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Folk Food beliefs in Mauritius and Rodrigues

Imtiaz Bahemia and Marie Chan Sun

Introduction

- 1 According to the World Health Organization guidelines, 30% of the Mauritian population is hypertensive (Ministry of Health and Quality of Life 2004), as compared to the worldwide prevalence of hypertension which is 26.4% in the adult population (Kearney et al. 2005). The role of diet in the promotion and maintenance of a normal blood pressure has been established by the Dietary Approach to Stop Hypertension diet study (Appel et al. 1997). However, people's eating behaviours reflect their perceptions. Some people tend to avoid certain food items because of their perceived adverse effects on their health whereas others might add some food items if they perceive that these would be beneficial to their health.
- 2 In Mauritius, several plants and vegetables are feared and avoided in the diet as they are perceived as being responsible for high blood pressure; others which are perceived as having medicinal properties are added to the diet. Moreover, doctors often have to face questions from hypertensive patients with respect to the effect on blood pressure of certain plants or vegetables in Mauritius. This situation prevails because the Mauritian population has a multi-cultural origin. Over time, as people mixed with each other, they came to share some of their cultural dietary beliefs.
- 3 In Mauritian popular perception today, a number of food items are believed to have an effect on blood pressure; these food items are namely: garlic, onions, lemon, lentils, black nightshade, spinach, *Aloe vera* (L.) Burm. f., moringa (*Moringa oleifera* Lam.) pods and leaves, and eggplant. These food items are known in Mauritian Kreol as: "l'ail", "zoinion", "limon", "lanti", "bred malbar", "zepinar", lalwes vera, "bred mouroum et baton mouroun" and "brinzel" (see Carpooran 2009) respectively. Mauritians have various beliefs on these food items as to their hypotensive or hypertensive effect, some of them being controversial. Little is known about the

prevalence of these perceptions or any other connotations associated with these food items. There is need for an initial study to address the perceptions of the inhabitants of Mauritius and Rodrigues with regard to the effect of these food items on blood pressure. The outcome of this research work will contribute to better deal with the public health problem of hypertension in Mauritius and Rodrigues. It is to be noted that Rodrigues forms part of the Republic of Mauritius.

- 4 This research work has been designed with the objectives to (1) determine Mauritians' perceptions of the effects of the following food items on blood pressure: garlic, onions, lemon, lentils, black nightshade, spinach, *Aloe vera*, moringa pods and leaves and eggplant; (2) critically analyse the perceptions of respondents.

Methodology

Study design

- 5 This was a questionnaire-based study in which the perceptions of Mauritians concerning the effect of some food items were evaluated. The survey was carried out in the local language, the Mauritian “Kreol”, so that people from all backgrounds and levels of education could understand the questions.

Sample population

- 6 Participants were chosen randomly regardless of their age, gender or general appearance to avoid selection biases for ethnicity, age group, gender and level of education. Subjects were taken at different places during all days of the week at any time of the day from 9 a.m. to 6 p.m. except for Sundays when the time frame was between 9 a.m. to 2 p.m.

Ethical Considerations

- 7 Ethical clearance was granted by the Ethics Committee of the Ministry of Health and Quality of Life of Mauritius.

Data Collection

- 8 The survey was carried out extensively throughout Mauritius and Rodrigues over a period of four months. Each participant was given a participation information sheet, was given clear explanations on the nature of the study and then requested to sign the participation consent form. They were then questioned on several personal characteristics and demographic factors followed by the questions on their food perceptions.
- 9 Finally, each participant was given a leaflet containing the answers to the questionnaire based on scientific evidence written in simple English to be accessible to people of all backgrounds.

Data Processing and Analysis

- 10 The data collected was recorded using the software Epi Info version 2004. Microsoft Excel (Office 2007) was used to construct tables and charts. The Chi-square test (Yates corrected) with 5% level of significance was used to evaluate relationships.

