

EXPLORING THE PERCEPTION AND ACCEPTANCE OF TEXTURE-MODIFIED FOODS AMONG THE ELDERLY IN SELANGOR, MALAYSIA

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Abstract: *As the world population ages, texture-modified foods (TMFs) among elderly people are a topic of growing interest due to the high prevalence of eating difficulties in this population, which may increase their risk to health. However, there is a lack of studies documented regarding this issue, especially from a Malaysian perspective. Hence, this study aims to explore the perception and acceptance of texture-modified foods (TMFs) among elderly people, specifically in Selangor. To achieve the objectives, qualitative research was conducted, and a total of fourteen (14) elderly people were interviewed face-to-face in pairs for data collection. The data were then analysed, and the result shows themes such as Favoured, Understanding, and Insight have emerged to know the perception of texture-modified foods (TMFs) among elderly people. Meanwhile, Enjoyment and Requirements from the elderly were acknowledged in terms of to what extent does texture-modified foods (TMFs) are accepted, as the evidence shows that texture-appropriate and palatable texture-modified foods (TMFs) can significantly improve the elderly's nutrition intake and quality of life. After all, deeper exploration and investigation must be carried out to discover more effective actions that could be taken to help the well-being of elderly people.*

Keywords: *Perception, Acceptance, Elderly People, Texture-Modified Food, Gastronomy*

Introduction

According to the Department of Statistics Malaysia (DoSM) in 2024, it is estimated that by 2040, the total population of the elderly in Malaysia is going to reach 6.4 million, which represents 17.3% of the total population, making the country officially an ageing country in the future. A study by Ain et al. (2018) found that around 24.3% of the elderly in Malaysia (60 years old and above) reported having trouble eating. As people age, their nutritional needs also change, and it becomes increasingly important to consume enough food to maintain good health and prevent malnutrition and chronic diseases, especially for the elderly who already face eating difficulties due to poor oral health (Antoniadou and Varzakas, 2021). It is equally important to study the elderly in Malaysia who experience eating difficulties, so that they can improve their health status and quality of life. Therefore, edible foods such as texture-modified foods (TMFs) are created to meet the dietary needs of individuals who have difficulty swallowing or chewing. TMFs are done to enhance swallowing efficiency and reduce the risk of choking by chopping, mincing or mixing TMFs with liquid, the textures become softer and smaller particle sizes with a cohesive consistency are created (Chalerm Sri et al., 2020; Liu et al., 2024; Raheem et al., 2021). This study aims to explore the perception and acceptance of texture-modified foods among the elderly and focuses on Malaysian kuih Onde-Onde. It is well noted that Malaysians love to eat *kuih*, however, some *kuih* are difficult to consume, especially those made from glutinous flour, characterised by a chewy and sticky texture. It is worth noting that the elderly experience a lack of appetite, difficulty chewing or swallowing, and generally poor nutritional food consumption. The expected outcomes of this study include identifying perceptions and acceptable texture-modified foods that may improve the understanding to increase and enhance nutritional intake, quality of life, and overall health outcomes for the elderly, specifically from a food texture perspective. The significance of this study, conducted in Malaysia, was to explore and deepen the current understanding of texture-modified foods. With more people getting older, knowledge on TMFs is getting more relevant each day.

Literature Review

Elderly People

An increasingly large percentage of the world's population is now made up of older adults due to rising life expectancy and falling death rates. The population segment composed of individuals over the age of 60 is growing faster than any other age group. More than 400 million people will be over 80 across the world by the year 2050 (Gallego et al., 2022). The elderly are more likely to be malnourished than any other age group, and this is generally because of infirmity and poor health. As a result, malnutrition throughout this phase of growth is linked to a higher risk of disease and death. Feeding, chewing, and swallowing can become more of a challenge as individuals become older due to natural physiological and anatomical changes that might compromise the elderly's safety and efficiency. The inability to chew food properly (dysmasesis) and/or securely swallow food (dysphagia) are examples of these disorders. Moreover, negative effects on health and quality of life, eating habits and social engagement may follow from these conditions, such as the decrease in oral intake, dehydration and aspiration (Lutz et al., 2019).

