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ABSTRACT

Background: Now a day people are more concerned about the nutrition and their health status. Form the last two decades a lot of progress has been seen to isolate substance of high nutrition and medicinal values from the daily consumable items. It is proved that these dietary supplements derived from plants and animals have benefits to the body or may supply the body with essential fatty acids, proteins or other nutrients which are helpful in improving body function. The especial food entities with such benefits are termed as nutraceuticals.

Objective: This study aims to evaluate the use of nutraceuticals among the inhabitant of Penang, Malaysia. Furthermore, this study also aims to understand the population need for the nutraceutical use and difference in nutraceutical use among the inhabitants.

Method: A cross sectional study conducted among the inhabitants of Penang using a structured twenty three item questionnaire. A non-probability sampling method was used to approach the potential participants. *Chi Square* test was used to test the difference between proportions. However, in the case where 2x2 tables have expected cell count less than five among 25% of the cells then *Fischer exact test* was preferred over *Chi Square.*

Results: A total of seven hundred respondents were approached for their participation in this study. Of whom four hundred showed their willingness to participate in the study with a response rate of 57.1%. Majority 218 (54.5%) of the respondents were female. Findings demonstrated that 267(66.8%) of the respondents were familiar with the use of nutraceuticals and 282 (70.5%) have used or using nutraceuticals. Most of the respondents 294 (73.6%) believe that nutraceuticals are safe to use. While evaluating respondents perceptions toward the use of nutraceutical, the use of nutraceuticals to cure the medical complications was found statistically significant (x^2= 21.196, df=3, p= 0.000). In addition to this other disclosed the nutraceutical use to improve the body function [i.e overall organs performance], to improve the mental performance and to reduce weight.

Conclusion: Malaysian population was found familiar with the nutraceuticals and nearly all participants of this study have reported their use. The use of nutraceuticals was higher among Chinese women in comparison to other ethnic groups' i.e Malay and Indians. In general it was found that majority believe that nutraceuticals are safe to use, for general well being. Women were more likely to use nutraceuticals for sliming purpose, while men reported to improve the body function.

Keywords: *Malaysians, Nutraceuticals, Chinese*

Introduction

Growing concerns about diet's impact on health reflects the rising economic and social costs associated with diet-related diseases such as cancer, diabetes and cardiovascular disease [1]. With the emphasis in many jurisdictions focusing on cost-effective health care, the importance of dietary changes for improved health and disease prevention is widely acknowledged. Historically, the predominant focus has been on broad in take of the dietary product which help to improve body functioning and to develop/ boost the immune system [1,2]. More recently nutraceuticals are found to demonstrated beneficial affects one or more target functions in the body, beyond adequate nutritional effects [3]. In a way that is relevant to either improved state of health and well-being and/or reduction of risk of diseases [3].

The concept of *Nutraceuticals* is not new; the use of food as medicines was practice by mankind since early ages. However, an earlier concept of nutraceuticals was given by ***Ibn Al-Bitar*** 12th century AD when he has introduce the way of treatment through food in his book *"The Collection of Medicines and Food"* (**الجامع لمفردات الأدوية والأغذية**) [4]. However, the modern concept of nutraceutical was re-introduced by in 1989 by Dr. Stephen DeFelice [5].

Many dietary supplements derived from plants have benefits to the body or may supply the body with essential fatty acids (*Glycerols, Omega 6, and Omega 3*), proteins *(globulins, methionine, cysteine, tryptophan and lysine),* and other macro and micronutrients *(Zinc, Calcium, Cobolt, Iron, Sodium etc)*. Theses foods with medicinal benefits are termed as nutraceuticals [5]. In other words the chemical/ biological composition/ ingredients of these food entities posses specific health or medical benefits including the prevention and treatment of disease *(like High cholesterol, Diabetes mellitus, Hypertension etc)* are called as nutraceuticals [6]. According to Khan et al 2004, Nutraceutical have the potential to play a vital role to the prevention and treatment of certain diseases [7]. The emergence of nutraceuticals was not immediate, we have learned from our experiences that new molecules are not only difficult to discover but they are also expensive and risky then ever before [8]. Moreover, over for the new products the beneficial affects are sometimes less than the adverse affect [8]. These issues have motivated many pharmaceutical companies towards the formulation of the new nutraceuticals [8]. So that there is undoubtedly a very huge and growing market, according to a market research report, *Nutraceuticals: global markets and processing technologies from BCC Research*, In 2007 the global market for nutraceuticals was worth $117.3 billion with an expected increase to $123.9 billion in 2008 and is predicted to exceed $176.7 billion in 2013 [9]. Currently, the nutraceuticals market is broken down into nutraceuticals foods, beverages and supplements. United States (US) is leading the global nutraceuticals market with over 32.8 percent of the global market share [9].

