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Factors Affecting Dieticians in the Provision of Advice Relating to Personalized Nutrition (Nutritional Genomics)

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Author's contribution

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

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ABSTRACT

A great amount of research has focused on nutritional genomics in order to personalize dietary interventions based upon genetic premises. The aim of nutritional genomics research is to use this information as a preventive tool in primary care, through personalized dietary advice to populations or to individuals. Increasing the understanding of genetic traits on the part of dieticians and other healthcare professionals can complement the data that is required to create personalized recommendations for dietary intervention. A literature review was conducted by the author using PubMed journals from 2000 to the present day with regard to nutritional genomics studies in order to address the factors affecting dieticians in the provision of advice related to personalized nutrition. Inclusion criteria included research limited to human studies, in the English language and published after 2000. This review concludes that there is a huge demand for an increase in the knowledge and skills of dieticians in order to transform the genetic results and nutrigenomics message into common language as part of their clinical practice. This could be achieved by participation in specific training courses on diet and gene interaction, and by attending conferences and seminars to exchange their perspectives on nutritional genomics. In addition, there is a need

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to establish a healthcare system that supports and rewards these approaches and promotes their application.

Keywords: Nutrigenomics; nutrigenetics; personalized nutrition; dieticians.

1. INTRODUCTION

Current treatment plans for most nutrition- or metabolism-related diseases are based primarily on clinical tests and dietary advice [1]. However, recently, a great amount of research has focused on nutritional genomics in order to personalize dietary interventions based upon genetic premises [2]. This developing field is based on the recognition of the fact that the individual's genetic makeup that can influence the prevention or cure of nutrition-related diseases [3].

Nutritional genomics includes two fields of research -'nutrigenomics' and 'nutrigenetics'. Although their conceptions are linked, the implications and functions are basically different in terms of the relationship between genes and nutrient interactions. Nutrigenomics focuses on the influence of particular nutrients or food compounds on gene expression and metabolite concentration. On the other hand, nutrigenetics is the impact of genetic variations and dietary conceptson diet-related disorders [4].

The main potential of nutritional genomics research is to use genetic shapes for the early detection of those genetic diseases which are associated with nutritionally-related disorders, and to use this information as a preventive tool in primary care, and to provide personalized nutritional advice to populations or to individuals. This could facilitate the production of food or dietary advice adapted to the nutritional requirements of individuals or specific groups within the community [5].

As a result of the evolutionary processes, individuals differ in their DNA specifically in "single nucleotide polymorphism", which control the way persons process and absorb food components [6]. additionally, the physiological process in the humans that related to the transportation or consumption of nutrients is also linked with the reciprocation of various genetic variants. This hypothesis structures the basis for nutrigenetic filed. In the anther hand the nutrigenomic analysis are rooted in the effect of nutritional components on the proteome, genome, transcriptome and metabolism [7].

In sight of the recognized and rising role for nutritional genomics in health care, there is strategy in many countries to involve genetics-led health care [8]. The successful application of nutrigenetics and nutrigenomics since in health care system require interrelated action from various health professionals from different fields who involve in patients care from 'bench to bed' for example, in research, education and healthcare environments. Several study has address the possibilities and barriers to introduce genetics and genomics filed among different workforces including occupational therapy, pharmacy, nursing, public health and dietetics [9,10,11].

Dieticians, are the health professionals who have capability in biomedical and dietetics sciences and who are competent to translate and deliver dietetics intervention as health messages to the patients and public, will be involved in the application of nutritional genomics in health care service.

Although, nutritional genomics has great possibility for the improvement of preventive health approaches, great number of dietitians still not familiar with nutritional genomics advance role in health care.

Increasing the understanding of genetic traits on the part of dieticians and other healthcare professionals can complement the data that is required to create personalized recommendations for dietary intervention. However, dietetics practitioners would require extensive training to bring nutritional genomics into their clinical practice [12]. To achieve this, healthcare professionals such as physicians and dieticians who are involved in this field, and who have direct contact with patients, require advanced knowledge and skills that are related to diet and gene interaction [13].

This report addresses the factors affecting dieticians in the provision of advice related to personalized nutrition.