Traditional Malaysia Kuih Onde-Onde

The phrase "traditional Malaysian kuih" refers to a wide variety of bite-sized treats, from sweet or savoury pastries and breads to steamed and grilled snacks with a wide range of textures and flavours. Traditional Malaysian kuih are referred to as "confectionery," which is a whole other level of culinary appreciation. Kuih, however, is widely recognized to be consumed as a snack throughout the day whenever it is available and is sometimes included in feasts or festivals (Kamaruzaman et al., 2020). Although in the present day, Malaysian sweets can be enjoyed as a light meal, appetiser, or dessert. Onde-Onde is a Malay and Nyonya dessert. It is a ball of dough with a liquid palm sugar (gula Melaka) centre that squirts out delightfully at the first bite. Traditionally, the dough is a mixture of ground glutinous rice and pandan extract. The pandan leaves are pounded, mixed with water and sieved to obtain a green juice. This is mixed with glutinous rice flour to give Onde-Onde flavour and colour. The dough is wrapped around palm sugar and rolled into a ball. When properly made, the melted palm sugar will burst out when biting into the dough (Sarkar et al., 2023). The basic idea of what constitutes a traditional Malay kuih is still at a nebulous stage, in part because the term kuih itself is used loosely and in part. After all, there is a lack of solid documentation on such a topic (Kamaruzaman et al., 2020).

Gastrophysics

Physically speaking, foods are better understood as multi-scale systems. This is apparent from the food's taste and texture. Biting, chewing and swallowing break down food in a way that releases aromas and flavours, meanwhile, saliva breaks the food pieces and transforms them into a semi-liquid bolus that can be consumed with pleasure. The connections to the field of materials science can be brought into focus by converting these fundamental processes into basic physical concepts (Faat and Azmi, 2019). According to Mouritsen (2012), gastrophysics is defined as the scientific field concerned with understanding the underlying mechanisms and behaviour of gastronomic phenomena, such as the art and knowledge of preparing and eating a good meal. All our senses are engaged by the food we consume because of the simultaneous physical, chemical and biological processes that occur during food preparation and consumption (Faat and Zainal, 2013; Pedersen et al., 2021). Taste, smell, astringency and how the food is processed, sensed and absorbed in the mouth and body all have a role in the entire sensory experience of eating. The goal of gastrophysics is to figure out how everything is linked with one another between the sensory experience and the food's physical and chemical features, as well as the methods used in cooking (Mouritsen, 2012). For example, ice cream is a soft-textured food that is often perceived as rich and indulgent due to its creamy texture, as it provides a smooth and velvety sensation in the mouth. The advancement of gastrophysics will not only provide food experts and home cooks with a greater grasp of how to prepare 'better meals,' but it will also be an essential addition to the existing scientific approach to food, which is driven by commercial and industrial considerations (Faat et al., 2023). Gastrophysics plays a role in understanding how the physical properties of food, such as texture, affect its perceived taste and overall acceptability to the consumer, including people with difficulty swallowing or chewing (Faat et al., 2023; Pedersen et al., 2021).

Texture-Modified Foods (TMFs)

Texture-modified foods, generally known as TMFs, are foods that have soft textures and/or smaller particle sizes. These also include drinks that have a thicker consistency, and which are marketed at the target market group of the elderly who have eating disabilities. The textures of foods that are suitable for the elderly should be soft and moist. Textures such as adhesive and

sticky, as well as fibrous structures that are not easily digested, must be prevented (Cichero, 2016). Soft-textured foods are preferable because they can disintegrate and mix in the mouth by compression between the tongue and palate, which eliminates the need for teeth mastication. Nevertheless, in consideration, TMF products must not only have a suitable texture but also have appropriate nutritional content and appeal to the taste buds of the target audience (Gallego et al., 2022). However, due to fast development and advancement in technology and rapid growth in consumer interest, the market for commercial TMF products has been increasingly competitive in recent years. At this time, ready-to-eat TMF products sold in commercial packaging are only available in minced and moist and pureed textures, and there are no other alternatives for the soft and bite-sized level. According to the data, TMFs with a suitable texture and a pleasant taste have the potential to greatly increase the nutritional intake and quality of life of elderly people. Even though TMFs have been established for quite some time, making ones that are both tasty and standardized while maintaining high nutritional value remains an issue (Wu et al., 2022). Moreover, Smith (2023) predicts that demand for texture-modified food will grow in the coming years due to an ageing population and the increasing prevalence of eating difficulties.

