

6.1 Plant-Based Food and Cancer Diseases

Based on the case-control studies and report of the "World Cancer Research Fund (WCRF)" in 1997 about highlighting the relationship of higher consumption of plant-based foods "Vegetable and Fruits" and lower risk of particular types of cancer such as mouth, pharynx, stomach, and lungs as well as cancers of Breast, Bladder, Larynx, and Pancreas with considerable evidence and similar relation with the higher consumption of the only vegetables with lower risk of the Colon and Rectum Cancer [16].

Based upon the data in the report of "WCRF" in 2017 that more cohort studies were mentioned, with evidence of the possible relation between higher consumption of vegetables and lower risk factors of specific types of cancer such as stomach, esophagus, larynx, pharynx, and mouth. Likely an inverse association of lowering the risk of colon, rectum cancer, and stomach cancer regarding garlic and allium vegetable consumption, inverse association within the higher fruit intake, and lower risk of the esophagus, stomach, mouth, larynx, and pharynx cancers. Also, the report mentioned and determined concerning the possible emphasized association between higher consumption of foods containing lycopene and food that contains selenium with a lower risk of prostate cancer [17].

Many studies have been done in recent decades about the effect of higher vegetable and fruit intake in reducing the risk of various types of cancer especially reduction of the risks of epithelial cancer types, particular types of breast cancer but maybe not prostate cancer but in general, cancer determined as the correspondingly associated with the plant food intake [18].

The evidence and health instructions change over time regarding community health, there is a gap of research for researchers to have a clear message for public health and to prevent the risk of cancer and improve community health. The current studies show the dependable and considered relationship between vegetable and fruit intake with reducing risks of cardiovascular diseases [19].

6.2 Studies about the Association between Fat Intake and Breast Cancer

Many research studies have determined the risks of Dietary Fat intake and its association with the risks of breast cancer, which still has been a debatable subject. In the current studies, Nutritional Epidemiologists have the role and contribution to have some outcomes about these associated risk factors [20].

Regarding the studies that have been done by the health professionals as well as from nurses, have shown evidence about the association and role of dietary fat intake and increase the risk of breast cancer. In the cohort study that has been studied for 8 years, more than 90,000 women have been followed up, with developed 714 incident cases of invasive breast cancer. The cases from highest compared with the lowest of the equal 5 groups of dietary fat intake had a boundary increased risk of Breast Cancer. The consumption of Dietary fat, red meat, and Dairy products both unsaturated and saturated fat intake is a higher risk of Breast cancer [20].

Moreover, about the data of cohort study that has been collected by the European Prospective Investigation into Cancer and Nutrition “EPIC”, 320,000 females have been followed for about 9 years with nearly 7000 cases of developed cancer, an association between high saturated dietary fat intake and higher risk of breast cancer was determined but no association with the other Dietary fat intake [21].

6.3 Nutritional Epidemiology Involvement in Preventing Obesity

obesity is a common and epidemic diseases in the world, most obesity diseases begin from Childhood which is a serious health issue for developing other chronic diseases, Nutritional Epidemiology works on controlling and preventing the factors that control childhood obesity, the studies identified that School is the most key point of public health strategy to lower the Risks and prevent the Overweight and Obesity prevalence [22].

Children spend most of their time in school and school alone cannot prevent or control the Obesity epidemic, but based on the health policy and setting strong programs to support and guide children to healthy eating and regular physical activities can be a factor prevent or control this epidemic Disease [22].

The studies found that the Schools are not providing the recommended amount of Nutrients and junk foods are commonly available in school especially in high school and secondary school, the studies have linked these junk foods and snacks including Soft drinks that sold in schools to Students as a factor of the prevalence of Obesity and overweight which contain a high amount of total calories, total fat, saturated fat, and non or lower availability of fruits and vegetables in Schools [23].

The studies identified that by making some plans in improving the environment of the school and setting stronger policies to improve school food and increasing intensity of physical activities in the curriculum of the Study plans with limitation of the Junk foods and high dense foods throughout the school days and adding more healthy foods in meals can be a strong key factor for preventing Obesity among Students and providing a healthful environment [23].

6.4 Nutritional Epidemiologic Studies about Rice Intake and Type 2 Diabetes

The main food in most countries of the Asian population is Rice, it’s an essential and heavily consumed food, the health impacts of rice compared to plant-based foods have been less observed in nutritional epidemiologic studies. Concerning Meta-analyses composed of the prospective cohort studies that have been identified the association between rice intake and

risk of type 2 diabetes and other chronic diseases which is an incidence of mortality from these diseases. The effect of Brown Rice "unpolished" and white rice "polished rice" was different strangely. Many epidemiological studies especially high-quality types of research are required particularly among the Asian population [24].