Results

- 11 Our data collection yielded 720 participants from Mauritius and 80 participants from Rodrigues. While the response rate in Mauritius was 85%, it was 96% in Rodrigues. The minimum age in Mauritius was 18 years, the maximum age was 84 years and the mean age was 41.1 years. For Rodrigues, the minimum age was 18, the maximum age was 78 years and the mean age was 38.2 years.

	<i>Most common perceived effect on blood pressure</i>	<i>%</i>	<i>Most common perceived effect on blood pressure</i>	<i>%</i>
Food Item	MAURITIUS (n=720)		RODRIGUES (n=80)	
Garlic	Decrease	61.50%	Decrease	57.50%
Onion	No perception (Don't know)	59.90%	No perception (Don't know)	63.80%
Lemon	Decrease	84.20%	Decrease	83.80%
Lentils	Increase	79.00%	Increase	62.50%
<i>Solanum nigrum</i>	Increase	79.40%	Increase	82.50%
Spinach	Increase	54.90%	Increase	62.50%
<i>Aloe vera</i>	No perception (Don't know)	50.60%	No perception (Don't know)	76.30%
Moringa pods	Increase	53.60%	No perception (Don't know)	50.00%
Moringa leaves	Increase	70.10%	Increase	58.80%
Eggplant	Increase	59.90%	Increase	46.30%

- 12 The results of this study, which was carried out on a national basis, show that a number of perceptions are prevalent in Mauritius. Our findings confirm that perceptions regarding most of the food items investigated are not related to age, ethnic origin, level of education, area of residence or gender.

Discussion

- 13 This study has exposed several folk food beliefs in Mauritius and Rodrigues. Seven perceptions were well anchored culturally but were scientifically incorrect. Emerging scientific research suggests that one of these beliefs was correct and the effect of two other food items, namely onion and *Aloe vera*, on blood pressure were not known by the participants. In most cases, the perceptions exist irrespective of age, level of education, ethnic group, gender and area of residence. The conclusion from this study is that, in

general, Mauritians of all walks of life share the same perceptions which are well established.

- 14 The three most prevalent perceptions were that lemon lowers blood pressure, that lentils increase blood pressure and that black nightshade (*Solanum nigrum* L.) increases blood pressure. None of these are supported by conclusive scientific evidence. Mauritians have demonized three highly nutritious food items on the basis of cultural beliefs.
- 15 While this study addresses some of the perceptions regarding food items in Mauritius and their effect on blood pressure, other studies in the literature have dealt with the investigation of perceptions elsewhere. For instance, Pomerleau et al. (2000) showed that misunderstood concepts (myths) related to dietary salt, types of fat, meat consumption and bread and potatoes were prevalent in the population of the Baltic countries.
- 16 Also, the Australian Food and Grocery Council (2001) carried out a survey on 15 folk food beliefs including one that states that food colouring, especially red, can make children hyperactive. It was then shown that some long-held misconceptions about food were slowly fading in Australia. To the contrary, the perceptions investigated in Mauritius and Rodrigues seem to be deeply rooted among the inhabitants.

Garlic

- 17 Given the extensive literature on garlic, we expected that its hypotensive effect would be one of the most prevalent beliefs in our study. However, our survey ranked this perception in 5th position for positive effects, behind lemon, lentils, black nightshade (*Solanum nigrum* L.) and moringa leaves. While the Mauritian population is aware of the beneficial effects of garlic, they need to be informed on the side effects of garlic and its possible interactions with some drugs.
- 18 Out of 9 studies published, between 1993 and 2006 on the effects of garlic on blood pressure, 6 showed a reduction in blood pressure when garlic powder or garlic in the diet was examined (Banerjee and Maulik 2002, Dhawan and Jain 2004, Durak et al. 2004, Turner et al. 2004). Consistent with these scientific results, our survey shows a correlation between the general perception and scientific evidence. This study showed that 61.5% for the island of Mauritius and 57.5% from the Island of Rodrigues believed that garlic decreases blood pressure. Similarly, the results of Wilson *et al.* (2002) demonstrated that 11 out of 12 focus groups carried out on a group of African-Americans thought that high blood pressure can be treated with garlic. The large amount of available information on garlic and its anti-hypertensive effects may help to explain the similarity between the local and worldwide perception.
- 19 No meaningful difference was noted in the response of participants answering that garlic lowers blood pressure when they were categorized into age groups, ethnic groups, level of education attained or into their area of residence. The only factor that showed some statistical power was gender. The higher awareness of female participants on garlic's lowering effects may be attributed to the fact that females are the ones using garlic for cooking in most households.
- 20 Several studies have reported that belief and knowledge are positively related to dietary behaviours (Pomerleau et al. 2000). Similarly, our results show that 66% of

