Obesity, Type-II Diabetes and the Use of Food Labels: A Malaysian Perspective

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Abstract: Nutritional labelling of processed foods serve to implement consumer-driven food choices in an attempt to reduce the myriad of food and obesity-related chronic diseases, including type-2 diabetes and heart disease, prevalent in modern societies and posing a significant strain on healthcare resources. Many countries, including Malaysia, have moved towards both voluntary and mandatory regulations to policy such public-health interventions, requiring disclosure of nutritional information on food labels. [1-3], often with particular emphasis on sugar, salt and fat content. The introduction of these policies demonstrates the considerable medical and economic burden of obesity and chronic diseases such as type-2 diabetes on healthcare, and recognition among policymakers of the need for dietary intervention through patient education. Various obstacles exist in ensuring consumers use nutritional labelling, including clarity of information, consumer health orientation, literacy levels, motivational factors and health education levels. It is clear however that consumers and patients need to be better informed to effectively utilise nutritional information in order to make better food choices to address the burden of obesity and non-communicable diseases such as diabetes.

Keywords: Diabetes, Obesity, Pharmacy, Nutritional Labels.

INTRODUCTION

According to the Malaysian National Health and Morbidity Survey, obesity levels in the country are almost 18%, while 30% of Malaysians are categorised as being overweight. This epidemic of obesity points towards the dramatic increase in the incidence and prevalence of type 2 diabetes, currently estimated at 3.5 million Malaysians, diagnosed and undiagnosed [4]. The Malaysia Nutrition Society has stressed the importance of education to address the rising levels of obesity within the country, with a focus on the younger generation of 10 to 11-year-olds. With regard to added sugar intake, for instance, varying recommendations exist; the World Health Organisation (WHO) recommendations in 2015 state that the intake of free sugars should not exceed 10% of total energy in order to prevent chronic disease. On a 2000 kcal diet, this translates to 50 grams of added sugar per day. The American Heart Association (AHA) recommends [5] the intake of added sugars not to exceed 100 calories per day for women and 150 calories per day for men, or 24g and 36g of sugar respectively [6]. The 2013 Malaysian Dietary Guidelines include the statement "Consume foods and beverages low in sugar" with general dietary advice on how to achieve this goal however, no specific limits regarding sugar intake are set. Sugar is the second most frequently consumed food item consumed by Malaysians [7], with an estimated mean intake of 22.21 g. However, this figure only accounts for added sugar consumption and does not include hidden sugars found in processed foods and beverages. Recent studies have suggested the intake of added sugar among Malaysian adults and children cannot be accurately determined, however, preliminary figures indicate sugar consumption appears to exceed the 10% of total calories limit recommended by the WHO [8]. This is a possible contributing factor to the rising obesity levels in the country [9]. Considering most Malaysians daily calorie consumption falls below the recommended nutrient intake (RNI) set by the Malaysian Ministry of Health's, RNI [7], it is logical to deduce that a significant proportion of these calories may be in the form of 'empty-calories', obtained from sugar and processed foods.

Obesity

Childhood obesity has become a major health concern and current estimates of obesity levels in Malaysian schoolchildren, according to current WHO definitions for 5-19-year-olds, stands at 20% [10]. Overweight (BMI greater than or equal to 25.0) and obese (BMI greater than or equal to 30.0) children are more likely to remain as such into adulthood and are more likely to develop diabetes [11]. Children who eat more "empty-calories" in the form of sweets and sugary drinks and expend fewer calories through physical activity are more likely to be obese than other children [12]. Beverages with high-sugar content, for instance, have been shown to cause weight gain and increased body mass index (BMI) in teenagers and children, and

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increase the risk of developing type 2 diabetes, independently of obesity [13]. The epidemic of obesity thus points towards the dramatic increase in the incidence and prevalence of type 2 diabetes [14]. Indeed, there is a close link between the risk of developing type-2 diabetes and body mass index (BMI). The distribution of fat is important and abdominal obesity in the form of central or visceral adipose, indicated by waist circumference is an established risk factor for the development of type-2 diabetes. 75% of Malaysians with type 2 diabetes were found to be obese (BMI > 30kg/m^2) [15], and abdominal obesity, indicated by an undesirable waist circumference among diabetics standing at 90% in women (> 80cm) and 74% of men (> 90cm) [16]. Ethnicity also appears a significant role as those of Asian ancestry appear to be at greater risk of developing type-2 diabetes compared to Caucasians, possibly due to variation in fat distribution and the associated implications to insulin resistance. In addition, the prevalence of prediabetes has also been shown to be highest among overweight and obese individuals [17]. It is important to note however not all patients who are overweight or obese develop type-2 diabetes. The precise mechanisms linking obesity and type-2 diabetes currently remain unclear [17].