2. METHODS

To develop this research, a literature review was conducted by the author involving PubMed journals from 2000 to the present day with regard to nutritional genomics studies. Manual literature searches and reviews were also undertaken.

Inclusion criteria included research limited to human beings, in the English language and published after 2000. The keywords used included nutrigenomics, nutrigenetics, personalized nutrition, dietician/dietitian, dietary advice, dietary counseling and nutritional advice.

3. RESULTS

3.1 Nutritional Genomics in Dietetic Practice

Evidence reports that the link between dietetics services and genetics has always related to dietary advice with regard to single-gene diseases by which a mutation in one gene results in a particular disease such as cystic fibrosis [14]. At the same time, there are multi-factorial and multi-genetic disorders with an etiology of environmental factors such as cardiovascular disease, diabetes, obesity and cancer, that usually involve dietary intervention on the part of dieticians [15-17]. For example, in chronic liver disease studies, it has been shown that the interaction between the PNPLA3 I148 M variant and a wide range of nutrients or alcohol is associated with having a fatty liver; this could possibly lead to a particular genetic-tailored diet to reduce liver fat accumulation [18].

In obesity, the main aim for nutrigenetic is to classify genes that make certain people more susceptible to obesity and obesity complication [19]. The thrifty gene hypothesis is an model of a nutrigenetic aspect in obesity. The thrifty gene supposedly causes carrier to store high-calorie foods as body fat, a presumably as an progress protection against undernourishment during famines. Moreover, several research have found connection between the single nucleotide polymorphism (SNPs) and obesity. The mainly recognized obesity correlate gene is the FTO gene. Among studied individuals, it was Studies found that individuals with AA genotype illustrate a higher Body Mass Index compared those with TT genotype when having high low carbohydrate or fat diet [20]. The APO B SNP rs512535 is an additional example of obesity linked variation. It was indicated that individuals with A/G heterozygous genotype has high body mass index and waist circumference [21].

Although it is important to provide effective dietetic interventions based on nutritional requirements, dieticians need basic competency in genetics as a foundation for understanding nutritional genomics in order to apply nutrigeneticsas part of their dietetic practice [22]. However, this is not the main requirement, as evidence suggests that certain key factors play a major role in the provision of advice related to personalized, genotype-based nutrition [23,24].

3.2 Dieticians' Current Practice and Attitudes about Nutritional Genomics

In the USA, a survey involving 362 dieticians with regard to the gap between the practice and the genetics education of health professionals concluded that the main concern for the dieticians in terms of providing personalized nutritional advice was the minimal involvement in genetic activity [23]. In addition, another study involving995 dieticians aimed at assessing the educational needs of registered dieticians in the USA, indicated a low level of confidence in the ability of dieticians to provide dietary counseling related to nutrigenomics in practice [24].

In a recent online survey study including 373 registered dieticians in Canada with regard to the current situation about nutrigenomics in the practice, indicates that dieticians know and are interested in nutritional genomics, mainly on the part of those with less experience while they do not feel sufficiently trained to integrate outcomes from nutrigenomics into their dietetics practice [25].

In the United Kingdom, a national postal survey included 390 dieticians and indicated gaps in their genetic skills and knowledge, with no involvement and low confidence in activities relating to nutrigenomics in their clinical practice [4]. This finding was supported by another study which aimed to assess the factors related to the knowledge of nutrigenomicson the part of dieticians in the UK [26]. Moreover, a review of specialist dietician services for patients with inherited metabolic diseases in the UK, pointed to the need to increase the degree of knowledge with regard to nutrigenomics among specialist dieticians [7]. In a recent qualitative study that explored current practice and the attitudes of dieticians with regard to nutritional genomics, involving sixteen semi-structured interviews with practitioners from the United Kingdom and Australia, the dieticians acknowledged that there are wide applications for nutritional genomics and there was a general lack of awareness of nutritional genomics that

indicates knowledge, skills, and confidence gap on the part of dieticians [27].