6.5 Nutritional Epidemiology Involvement in Cardiovascular Diseases

Cardiovascular diseases including coronary heart disease "CHD" and stroke identified as the major Health problem in the world, the main cause of leading mortality in the globally, about 30% of the total deaths annually. The etiology of CVD has been studied by Nutritional Epidemiologists to prevent and manage these diseases because the main cause of CVD is the unhealthy diet and incorrect choices of food, identification of the recommended consumption of each nutrient can help to prevent or reduce the risk of these diseases, analysis for some other contributed factors such as sedentary lifestyle and physical activities [25].

The association between dairy consumption and CVD has been observed, a meta-analysis study determined that dairy product consumption in a high or low intake amount possibly reduces the risk factors of CVD, CHD, and stroke diseases. Still, depended on the prevailing evidence of dose-response association is not evident and more studies are required to focus on the impact of particular types of dairy product intakes on outcomes of particular CVD [26].

Based on the Nutritional epidemiology and clinical studies that show evidence about the relationship between Nut's intake and reduced risks of CVD. Nuts contain bioactive phytochemicals and rich in micronutrients and macronutrients and recognized as the seeds of high energy with beneficial nutrients. Adding nuts to the diet is recommended against CVD, the healthy components of nuts observe the relation of reduction of CVD risks as well as prevention of the other chronic diseases such as cancer and neurological disorders [27].

7. NUTRITIONAL ASSESSMENT IN NUTRITIONAL EPIDEMIOLOGY

In the 1980s - 1990s, nutritional epidemiology studies started to inspect the relationship between diet and diseases, then planned dietary questionnaires developed such as the Food Frequency Questionnaire (FFQ) and has been sent in the form of paper about "48000 topics" to large cohorts and realized as a cost-effective way for individual assessment use [28].

The accuracy of FFQ in Nutritional assessment has been debated largely concerning Nutritional intake. Limitations of FFQs in the association of diet-disease lead to Bias in Nutritional revealing measurements. The Nutritional epidemiology studies have applied the Nutritional assessment of Short term period and used it as a reference calibration technique especially as a major Nutritional assessment method for the community. The collected data and evidence show that food records and 24-hour dietary recall methods may assess the accurate result of the usual intake of the individuals. Modern technologies were established to assess specific short-term Nutritional assessment methods [29].

The nutritional assessment is improved by innovation and the application of technologies. The evaluation of estimated accurate quantitative is required to determine the usual nutrition intake by individuals. The new technologies of nutritional assessment have been compared with the other methods of assessment and the errors of the results in web-based surveys with paper-based surveys FFQs methods were observed to be the same ratio of error, the methodology determined to be same by using technology, both methods can be used in the nutritional assessment and the studies of nutritional epidemiology [30].

The Nutritional assessment study observed that systemic bias was associated with the specific bias of individuals in FFQ by using nutritional report techniques as proposal evidence of instruments to determine the correlation intake of the nutrients that produced a considerable over evaluation with true and usual intake under evaluation [31].

The influence of Nutritional assessment measurement of errors on analysis, plan, and interpretation of Nutritional epidemiologic studies had a greater impact than earlier estimation, Nutritional epidemiology determined that it gives a greater structure of Nutritional measurement errors and the studies of Nutritional epidemiology should be interpreted carefully [31].

8. LIFESTYLE ROLE IN NUTRITIONAL EPIDEMIOLOGY STUDIES

Lifestyle is the most important factor in the prevention of the most diseases or close to the elimination of the most health issues related to nutrient deficiency. Nutritionists and health professionals skipped some questions to answer regarding the area of the study and its association within the nutritional status of the individuals and rate of sedentary lifestyle [32].

Scientists in the field of medical technology were unsuccessful to control and influence the prevention of chronic diseases. Chronic diseases became epidemic diseases and big health issues that have been solved by medicine by Medicare in 1965. The increase in price is directed to a rise in the outcomes of healthcare and attempts to control the costs of medicine [33].

The nutritional intervention had developed, and nutritional intervention was not only able to use as a method to prevent chronic diseases but also was a reason to open a new area of research for Nutritionists. Health policies improved with a method to spend on heart disease, stroke, cancer including diabetes. The goal of public health was determined by mutual development through personal behaviour [33].

The growth of public health hypothesis that included change in human behaviour, as both a means of prevention and early intervention, as well as the development of reporting requirements which seem to be the conceptual model of smoking and health that also presented a scientific basis for how much these changes should always be. These other developments made wellbeing an entity, instead of just collaborative, liability and diseases assumed a natural extension of the process of aging [33].