Type-II Diabetes

Diabetes mellitus remains a significant global health problem [16] and is associated with abnormalities in protein, carbohydrate and fat metabolism [18], all of which can lead to devastating complications for a patient, reducing life expectancy and quality of life. The Western Pacific (WP) region, as classified by the International Diabetes Federation is home to just over a third of the total number of people with diabetes in the world. Including countries such as Australia, China, Indonesia and Malaysia, approximately 138 million people have diabetes; within this region, overall prevalence stands at 8.6%. Many countries within WP are experiencing a rapid rise in diabetes, with China leading the way. Within the next two decades, the number of people with diabetes in WP is expected to rise by 46% per cent. The number of Malaysian citizens with diabetes has almost tripled over the past fourteen years from 6.3% in 1986 [19] to 17.5% in 2015 [20]. The current prevalence of diabetes is estimated at over 3.5 million Malaysians, including both diagnosed and undiagnosed cases, the highest in the Western Pacific region and represents a total healthcare cost of RM1.40 billion per year [4] or almost 10% of the total healthcare spending by the Malaysian Ministry of Health. These figures do not consider individuals most at risk from developing type-2 diabetes, those with pre-diabetes, a condition in which blood glucose levels are higher than normal but are not high enough for a diagnosis of diabetes. Diabetes has thus become one of the top-ten major diseases that weigh a significant burden on the Malaysian healthcare system, holding the 6th place among men and 5th place among women [21]. Thus the importance of patient education and promoting self-care is not only an important component of disease prevention through dietary and lifestyle advice but also chronic disease management and improving patient outcomes since good adherence to medication is associated with reduced risk of diabetes complications and reduced mortality.

Patient Education

Promoting self-care in patients with chronic diseases such as type-2 diabetes is crucial to improving patient outcomes [22] and there are two major aspects to this. Firstly, patient education, focusing on a holistic approach to lifestyle, to allow patients to make informed choices when it comes to diet and health. Secondly, the adherence to often complicated medication regimes; which is of particular concern in diabetic patients who often present with co-morbidities. Good adherence is associated with reduced risk of diabetes complications, reduced mortality [23] and reduced economic burden [24]. The strict control of type-2 diabetes, in relation to blood glucose levels, Hb1Ac, diet exercise and lifestyle intervention could and should delay the onset of the myriad of diabetes complications. However, a substantial proportion of individuals with type-2 diabetes do not take medication as prescribed, with only 67–85% of oral medication doses taken, and approximately 60% of insulin doses [22]. Adherence levels among Malaysian patients have revealed worryingly low levels in type-2 diabetic patients, currently standing at 43% [25]. In recent years the Malaysian Ministry of Health Malaysia has made a considerable effort towards improving adherence through the introduction of multidisciplinary diabetes medication therapy adherence clinics (D-MTAC), which offer diabetes self-management education, and lifestyle support in the form of nutrition advice and encouragement of physical activity, together with smoking cessation counselling. A 2008 Diabetic Care Study (DiabCare), conducted in Malaysia [19] revealed the prevalence of combined microvascular complications of diabetes (retinopathy, nephropathy, and neuropathy) standing at 75% and combined

macrovascular complications (angina pectoris, myocardial infarction, angioplasty/coronary artery bypass graft, and stroke) to be 29%. Worryingly, these prevalence figures have remained relatively unchanged as illustrated by a similar DiabCare study conducted in 2013 [16]. Thus despite evidence of improved access to diabetes care, in the form of medication therapy adherence clinics (MTAC) introduced in Malaysia since 2004, it seems the prevalence of many diabetes-related complications among Malaysian diabetics remains relatively unchanged. Only 27.6% of Malaysian patents achieved target fasting blood glucose levels of <6.0mmol/L. In addition, only 37% of patients achieved a Hb1Ac of <7.5% and 12% of patients achieved the target Hb1Ac of <6.5%. It is clear that diabetic specific intervention services still have a long way to go to achieve the goals of reducing long-term diabetic complications, and such provisions must be undertaken with a multi-disciplinary and multi-faceted approach, focusing not only on the disease state, but also the broader root cause, in particular modern consumer patterns and dietary and lifestyle habits which lead not only to type-II diabetes, but also obesity. Thus focusing on patient education, an important question is, do current diabetic intervention programs and government healthcare policies provide diabetic patients with sufficient information and exposure to make informed food purchasing decisions, and crucially, do such programs sufficiently motivate patients towards making such decisions.