hypertensives put into practice their perception on the effect of garlic on blood pressure. Considering that 30% of the Mauritian population aged 30 and above suffers from hypertension (Ministry of Health and Quality of Life 2004), it appears that supplementing medication with dietary garlic could be a good step towards controlling blood pressure, especially, if we take into account the fact that 39% of the hypertensive patients examined were poorly controlled (Ministry of Health and Quality of Life 2004).

- 21 However, this finding must be received with caution because garlic intake may negatively interact with some conventional drugs such as warfarin (Ramsay et al. 2005) due to its anti-platelet and antihypertensive effects (Mashour et al 1998). Consumption of garlic has also been associated with bleeding events (Bordia 1978, Burnham 1995, German et al. 1995, Rose et al. 1990, Samson 1982) and gastrointestinal upset (Ackermann et al. 2001, Tattelman 2005).

Onion

- 22 Kiviranta *et al.* (1989) could not show anti-hypertensive effects of oral administration of an ethanolic extract of onion on Spontaneously Hypertensive Rats (SHR) for up to seven weeks. By contrast, Quercetin, a flavonoid found in onions has been studied in SHR by Duarte *et al.* (2001) and has induced a significant reduction in blood pressure. From 2001 to 2006, two additional studies in favour of onion as a blood pressure lowering agent have been carried out (Sakai et al. 2003, Yamamoto and Oue 2006). We believe that the lack of conclusive evidence from clinical trials accounts for the high prevalence of ignorance on the effect of onions on blood pressure.
- 23 Our study found that, among participants, Hindus and people living in rural areas were more likely to have the perception that onions increase blood pressure.

Lemon

- 24 It has been postulated that the vitamin C content of fruits and vegetables might be an important component in their ability to lower blood pressure and also that tissue ascorbic acid levels may be important in maintaining low blood pressure (Block et al. 2001). Controversially, a study by Kim *et al.* (2002) showed no reduction in blood pressure following a 5 year vitamin C supplementation in a high-risk population for stomach cancer and stroke. Despite the lack of conclusive evidence on the effect of lemon on blood pressure, the perceived hypotensive effect of lemon was the most common one among all the food items.
- 25 In this study, the frequency of participants answering that lemon lowers blood pressure increased from the youngest to the oldest age group. Interestingly, levels of education also had an impact on perceptions: people who had completed tertiary education were less likely to believe that lemon increases blood pressure. Similarly, Verbeke *et al.* (2004) observed that the level of education was a factor influencing the association between perception and evidence in their survey on fish consumption in Belgium. Mauritius provides free education from primary to tertiary level but most people, even professionals with high academic achievements, still take for granted lay beliefs of unknown origin. This is in line with Lin *et al.* (2005) who found in their study in Taiwan that the nutrition knowledge of participants was poor, especially regarding the relationship between nutrition and disease.

- 26 In contrast with our results, a survey carried out by Qidwai and Chand (2006) on 110 participants in Karachi, Pakistan, showed 19% of participants believing that lemon juice is a good home remedy to treat low blood pressure when they were asked to choose between salt intake, lemon juice, fruit juices, honey, egg, tea and coffee.