Malaysia's is multicultural country, the estimated population of 27,730,000, of whom 5.44 million Malaysians live in East Malaysia and 21.2 million live in Peninsular Malaysia. Malaysian population comprises of Malays (Bumiputera) which comprises 65% of the population followed by Chinese 26%, Indians 8% and other ethnic groups 1% [10]. It is reported that Malaysians are more inclined toward the used of herbal products [11,30]. However, nowadays this trend toward herbalism is shifted toward the nutraceuticals use; variety of such products can be found in the Malaysian shelves. Both national and international nutraceuticals industry is providing a huge product range that provides

prevention from disease in addition to nutrition. While observing the scenario in Malaysia in term of herbs use it is seen that all these three main ethnic groups are found more inclined to use herbs [11]. Moreover, the use of herbal products is quite frequent to improve the immunity, health status and body performance [11,30].

In recent years the area of nutraceuticals have been actively established by the Malaysian research institutes [8], best examples in this regards are Malaysia Institute of Pharmaceuticals and Nutraceuticals (University Sains Malaysia) and Functional Food and Nutraceuticals Research Unit (International Islamic university Malaysia). A wide herbal diversity in Malaysia may be one of the reasons for developments and advancement in the field of nutraceuticals [12]. For example, in Malaysia Tongkat Ali is known as *Asian Viagra* which is an endurance enhancer and used by Malaysian men to enhance their sexual performance [12]. Besides, under Universiti Teknologi Malaysia CEPP (Chemical Engineering Pilot Plant) there are research activities regarding in development of C*innamon zeylanicum* for diabetic patients and pineapple fiber as functional food [12].

The empirical literature on consumer attitudes towards and preferences for nutraceuticals has only recently become established. To date, most studies have focused on consumer awareness and acceptance of functional foods and nutraceuticals [13]. In Malaysia the nutraceutical revolution is in full swing and has dramatically changed the nature of the food industry. Varieties of nutraceuticals are available in the market which people commonly said it was food supplements. Majority of Malaysian used it for different kind of purposes such as for beauty, memory enhancements, anti-aging, disease related products, extra supplements for general wellbeing and diseases like diabetes, high-cholesterol, hypertension etc [12]. Malaysia is one of the countries where traditional and cultural medicines are abundantly practiced. However, still there is a scarcity of efforts to explore that facts that how much do consumers actually know about the nutraceutical. What is their knowledge regarding the safety and the benefits of nutraceutical safety. The current study will focus on this area to explore public knowledge and attitudes regarding the use of nutraceuticals in Malaysia. In addition this study will also provide the figure, how many of the Malaysians are prone to use nutraceutical with some major or minor illnesses.

Methodology

A cross sectional study was conducted to attain the objectives of the study. Face to face interviews were conducted using a structured 20-item questionnaire. The current study was conducted among the Inhabitants of Penang, Malaysia. Penang is one of the thirteen states of Malaysia with an estimated population of hundred and fifty thousand people.

Participants and ethical consideration

This study encompasses a non-experimental method. A non-probability sampling method was used to approach the potential participants. As no previous study was performed in Malaysia on this topic, so the use of non-probability sampling method was preferred to obtaining immediate results which provide basis for methodologically strong studies. A total of seven hundred respondents were approached for this study. A verbal consent was also taken from the respondents in order to assure the confidentiality of the information. The study protocol was approved

by the college committee under the Ethical approval EA1808.

Reliability and validity of tool

Interviews were conducted using a self developed twenty item questionnaire. The content validation of the questionnaire was conducted by the professionals at the department of pharmacy, Island College of Technology (ICT) and School of Pharmacy, University Sains Malaysia. After the content validation the questionnaire was translated in to Malay language in order to make the questionnaire easier for the respondents to understand.

After the content validation face validity was performed. A pilot study was conducted to test the face validity, a total of fifty respondents were approached. Keeping in view the responses the reliability scale was applied and internal consistency of the study tool was estimated on the basis of Cronbach's Alpha (α = 0.78) ***[In general the Cronbach's Alpha equal to 0.70 or over is considered acceptable]*** [31] . In addition factor analysis was carried out using Bartlett's test of sphericity and Kaiser-Mayer-Olkin measure of sampling adequacy. The Bartlett's test of sphericity was for the study tool was significant 0.0000 and Kaiser-Mayer-Olkin measure of sampling adequacy was 0.840. According to Sheridan and Lyndall (2001), a measure of more than 0.6 reflects the adequacy of the contents of the questionnaire [31].

