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A Brief Overview and History of Human Nutrition and Health

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ABSTRACT

Nutritional biochemistry is finally getting the attention it deserves, despite the fact that food and nutrition have been studied for centuries. In 1926, less than 100 years ago, the first vitamin was extracted and chemically characterized, leading to studies on single-nutrient deficiency diseases. Nutritional research on chronic diseases like cardiovascular disease, diabetes, obesity, and malignancies has hastened in the past few decades, especially after the year 2000. Nutrition has played a key role in the improvement of public health since the past 200 years, and is expected to play a major role in public health for the future.

Keywords: *nutrition, diet, history, food, agriculture.*

1. INTRODUCTION

The history of human nutrition dates back to the dawn of civilization. Human diet was largely and basically determined by the availability and palatability of foods. A famous quote attributed to Socrates, the ancient Greek philosopher is “Thou shouldst eat to live, not live to eat”. Hippocrates, the Greek physician and the Father of Medicine, was amongst the first to establish the role of diet in human wellbeing, through his sayings “let food be your medicine”. He proposed routine daily modifications in lifestyle such as diet and exercise to treat diseases. Jerome Groopman (USA) stated that “Aside from relatively common dietary deficiencies - lack of vitamin B12 causing pernicious anaemia or insufficient vitamin C giving rise to scurvy - little is known about the effects of nutrition on many bodily functions”. During the “Chemical Revolution” in France at the end of the 18th century, various methods were developed for the chemical analysis of substances in a quantitative and scientific way. After the breakthrough discovery by James Lind (British Navy) and Kanehiro Takaki (Japanese Navy) on the importance of lime/oranges on the health of sailors, the causative agents were

later identified to be vitamin C and B1. Moreover, nearly all vitamins were discovered between 1913 and 1948, ushering in a new era of scientific research focusing on single nutrient deficiency diseases. Hence, the field of nutritional science established the role of diet and nutrition in complex chronic diseases (Trueb, 2020).

2. HISTORY OF HUMAN NUTRITION

The history of human nutrition spans several millenniums and records a variety of sources of food and diet. Archeological and fossil records date the emergence of modern human beings (Homo sapiens) between the years 50,000 - 40,000 BC. The progression of humans in the Upper Paleolithic period of the Pleistocene epoch or the Cro-Magnon period, during the period 40,000 - 10,000 BC, the populations hunted large mammals such as mammoths, horses, bison and caribou and the game meat contributed about 50% to the human diet and nourishment. Additionally, they also gathered and stored wild fruits and nuts for consumption during the harsh winter period. During the Mesolithic period, also known as the Middle Stone Age (10,000 - 8,000 BC), the bow and arrow was invented by the early humans, enabling them to successfully kill fast running animals such as gazelle, antelope and deer. The archeological evidence suggests that around 17,000 BC, the human population were scavenging wild grains, wheat and barley, which had become a common food source by 13,000 BC. Furthermore, with the advancement of grinding edible grains into flour, they became an important source of food (Underwood and Galal, 2011). During the Neolithic period (New Stone Age), around 10,000 BC, with the increasing human population, it became necessary to efficiently acquire more food. The increase in population resulted in the changes in agriculture i.e. domestication of plants and animals for food. With the dawn of the ice age and the beginning of the New Stone Age (Neolithic period), many large animal species became extinct and agriculture became more prominent source of food which resulted in the transition of human life from foraging, scavenging and hunting to agriculture and domestication of animals. Around the year 9,000 BC, the sheep and goat were domesticated; after 7,000 BC, grains and legumes were being extensively cultivated; and by 5,000 BC agriculture had become common throughout the inhabited world (Underwood and Galal, 2011). Agriculture has been one of the prominent and predominant occupations since 10,000 BC. However, the domestication of animals earlier and later the development of the horse collar in the 12th century became one of the most important advancements during the Middle Ages (500-1500 AD) (Editors, 2018). It was originally invented in China during the 5th century which allowed the use of horses in place of oxen. Therefore, the production of food increased and fewer humans were required for farming and agriculture. Once the food supply became plentiful, the people now had more choice of diet and food items. Thus, the science of nutrition was born and became an academic endeavor and an important field of health sciences (Richard, 2018a, b).

Ancient people had devised ways of managing their health concerns, many of which were related to nutrition e.g., earlier physicians advised patients to drink the juice from liver of a black oxen or cock to relieve the symptoms of poor vision. The symptoms of anemia were reduced by placing iron filings in a glass of wine before drinking and goitre was thought to be treatable after chewing seaweed or burnt sponge. It was only later that the science behind the controversial and traditional practices was understood and was therefore, forbidden and withdrawn. Only during the last century, it as has been

scientifically found that liver concentrates vitamin A necessary for the visual process, the acidity of wine makes iron filings soluble and readily absorbed and seaweeds and sponges concentrate iodine required for thyroid functions (Underwood and Galal, 2011).