Multi-Faceted Education

Diabetics are actively encouraged to use food labels to make better food purchasing decisions as indicated by the wealth of online information available directly tailored to diabetic patients. The primary aim of such information is to assist patients to move towards their healthy-eating goals. One could argue that diabetic patients should be more motivated, due to health concerns, to make better use of nutritional information on food labels. Studies of health orientation and food-label use have shown food labels to have little effect on those who are perceived to need them the most [1]. One could deduce therefore there are two ways to tackle this problem of poor food label use among those with long-term conditions, firstly, the use of broad healthcare intervention directed at the general population, and secondly in the form of tailored and directed healthcare education to those that need it the most. Structured diabetes care programs have been found to have a limited impact on patients [26]. The Diabcare studies indicate the 'one-size-fits-all' approach to diabetes care and patient education may have a number of limitations. These could be hypothesised as not sufficiently rigorous in terms of content, not addressing the emotional, educational and motivational needs of patients, not sufficiently tailored to individual patients, utilising healthcare practitioners whom may not be confident in addressing patient needs, require reinforcement in terms of broad healthcare policy targeted to the general population, which should then filter down to diabetic patients and require the assist if community / tertiary practitioners to reinforce relevant healthcare information not only to the general public but also the target audience of diabetic patients [1-4, 27]. Thus both government policy and the better use of primary and tertiary healthcare practitioners must be at the core of such an approach. Shifting patient education away from clinicians and towards pharmacists, nurses and dieticians, providing clear boundaries for roles and responsibilities, in an attempt to present a unified front to patients [28]. Pharmacists are traditionally perceived as important sources of information, particularly within tertiary healthcare. The open and accessible nature of pharmacists within the community often collaborating with other health care professionals presents an opportunity for such tertiary level pharmacists to expand their roles within diabetes care order to improve long term patient outcomes. For diabetes prevention, for instance, community pharmacists have proven to be valuable in providing screening services to the general public, dietary and lifestyle advice and suggesting better approaches to self-management [29], possessing the clinical skills required to make a real impact on patient outcomes [30]. What is required are concerted and coordinated educational programs between primary and tertiary care practitioners, to ensure diabetic patients leaving primary care, are closely monitored within tertiary care, with a possible focus on diet, using pharmacists and other tertiary healthcare practitioners to better inform patients on the correct and effective use of food labels, allowing them to make better food choices.

Regulation and Taxation

The availability of energy-dense foods and beverages and the increased use of advertising especially that targets children and youth have been linked to the increase of childhood obesity [31]. There are no direct industry relevant regulations concerning the advertising of sugary foods to Malaysian children for instance, nor are there safeguards concerning the quality or types of food available in Malaysian school cafeterias. Public health professionals have decried the

generally high levels of hidden sugar found in everyday foods, and drawn parallels between the tobacco and food industries, with calls for additional regulation of sugary foods, including taxation of beverages with sugar content above a certain threshold [32]. Indeed, the idea of taxation of non-essentially commodities is not a new phenomenon and can be traced back to 18th Century Scotland, and the taxation of rum, tobacco and sugar, which were considered as non-essential for life [33]. Taxation of cigarettes and tobacco has become a universally accepted way of attempting to curb smoking and health consequences. In 2016, the World Health Organization (WHO) recommended the "implementation of an effective tax on sugar-sweetened beverages" as a key way to address the levels of childhood obesity [34]. Increasingly, governments are introducing fiscal policies including taxation as a means of controlling sugar consumption, including many states within the US, Fiji, Chile, Barbados, Mauritius, and Brunei [35]. Within Europe for example, Norway introduced such legislation in 1922, France in 2012, Belgium in 2016. Recently, the United Kingdom introduced a 24p tax on drinks with a sugar content of 8g/100ml and above a certain pack size [36]. The effectiveness of such an approach is still open to debate however research by Mintel, a global market research company, has suggested 50% of British consumers would be encouraged to reduce consumption of sugary drinks after such taxation. Estimations on the effectiveness of taxation on sugar-sweetened beverages in Chile points towards a -1 mean price elasticity, where a 1% increase in retail pricing will lead to a 1% reduction in overall consumption [37]. Other studies from Germany have estimated a significant influence on obesity levels and dental caries if a 20% sales tax is levied on sweetened beverages. The recent experiences in Mexico, have shown that a 10% level of taxation resulted in an approximate 7% reduction in consumption, while direct studies from Chile revealed a similar drop in consumption after a 5% increase in taxation [38,39]. To avoid taxation, some manufacturers, such as AG Barr have responded by reformulation to reduce sugar content, while others such as Coca-Cola have simply reduced pack sizes. On a separate note, aside from sugar consumption, modern society brings with it changes in lifestyle which ultimately will influence dietary patterns of a population. Continued urbanisation, with changing and ever demanding patterns of work, less leisure time, could be implicated in a shift towards the consumption of processed food and hence an increasing prevalence of non-communicable diseases.