Contents of the questionnaire

The questionnaire comprised of three parts. One demographic part, second the part evaluating the knowledge attitude and perception towards the use of nutraceuticals and third section comprises of items that evaluate the respondents perceptions like; which health care professional they will approach to learn more about nutraceuticals and what type of information they want to learn more about nutraceuticals. The demographic part comprises of eleven questions. The first seven questions have covered the demographic information of respondents like ***race, gender, age, martial status, educational level, occupation and monthly income***. However, the rest four questions were about ***the health status of respondents like; are you suffering from any medical complication (Figure 1), currently are you using some medical treatment and are you using some traditional or herbal medicine***.

The main focus of section two was to evaluate the respondent's attitude and perceptions towards nutraceuticals use. At the start of this section nutraceutical was defined to the respondents in order to enable them to differentiate between the herbal/traditional medicine and nutraceuticals. This section comprises of five items, the questions considered for this section were; (1) ***Are you familiar with the use nutraceuticals and dietary supplements*** (yes/no), (2) ***have you ever used nutraceuticals*** (yes/no), (3) ***what type of nutraceuticals you have used*** (item scale *nominal;* Anti-oxidants, Vitamins, Fibre, Pro-biotic, Fatty acids and Herbs (figure 2) ***[These are the commonly available and advertised nutraceuticals on Malaysian national TV channels, Newspapers and Pharmacies and Shopping malls]***, (4) ***what was your main purpose behind nutraceuticals use*** (item scale *nominal;* To improve the general well being, To improve the body function ***[i.e over all organ performance]*** , To improve the mental performance, To reduce the weight, To improve the specific health and medical complication) (Table 2), (5) ***In your opinion***

how safe is nutraceuticals use (item scale *nominal;* completely safe, moderately safe, not very safe, not safe at all).

Section three comprise of four items. The main focus of this section was to get the respondents idea about the level of satisfaction with the information provided to them regarding nutraceuticals. Moreover, it was also questioned to the respondents that are they willing to know more about nutraceuticals. Further more a list of six sub items were presented to the respondents to know exactly that what type of information they seek more and which health care professional they prefer to seek further details about the use of nutraceuticals (Figure 3).

Data analysis

The data analysis was conducted using statistical package for social sciences students SPSS 13®. *Chi Square* (X^2) test was used to test the difference between proportions. However, where the expected cell count was less than five in 25% of the cells (2x2) *Fischer exact test* was preferred over *Chi Square.*

Results and Discussion

For centuries, man has self medicated for common ailments, and continues to use them along side modern medicines even today [14,15]. The plant kingdom has always been a source of medicine in their crude forms as herbal teas, syrups, infusions, ointments, liniments and powders. Despite the advances in modern medicine, traditional medicine has always been practiced. Traditional medicine refers to health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines as well as spiritual therapies applied singly or in combination to treat, diagnose and prevent illnesses or maintain well-being [20].

In past the use of traditional medicine was common among most of the current developed countries. However, the food and drugs manufacturers have introduced a new line of i.e functional foods/ nutraceuticals that are often available in supermarkets, pharmacies and grocery stores [21]. New developments in the food processing have resulted innovations in the food sector and majority seems to be inclined toward the use of these new food products [16]. Consumer acceptance is crucial to the development of successful food products [17]. It seems evident, overall, that there is increased consumer interest in food production technology [18]. As a consequence, consumers' attitudes toward new food technologies should be taken into account at an early stage of product development. Consumers' risk perception may differ from experts' assessments [19]. The views of both lay people must be taken into account concurrently in order to be successful in the market.

In recent years the use of nutraceuticals has increased drastically in Malaysia, which raises a need to evaluate the public knowledge about the use of nutraceuticals. The findings of the study offer evidence that the use of nutraceuticals is believed as a cure for various medical conditions. Hassali et al, 2009 that reported the evidence of herbal beverages use in the Malaysian population s preventive measure from various disease [11]. Almost a similar attitude is seen toward the use of nutraceuticals, gender and race were found to be significantly affecting the public attitude toward the use of nutraceuticals. It is noted that Chinese were found to be more inclines toward the use of nutraceuticals as cure or preventive measure for various medical

conditions Table 2. Similarly the use of nutraceutical for general well being particularly to reduce weight was higher among women (x^2 = 4.327, df=1, p= 0.038). Finding of this study prove the evidence provided by previous studies of high use of traditional and alternative medicines by women [11, 13,22,23,24, 25, 26, 27, 28]. Globally women are found to be more beauty conscious in comparison to men and this reason may have affected their will to use the nutraceuticals to reduce weight and physical beauty. However, on other hand the use of nutraceuticals to improve the body function was more common among Chinese men in comparison to women (x^2 = 4.717, df=1, p= 0.030) [11]. This attitude may be due to more physical responsibilities of male in the society as in most of the case men are the bread winners of the family. However, one question still remains unanswered. It may be possible that men have mixed up the sexual performance with the improvement in the body function. This limitation is one of the potential motivations for the future studies to explore the answer for these questions.