Finally, early in the twentieth century purified diets fed to animals were found to be inadequate for growth and survival as compared to those that were fed the same diet with added milk or eggs. The ground work to identify the essential dietary constituents gathered momentum when it was found that laboratory animals such as mice and rats were important for research studies, which was a substitute for expensive and time consuming method using large animal models in the science of nutrition. The nutrients essential in diet for the growth, development, reproduction and health have been described, identified, isolated, synthesized, and their biochemical functions have been elucidated in the 20th century. In conclusion, the science of nutrition is firstly dependent of the study of biochemical and molecular mechanisms involving nutrients and secondly the association of foods and dietary patterns to health and development of human beings (Underwood and Galal, 2011).

3. HUMAN DISEASES AND HEALTH

The potential for infectious diseases on human life still exists today, especially in low-income countries, but can also pose serious challenges in the high income countries. This threat may increase as infectious diseases evolve and escape preventive mechanisms. The spread of the plague throughout Europe and Asia in the 14th century caused death and social destruction to an estimated one-third to half of the population of Europe. The 1918-1919 Spanish (swine) influenza pandemic may have affected one-third of the world's population resulting in between 50-100 million deaths more than the people who died in World War I (Tulchinsky and Varavikova, 2014). Other pandemics that have caused massive recurring devastation, such as smallpox, tuberculosis, syphilis, measles, cholera, and influenza, show the destructive potential and epidemic nature of infectious diseases. Some of these diseases have been brought under control and some may be eliminated, but newer or recurrent communicable diseases continue to emerge. The spread of acquired immunodeficiency syndrome (AIDS) in the 1980s, the ongoing cholera epidemics in Asia, Africa, and South America, diphtheria in the Soviet Union in the 1990s, measles in Western Europe in 2010-2012, and diphtheria and pertussis in many western countries in 2011-2013 remain one of the major public health concerns. A modern example of the recurrence of an infectious disease is measles in 2010-2011 in Europe and Africa (Tulchinsky and Varavikova, 2014).

Great advancements have been made in the control of communicable diseases through public health efforts in environmental sanitation, safe foods, vaccination, and antibiotics in the industrialized countries. However, the field of infectious disease continues to be dynamic and challenging. Emerging infectious disease threats from new diseases not previously identified, such as HIV and SARS, and new variants of old diseases with resistance to current methods of treatment, together provide great challenges to public health. Diseases once localized to specific parts of the world, such as Dengue, West Nile Fever, Lyme disease, Chikungunya, and Rift Valley Fever (RVF), are emerging and spreading in locations far from their normal habitat and becoming endemic (Tulchinsky and Varavikova, 2014).

4. NUTRITION AND EPIGENETICS

With an increase in world population and human life span and expectancy in several countries, there is a significant increase in

chronic diseases as well (Figueira et al., 2016). Non-communicable diseases (NCDs) such as diabetes, osteoporosis, cardiovascular diseases, neurological disorders, and cancers, increase with age and seriously affects life and healthcare systems (Troesch et al., 2015). NCDs lead to a gradual deterioration of health and quality of life of subjects and a higher risk of disease and mortality (WHO, 2018). According to WHO, unhealthy diet, sedentary lifestyle, excessive alcohol consumption, tobacco use, and pollution are among the main preventable risk factors of human health (Eggersdorfer and Walter, 2011). Human diet and nutrition has a pivotal role in maintaining health and malnutrition is a major determinant of chronic diseases. The epidemiologic and experimental data shows that an imbalanced diet leads to health concerns later in life. Therefore, there is an increasing interest on the possible role of epigenetic mechanisms as the causative link between nutritional imbalances and NCD (Block and El-Osta, 2017; Greco et al., 2019; Deas et al., 2019).

The word "epigenetics" (Greek "Epi" means "above" or "beyond") was coined by Conrad Waddington in 1942 (Waddington, 2012). Epigenetics is defined as a process of growth and development linking genotype and phenotype and provides information about the functions of genetic material (Choi et al., 2010). Various agents such as nutrients, environment, etc. can modify physiological processes through epigenetic mechanisms and alter gene expression. The metabolic pathways link nutrition and epigenetics especially one carbon pathways that attach methyl groups to proteins or DNA. One carbon metabolism involving folate and methionine integrates carbon units from amino acids and generates substrates for methylation of nucleic acid and protein. Nutritional deficiencies in folate, choline, methionine, vitamins B6 and vitamin B12 modify the regulatory pathways that maintains one-carbon metabolism (Mohanan A, Kanakkaparambil, 2018). The individual genetic traits which are inherited from our ancestors get altered by diet and environmental factors leading to diseases. Bacalini et al., (2014) studied the inheritance pattern of epigenetics and environmental factors during different stages of development which has helped focus attention on the contribution of epigenetics in preventing diseases. With ageing, epigenetic modifications are positively related to diet, physical exercise, and lifestyle habits (Lillycrop and Burdge, 2012; Mohanan A, Kanakkaparambil, 2018).

CONCLUSION

Modern nutritional science is less than a century old since the first vitamin was isolated in 1926. In the first half of the 20th century, the discovery, isolation and synthesis of essential micronutrients and their role in deficiency and non-communicable diseases was understood. This may be compounded by the increasing dissimilarity between rich and poor nations or "double whammy" of combined undernutrition and non-communicable diseases.

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Conflict of interest

The author declares that there is no conflict of interest.

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