Lentils

- 27 This study has confirmed that there is a strong perception that lentils increase blood pressure. This perception emanates from the local belief that iron-rich foods, including lentils, increase blood pressure. Before 1948, there was a general perception that hypertension was due to protein intoxication (Meneton et al. 2005). As from 1948, the beneficial effects of a diet low in sodium were shown, the effectiveness of a rigid restriction of proteins was evaluated and the belief that protein intoxication causes hypertension started to loosen (Meneton et al. 2005). The perception of Mauritians with respect to the hypertensive effect of lentils may stem from the fact that some persons add too much salt in its preparation. It was reported by Meneton *et al.* (2005) that the evidence of a causal link between chronic high salt intake, high blood pressure, and cardiovascular diseases is very strong.
- 28 The Seventh Report of the Joint National Committee mentioned the DASH eating plan as a lifestyle modification to manage hypertension (Chobanian et al. 2003) and it is to be highlighted that the DASH diet includes lentils. This study has shown that many Mauritians are avoiding lentils when, in fact, lentils are recommended as part of a healthy diet. There is therefore a need to educate the population on the nutritive value of lentils and on the sparing use of salt as part of healthy diet. On the other hand, there is a clear need for randomized control trials to directly assess the effects of lentils on blood pressure.

Solanum nigrum

- 29 The perception that *Solanum nigrum* increases blood pressure was present at 79.4% in Mauritius and 82.5% in Rodrigues irrespective of age group, level of education, ethnic origin, gender or area of residence. While unripe fruits of *Solanum nigrum* are known to be toxic, ripe fruits can be eaten safely because they have no toxic effect (Turner and Szczawinski, 1995). The paucity of scientific data on the effect of *Solanum nigrum* on blood pressure does not allow a comparison between cultural belief and scientific evidence.

Spinach

- 30 The literature search identified only 2 studies by Yang *et al.* (2003, 2004) investigating the effects of spinach on blood pressure in animals. Although these two studies showed that spinach might have antihypertensive effects, the majority of Mauritians from our survey believed that spinach increases blood pressure (54.9%).

Aloe vera

- 31 In support of the 24.7% of respondents from the Island of Mauritius and the 15% of respondents from the Island of Rodrigues who believed that *Aloe vera* lowers blood pressure, a study performed in 2001 by Saleem *et al.* (2001) showed hypotensive effects of a constituent of *Aloe vera*, aloemodin. Our study revealed that there were more female respondents who believed that *Aloe vera* lowers blood pressure in Mauritius (61.8%). We believe that this might be explained by the fact that women knew *Aloe vera* for its beneficial effects on skin before it was introduced in other products.

Moringa oleifera

- 32 This survey has also confirmed that there is a strong perception that moringa leaves increase blood pressure. However, there is no published data pertaining to the hypertensive effect of moringa leaves and pods on humans. Moreover, we also observed that among the participants who perceived that moringa leaves have no effect on blood pressure, a larger proportion had attained tertiary education level. Professionals with tertiary education seemed to be more critically minded regarding this cultural belief.
- 33 Analyses of the survey results demonstrated that among the participants who believed that moringa leaves lower blood pressure, a higher proportion was from the Chinese group.
- 34 We can observe a huge gap between general perceptions and recent scientific data. The hypotensive effect of both pods and leaves of *Moringa oleifera* have been demonstrated in rats (Faizi *et al.* 1994, 1998). However, more studies, including clinical trials would be required to determine the strength of evidence.
- 35 On the other hand, a particular aspect of the moringa leaves and pods need to be emphasized. The *Moringa oleifera* tree, often called the miracle tree, is one of the most nutritious vegetables on earth (Willis 2003). Its nutritional content is unparalleled by any other vegetable: it contains 5 times more vitamin C than oranges, 2 times the vitamin A found in carrots, 4 times the calcium of milk, about the same amount of potassium as bananas, almost 2 times the protein of milk and more iron than spinach (Broin 2005, Fahey 2005).
- 36 Some authors have asserted that moringa could help reduce malnutrition in Africa (Fuglie 2001). Yet, Mauritians look down on the moringa tree since they consider moringa as a crop for the poor. This belief even inspired a local artist called Marclaine to write a very popular song in the 70's that proclaims poor people like eating moringa pods and leaves.
- 37 The absence in our survey of an opinion on *Moringa oleifera*, especially in those under 25, may be attributed to the fact that moringa is not a vegetable sold in markets. Usually, it is obtained from friends and neighbours who have a moringa tree in their backyard.
- 38 *Moringa oleifera* is not commonly grown in Rodrigues. We believe that this accounts for the differences in the results of our survey in Mauritius and Rodrigues.
- 39 The nutritional values of the moringa tree are so important that the Church World Service has recently planted a million of the fast-growing, drought-resistant moringa