A report directed by Canadian Minister of National Health and Welfare Marc Lalonde has been published in 1974 entitled “A New Perspective on the Health of Canadians”. The above represented an important condition and take preventative measures of chronic disease a primary responsibility for population health through lifestyle changes [34].

The Lalonde Report contains obesity and overweight, high-fat dietary habits, workout abusive behaviour, hypersexuality, depression including the use of "mental state" prescription medications as "self-imposed" health hazards, along with other issues [34].

While the report identified that the scientific evidence supports connections of causal relationships between both the environment and lifestyle, on the one side, as well as death and suffering, and from the other, are contentious to dissension, everything just did not forget, that large number Canada's health challenges are enough urgent to take measures against people, even when all scientific proof isn't really available [34].

The above-mentioned "new perspective" report is not just to decide to make people responsible for disease prevention and management, but it also established professional opinion on how it can be actually achieved. Between 1975 as well as 1985, numerous middle-class Family’s needs to seriously check for medical information, as well as television starts to support or even recommend health conditions comprehensively [34].

There has been plenty of recommendation to choose from for the: Advisories have been received from American Heart Association on dietary cholesterol, this same to the Ancel Public key on saturated fat, the Ralph Nader committee on chemical additives, John Yudkin on carbohydrates, and Robert Atkins general on carbohydrate consumption [35].

Much of this knowledge had been based on the available scientific proof and it was in numerous manners contradictory to Worldwide FOOD Background. For instance, in regards to the wide-ranging discursive practices which connect food intake as well as other key elements of "lifestyle" with chronic disease, scientists continued to argue about the dietary cholesterol, cigarettes, sweetener, obesity, sedentary lifestyle, and stress weren't really important elements in cardiovascular improvement. The prevalence of conflicting advice tried to give the McGovern Review panel the potential to capitalize as refereeing authority for incompatible claims regarding nutrition-chronic diseases [35].

9. CAUSATIVE CRITERIA OF NUTRITIONAL EPIDEMIOLOGY

Attempting to make recommendations on nutrition and healthy food includes making composite decisions about the homeostasis of nutrients or food advantages and disadvantages. Causative characteristics seem to be fundamental but still not adequate characteristics of these decisions. Many scientific implications

involve design concepts of research findings, statistical analysis, bias, uncertainty, and evaluating problems. This same set of parameters at least corresponding analysis, organization power, medication response, validity, and reliability [36].

The common strategy, methodologies, and hypothesis of theory development encourage advantages for establishments' specifications, with their corresponding benefits or even about their guidelines of assumption. The coherence of research findings would be extremely important when researches are also of great quality or are not relevant to intolerance. Its statistically important with the need of independent relationship to be accessed, with only a 20 percent percentage change in hazard. The predictable or growing exponentially statistically relevant pattern helps to strengthen the viewpoint in developing of new guidelines [36].

A probable hypothesis as well strengthens the guideline even though the standards on scientific samples seem to be extremely probable to vary depending upon the circumstance. Solidity is really a factor to be considered of both the large extent that a nutritional influence policy on and disease progression for dietary guidelines. Evidence that supports those other requirements is indeed a powerful reason for determining the dietary guideline, considering the stability of supposed advantages as well as suspected damage [36].

Guidelines must start making about their range evident; the limited guideline tends to involve a singular medical condition; a wide-ranging guideline usually includes most other appropriate medical conditions [36].

Causative requirements seem to be fundamental to epidemiologist's evidential methodologies being used to give guidance on healthy food and nutrition, and it's not just the implementation of these guidelines. Significant might be other science-based aspects to consider including such previous research categories, statistical analysis, bias and uncertainty as well as the reliability of measurement techniques [37].

Ethical considerations also are crucial for going to recommend nutritious food, as they would with all aspects of guidelines throughout the field of public health. The fundamental important consideration here is that an advantageous equilibrium between advantage as well as damage in a community is predicted unless guidelines were also taken. If either narrowly focused like a particular condition or generally considered inside the view of any relating nutrient illness and state of health, nutrition guidelines are prescriptive as well as socially responsible statements on where to go for population health [37].

10. CONCLUSION

This review has summarized the role of Nutritional Epidemiology to prevent the diseases related to nutrition and its involvement and impact on public health and also referred to the studies and researches that have been done about the relationship between diseases and nutrients intake with the nutritional recommendations.

The role of Nutritional epidemiology in establishing policy in the community, the importance of Nutritional biomarkers in the intervention of nutrient deficiency, and the development of Nutritional Assessment in the determination of risk factors of diseases that are related to food consumption.

The importance of lifestyle and causative criteria of Nutritional epidemiology and its role in the management of diseases and improvement of public health, raising awareness of the community with the studies about accomplishments of Nutritional epidemiology.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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