In a wider study involving 1,844 dieticians from the US, Australia and the UK, aimed at assessing and determining the factors that affect dieticians' knowledge, involvement and confidence in genetics and nutritional genomics, it was concluded that dieticians' knowledge, involvement and confidence relating to genetics and nutritional genomics remains low, and a significant relationship between confidence, involvement and knowledge was observed [28].

4. DISCUSSION AND CONCLUSION

A development in nutritional genomics' research promises a future revolution in the prevention of nutrition-related disorders. However, since nutrigenetics is an emerging science within nutritional research, it is expected that the findings will not be consistent and may often be conflicting. This will decrease the effectiveness of the personalized dietary advice provided by dieticians [12]. Results in limiting the use of nutrigenetic testing in routine dietetics practice in the near future [22].

In the long future, nutrigenetics should allow dietitians to personalized dietary recommendations; therefore, preventive medical care could be optimized. The current relative research trials from the German Sport University Cologne show that health Personalized nutrition base on the outcome of a nutrigenetic investigation is more successful than classical diet counseling [29].

Conversely, at present there are no nutrigenomics practitioners licensed professions. Hence, there is concern on the legality of consultation providing by private companies on nutrigenomics test results. In other way, there are issue on how well does these companies interpret and understand the test result. The main potential ethical concerns arise is the unverified information regarding test results, such as, advertising unnecessary or over-priced supplements based on unproven medical claims [12]. In the end the understanding on genetic test outcome needs special consideration. Misinterpretation might probably give the wrong impression to patients leading to false medical claims. Confusing information resulting in undermine customers' capability to take informed decisions [30].

Consumer acceptance and ethical issues with regard to personalized, genotype-based nutrition becomes an issue when talking about nutrigenomics. Evidence indicates that the obvious benefits and ease of implementation of personal nutrition in terms of a habitual diet could help raise the rate of consumer acceptance of nutritional genomics [31]. In order to apply nutritional genomics in healthcare services, these social, attitudinal, and awareness issues on the part of dieticians need to be addressed [27].

The very fact that nutrigenetics and nutrigenomics require a deep understanding of different filed in health since include nutrition, genetics and biochemistry and ever new 'omic' technologies, it is often difficult, even for very well educated health professionals, to appreciate their relevance to the practice of preventive approaches for optimizing health, delaying onset of disease and diminishing its severity.

Intervention study examines the success of a genetics educational intervention for nursing and dietetic students [32]. Point out that understanding of genetics and nutritional genomics raise with university training or professional development in these filed. However, from the data presented, high levels of confidence in educating health since student and health professional in genetics activities are predictive of high knowledge scores, which reinforces that teaching and education in nutritional genomics in health care requires specialist knowledge and skills.

The conclusion that understanding, contribution and confidence relating to genetics and nutritional genomics are limited among dietitians reflect results of studies conducted with other non-genetic health professionals such as nurses, midwives, allied health professionals and physicians [33,34].

In the nutrition and dietetics area, the Academy of Nutrition and Dietetics has released a proposed position concept on the 'Importance of nutrigenetics and nutrigenomics since in dietetics and tertiary curriculum frameworks in the US and UK have been updated to include genetics and nutritional genomics, respectively [35,36]. Indisputably, further advance effort is still necessary to train dietitians for the nutritional genomic revolution.

Despite the need for increased research into nutritional genomics to provide a better understanding of the health benefits of personalized nutrition in terms of the prevention of various diseases, the application of

nutrigenomics in clinical practice will need an evidence-based method to validate the possibility that personalized dietary advice results in health advantages to patients, and does not cause harm [22]. There is a huge demand for an increase in the knowledge and skills of dieticians in this field, in that they should understand, interpret, and communicate complex genetic tests in order to deliver the genetic results and nutrigenomics message into common language as part of their clinical practice [2].

Dieticians can increase their knowledge and skills in order to meet these challenges by participating in specific training courses on diet and gene interaction, and by attending conferences and seminars to exchange their perspectives on nutritional genomics [13]. These initiatives could assist dieticians to apply the knowledge gained with regard to nutritional genomics to improve human health through personalized nutrition. In addition, instituting a healthcare system that supports and rewards this approach alongside other practices, could promote its implementation [19].

CONSENT

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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