In terms of race the use of nutraceutical among Chinese was higher in comparison to Malay and Indians [11]. Chinese respondents were found more likely to use nutraceuticals to improve their mental health (x^2 = 12.196, df=3, p= 0.007). In addition to the evaluation of respondents attitude toward the use of nutraceuticals it was also seen that majority 119(29.75%) of the respondents are suffering from some type of medical complication. The commonly seen medical disorders were DM 38(9.5%), HTN 27(6.8%), Heart Problems 21(5.3%) and High cholesterol 15 (3.8%) Figures 1, most of the respondents have disclosed the use of vitamin, antioxidants, herbal extracts and immunosuppressant along with these medical complications Figure 2. It is possible that the use of such herbal product may aggravate the current medical complication; furthermore it was not questioned from the respondents that are they using any medical treatment advised by their medical practitioner. In the case if there is co-administration of herbal extract and immunosuppressant along with the drugs prescribed by the physician then it may increase the risk of potential drug related problems which can result some fatal events among the users [29]. According to Laura, 2002 there is a need to educate the patient further about the concurrent use of modern medicines and herbal extracts [29]. As in the current study most of the respondents have shown their interest to know more about the safety issues of nutraceuticals 109(27.3%), source of product 104(26.0%), benefits and claims 69(17.3%) and adverse affects associated with the use of nutraceuticals. These findings highlight the need to educate the user about the safe and rational use of nutraceuticals. These findings highlight to stricken the sale of nutraceuticals only at pharmacies where pharmacist will provide all the necessary information to the consumer about the rational use of such products, which will not only help in reducing the risks associated with the use of nutraceuticals but also help the consumer to attain the desire the benefits in a safe way.

Limitation of study

A non-probability sampling method may be one of the main limitations of the study. In addition the respondents' purpose for the use of nutraceuticals is evaluated very superficiality. This limitation will act as a motivation for the future studies to perform in dept evaluation of public attitude toward the use and perceptions about the benefits of nutracetuicals.

Conclusion

Gender and race were the two main variables affecting respondent perceptions towards nutraceuticals use. It is seen that the use of nutraceuticals was higher among Chinese women. In general it was found that majority believe that nutraceuticals are safe to use, for general well being. Women were more likely to use nutraceuticals for sliming purpose, while men reported to improve the body function.

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Table 1: Demographic data of respondents

Demographics		N (400)	%
Gender			
	Male	182	45.5
	Female	218	54.5
Race			
	Malay	262	65.5
	Chinese	97	24.2
	Indians	41	10.3
Age			
	18-30	215	53.8
	31-45	102	25.5
	46-60	53	13.2
	61-75	19	4.8
	Over 75	11	2.7
Marital Status			
	Single	205	51.2
	Married	147	36.8
	Widow	37	9.2
	Divorced	11	2.8
Educational level			
	Primary	120	30.0
	Secondary	92	23.0
	University qualification	156	39.0
	Diploma	31	8.0
Current Occupation			
	Professional	93	23.3
	Self-employed	62	15.5
	Unemployed	24	6.0
	Housewife	28	7.0
	Pensioner	22	5.5
	Student	126	31.5
	Other	45	11.2
Income level in RM			
	< 500	64	16.0
	500-1000	68	17.0
	1100-2000	43	10.8
	2100-3000	49	12.2
	3100-4000	27	6.8
	>4000	25	6.2
	Depends on parents	124	31.0

Table 2: Purpose for Nutraceuticals

	For general well being	To improve the body function [i.e over all organ performance]	To improve the mental performance	To reduce weight	To cure the medical complications
Race					
Malay	35	21	6	8	11
Chinese	108	60	41	14	28
Indian	14	7	0	2	15
	x^2 = 2.311, df=3 p= 0.510†	x^2 =1.068, df=3 p= 0.785†	x^2 = 12.196, df=3 p= 0.007*Ĭ	x^2 =1.249, df=3 p= 0.741 Ĭ	x^2 = 21.196, df=3 p= 0.000*†
Gender					
Male	65	49	23	6	24
Female	92	39	24	18	30
	x^2 = 1.751, df=1 p= 0.186†	x^2 = 4.717, df=1 p= 0.030*†	x^2 = 0.254, df=1 p= 0.615†	x^2 = 4.327, df=1 p= 0.038*†	x^2 = 0.281, df=1 p= 0.867†