Regulation and Food Labelling

An interesting observational study, examining the effects of both price and labelling on purchase behaviour of sugary drinks was conducted among 675 participants [40]. As prices increased, there was a reduced tendency to purchase sugary drinks, however, labelling did not have a statistically significant effect on purchase behaviour, with one exception. The use of 'high sugar' warning labels tended to reduce the likelihood of sugary drink selection, pointing towards the importance not only of the importance of taxation but also front-of-pack or FOP labelling. For consumers in South Africa, the price was determined as the main influencing factor on purchasing behaviour, and consumers were found to struggle with the information presented in nutritional labels, with calls to simplify labelling, moving towards a more graphical and FOP representation [41]. A small study in Taiwan revealed the introduction of FOP in a worksite canteen resulted in consumers choosing foods based on recommendations increase from 38% to 50% [42].

The vast majority of consumers underestimate the calorie content of food [43] and as a result, considerable steps have been taken to better inform the public through comprehensive nutritional food labelling. The labelling of processed foods in the UK, for instance, has been a contentious issue and recently attempts have been made to standardise such with the use of a traffic-light system, which score different nutritional content such as salt, sugar and fat as red, amber and green for unhealthy, moderate and healthy respectively [44]. These are placed on the front of food packaging, to ensure consumers can instantly see the relevant nutritional information. Such systems go a long way to allow the public to make more informed and healthier food choices [45]. In an attempt to intervene in the increasing prevalence of obesity and diabetes within the population, the Malaysian government introduced an updated National Plan of Action for Nutrition [3], to promote healthy eating and living, with the aim to prevent and control the incidence of obesity and other diet-related diseases. Points of action under this plan include the public education of nutrition labelling, expansion of current labelling requirements to include a mandatory declaration of total sugar and sodium content, as well as to strengthen the voluntary implantation by manufacturers of FOP labelling to indicate energy content. The current labelling system implemented in Malaysia requires mandatory basic nutritional information, in the form of energy in kcal or kJ, amount of protein, available carbohydrate and fat

expressed in grams and the total sugars, usually placed on the back or side of the packaged product.

Considerable research has been undertaken on the effectiveness of food labels, particularly whether consumers do actually use food labels, and if such use leads to behaviour modification to result in positive changes to diet. Both questions remain inconclusive and as such, the use of food labels by consumers may or may not lead a change in intention or to healthier food choices [46-49]. The use of food labels has seen an increased, particular among household food shoppers, as indicated by a survey conducted in 2004 among Irish consumers, which indicated only 8% of shoppers consulted food labels [50]. A similar survey conducted in 2009 indicated this number had increased to 25% [51]. Those most likely to use food labels being women, and household grocery shoppers. Individuals least likely to consult labels were men and those aged over 55. Consumers were also least likely to use food labels for 'everyday' items such as milk, juice, pasta and also when it comes to items considered 'junk food'.

An important factor to consider is the motivation that drives individuals to use food labels, and evidence suggests that overall health status and orientation as being a positive driving force leading individuals to use food labels [52]. Consumers that are generally expected to be motivated by general health concerns and so more likely to display behaviours that lead to positive changes in health. Such individuals tend to be more self-aware and interested in food-related issues, however, whether this leads to such individuals to take advantage of nutritional information to achieve positive health outcomes is still debatable [53]. Studies among 500 consumers revealed nutritional labels have limited effects on consumers deemed to need them the most, where food labels appear to be used more frequently among consumers who are already very well informed and health conscious, and so engaged in other health-related activities [54].