trees in Africa to help combat malnutrition (Fuglie 2001). *Moringa oleifera* is indeed a nutritional powerhouse.

Eggplant

- 40 Very little data is available on the effects of eggplant on blood pressure. In order to reduce the bitterness of eggplant, it is often salted and then rinsed prior to cooking. This process is likely to leave some salt residues on the vegetable and it might be reasonable to think that it is the added salt rather than the eggplant itself which might be responsible for the perceived effect of eggplant in raising blood pressure.
- 41 Since eggplant is native to India (Seelig and Magoon 1978) where most of the Hindus and Muslims of Mauritius originate, we could observe from our results that a high percentage of Hindus and Muslims believed that the effect of eggplant is to raise blood pressure. Both groups believed in an increasing effect. Gender also appeared to affect perceptions of the participants from Mauritius; more females believed that eggplant increases blood pressure. As was the case with garlic, this can be explained by the fact that women are more involved in cooking.

Conclusion

- 42 This study will help doctors to better inform their patients on the relations between the food items studied and blood pressure. Education on the nutritive value of food items which are associated with folk food beliefs is fundamental. Our education system should aim at developing enquiring minds with critical thinking skills if we want to build a healthy Mauritian population. Patients who are under treatment for high blood pressure need to be warned on the possible interaction of garlic with conventional drugs. Moreover, the Mauritian population should be informed of the possible side effects of the excessive use of garlic. Furthermore, reliable randomized clinical trials are required to better address the cultural beliefs of Mauritians on the effects of onions, lemon, lentils, spinach, *Aloe vera*, *Moringa oleifera* and eggplant in their relation to blood pressure.

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ABSTRACTS

This questionnaire survey about folk food beliefs was carried out with the objectives to determine the perceptions of the inhabitants of Mauritius and Rodrigues on the effect of ten food items on blood pressure and to critically analyse these perceptions. Data was obtained from a representative sample of the population of Mauritius and Rodrigues, which comprised 800 randomly selected adults. Ethical clearance was obtained from the local health authority, the Ministry of Health and Quality of Life of Mauritius, and informed written consent was obtained from each participant. The results of this study expose a number of perceptions prevalent among Mauritians and demonstrate the extent to which they are put into practice. The findings highlight the need to educate Mauritians on the nutritive value of foods items that are associated with strong cultural beliefs.

Cette étude sur les croyances alimentaires a été faite dans le but de déterminer les perceptions des Mauriciens sur l'effet de dix aliments sur la tension artérielle et de les analyser. Les données ont été obtenues à partir d'un échantillon représentatif de la population de Maurice et de Rodrigues. La taille de l'échantillon était de 800 personnes tirées au hasard. Cette étude qui a obtenu l'accord du Comité d'Ethique du Ministère de la Santé et de la Qualité de la Vie de Maurice a demandé un consentement éclairé et écrit de la part de chaque participant. Ce travail a mis en évidence un certain nombre de perceptions présentes parmi les Mauriciens et a démontré leur degré de mise en pratique. Les résultats de cette étude ont fait ressortir le besoin de faire une éducation de la population sur les valeurs nutritives des aliments associés à des croyances culturelles.

INDEX

Keywords: Rodrigues Island, Food Preferences, Mascarene Islands, Medicine, Nutrition -- Psychological Aspects

Geographical index: Mascareignes (archipel), Rodrigues (île)

Mots-clés: comportement alimentaire, préférences alimentaires

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