** Significant, † Chi-square, Ĭ Fischer exact*

Figure 1: Type of medical complication reported by respondents

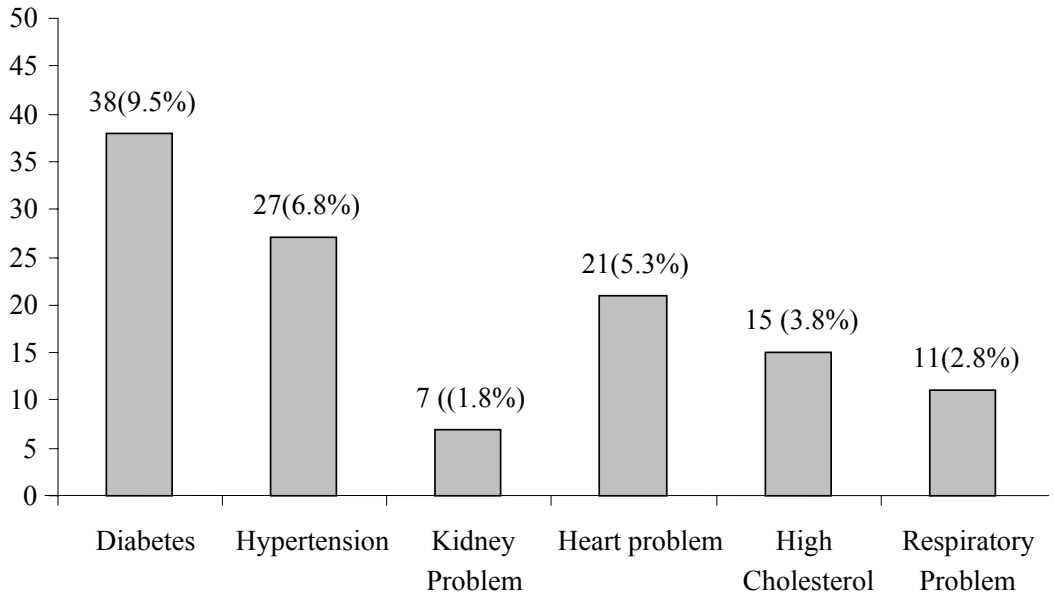

Figure 2: Type of Nutraceuticals used by respondents

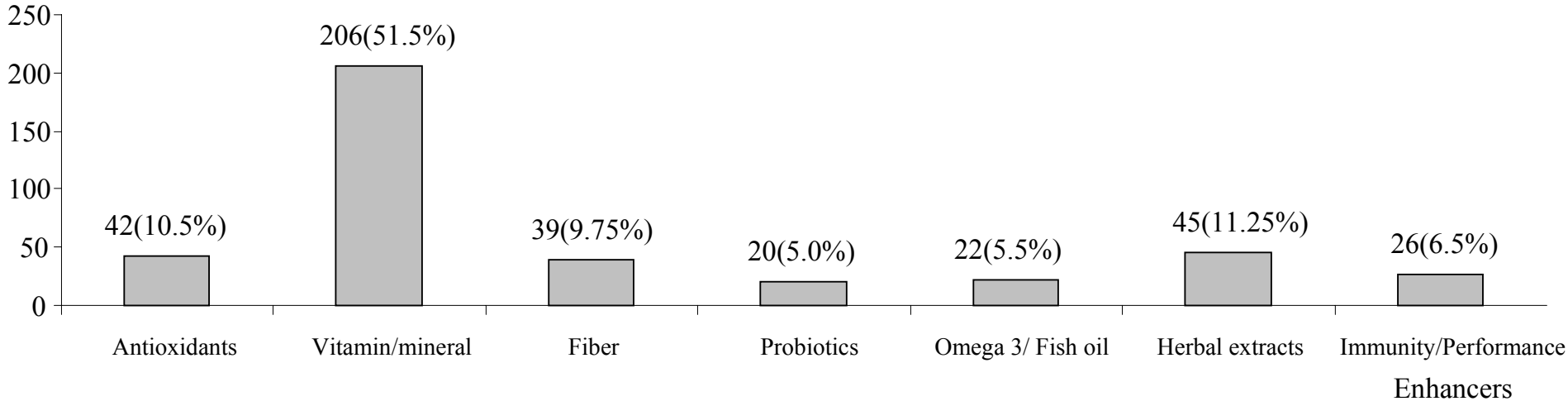

Figure 3: Type of information respondents want to know about Nutraceuticals