In a small US study, young adults with 'low health literacy' were less likely to use food labels compared to those with medium and high levels of health literacy [55]. This is an important consideration as health literacy and patient education levels are directly related to clinical outcomes for those with chronic conditions, indeed health literacy is important in improving adherence and in general, health literacy among diabetic patients tends to be low, associated with a lack of diabetes knowledge, self-efficacy and self-care behaviours [55]. Thus one major objective of multidisciplinary educational programs directed at diabetic patients is an improvement in health literacy. A rather more nuanced study, in which 24 Australian consumers [56] were interviewed in an attempt to explore consumer perceived food risks, where food 'risks' were defined in a traditional sense, in terms of allergens and food spoilage, and modern risks with respect to social and environmental issues of food production, and chemical contamination. The study revealed the role of food labels as both a symbol and a tool for consumers to allow communication and management of food risks. This seems to correlate with studies that indicate consumers appear to place greater emphasis and importance on food safety information, rather than nutrition [57]. This detail also stresses the importance on manufacturers to ensure the accuracy and authenticity of the information provided on food labels, both nutritional and risk related This is demonstrated by an interesting study from Malaysia [58], which examined the nutrient labelling accuracy of 1200 commercially available processed foods. The labelled information contained within 34% of the products did not comply with the nutrition labelling tolerances defined with the Malaysian Food Act 1983, 56% failed to comply with the UK LACORS limits, and a substantial 73% did not comply with the more rigorous 20% tolerance limits set by countries such as Japan. A detailed study of over 1500 consumers in Turkey attempted a direct evaluation of labelling use, with regard to the use and degree of confidence in information sources related to both nutrition and health. The overall frequency of use of nutritional food labels before a purchase was found to be 72.3%, (sometimes, 44.4% and frequently, 27.9%). Use of food labels was significantly higher among women, married individuals, and those from higher social economic groups (SES) [59].

Recent studies in Malaysia have revealed that almost 55% of Malaysian consumers do not read food labels when making a buying decision, and 22% 'sometimes' read labels [7]. This is very similar to British customers, who show very little engagement with food labels and often avoid reading the back of a packaged product [60]. A comprehensive 2014 survey conducted by the FDA asked respondents a number of crucial questions concerning lifestyle; the awareness of the relationship between diet and diseases (particularly cancer, heart disease, and high blood pressure), knowledge of fats and cholesterol, knowledge of dietary deficiencies, dietary management practices, and the use and impact of food labels [61]. The research findings were generally positive, with adults responding

positively to questions regarding diet and lifestyle-related questions. Similar to a Turkish study, 71% of respondents expressed that they used food labels when making purchasing decisions (regularly 25% and sometimes 46%). Of the rest, 52% of these users feel they don't need to use food labels, 28% do not have the time and 7% expressed difficulty in use. A meta-analysis of the impact of food labelling on food choices and eating behaviours revealed rather sobering figures where the use of food labels results in an 18% increase in healthier food choices and much smaller 3.59% decrease in calorie intake [62]. Both figures were deemed statistically insignificant. However, the traffic-light system of labelling was deemed marginally more effective in promoting healthier food choices. Colour coded and FOP labels have been proven to capture the attention of shoppers [63], and a recent study revealed that increasing the visibility of food logos, in this case, an organic logic [64], had a positive impact on attention capture.

CONCLUSION

The utilisation of food labels among consumers is still a much debated and contentious issue. The use of food labels, both among healthy consumers and individuals with compromised health orientations, and the effectiveness of such labels in moving consumers towards making better food purchasing decisions remains inconsistent. For obesity prevention and diabetes care, for example, promoting self-care, both pro-actively in the general population through the use of food labels, sugar taxation and the control of advertising, and formally through structured educational programs directed at diabetics, in order to help reduce the incidence of obesity and in diabetic patients, and reduce the myriad of long-term complications associated with the disease, must be considered one and the same. To this end, the use of food labels, and educating the general population, particularly vulnerable individuals and diabetic patients, in the correct use of food labels much be considered a public health priority. Patient education, both informal and formal must be designed and delivered to ensure consumers and patients are equipped with the knowledge and skills to make positive and long-lasting changes to diet and lifestyle. In order to achieve this, pharmacists, both within community and hospital, must be equipped with the correct knowledge to better educate diabetic patients in the practical use of food labels, ultimately to allow better outcomes for diabetics. Government policy in Malaysia, both in terms of healthcare promotion, obesity prevention and food labelling is moving in the right direction. For Malaysian diabetic patients, clearly, changes need to be made to address the poor and ongoing prevalence of long-term complications. Government policy within Malaysia has always been quick to adapt and change in order to address healthcare concerns. However patient education may need to be further refined by identifying the needs of the target audience or patients and tailored accordingly, with a particular emphasis on better food choices and the use of food labels to make such choices. For instance, recent literacy studies conducted by the Connecticut State University [65] revealed that Malaysia scored a rather poor 53 out of 61 among the world's most literate nations, where Malaysians were found to be more literate than countries such as Panama, Columbia, and Botswana. Research has shown that individuals may be limited in their ability to interpret nutrition food labels [66], and this will also most likely be reflected in overall literacy rates. Thus both health promotional and diabetic intervention programs and nutritional food labels will need to be modified accordingly.

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