Methodology

A qualitative research method was utilised in this study as it was a flexible approach that allowed the researchers to gather a broad range of information and explore a variety of perspectives on the topic studied (Žukauskas et al., 2018). With a semi-structured approach, the researchers were able to construct interview questions to gain more understanding of the topic because they were flexible enough to allow for the emergence of new themes yet structured enough to guide the conversation and ensure that certain topics are covered (Denzin & Lincoln, 2011). A snowball sampling technique was used, and informants were brief and thorough about the interview process and how the data from the interview was used for research purposes. All the informants in this study gave their consent to participate. Researchers assured them that their personal information would be kept confidential and that only the information about the study would be used for research purposes. A total of fourteen (14) informants were interviewed in pairs. The audio interviews were recorded, and the data collected from each interview was transcribed into a Word document. The transcribed data underwent thematic analysis to extract the theme that was used in findings and discussions (Suter, 2012). In addition, there are several new words shared with the elderly, like gastrophysics, molecular gastronomy, gelification and spherification. Therefore, an initial explanation pertaining to the terms was provided by the researcher to the elderly. This is to ensure the elderly provide the required information during the interview session. The population for this study consists of the elderly in Selangor, Malaysia.

The purpose of the interview was to achieve the two objectives in this study, which were to explore the perception and acceptance of texture-modified food among the elderly in Malaysia. Thus, two major questions were asked during the interview. The first one was to what extent does the perception of texture-modified food vary among the elderly? Meanwhile, the second question was to what extent does acceptance towards texture-modified food extend among the elderly? These two questions were then followed by several probing questions, as this allowed the interviewer to have greater flexibility in asking questions and at the same time allowed the informants to give more in-depth and detailed information on the subject. The questionnaires

were validated and approved by the UiTM Branch Ethics Research Committee (BERC) with the reference number (UG/MR/186) to ensure that the questions were relevant and appropriate.

Findings and Discussion

Based on the interview session, a total of 14 informants (seven males and seven females) aged 60 and above were interviewed in Selangor. The informants were interviewed in pairs. Then, they were asked about their perception and acceptance of texture-modified foods (TMFs). The interview results were summarised briefly after being conducted and analysed. The researchers interviewed elderly individuals throughout several Selangor districts. Table 1 shows the details of the informants.

Table 1: Informants' Information

Group	1	2	3	4	5	6	7
Gender							
Male (Age)	64	62	69	65	67	68	63
Female (Age)	61	60	63	63	62	63	62

Explore the Perception of Texture-Modified Food Among the Elderly

Favoured

As people age, their sense of taste and smell declines. This can make food less appealing and can lead to changes in food preferences. Additionally, some elderly people may have health conditions that make it difficult to chew or swallow certain foods (Smith, 2023). Regarding that, identifying the elderly's favourite food and why they favour it is important to get their perception towards texture-modified foods (TMFs) to create a diet that is both enjoyable and nutritious. Hence, researchers have asked several questions regarding their favourite food during the interview session and here are some of the statements given by the informants:

"...There are various kuih made from glutinous rice. I like to eat kuih Koci, Badak Berendam, but kuih Onde-Onde is the most I love. I like it because of the sweetness of the palm sugar filling and the salty, creamy taste from grated coconut..." [G1]

"...I like the flavour of the sweet filling when it bursts in the mouth. Well, I believe that's one of the best attributes about kuih Onde-Onde..." [G7]

"...It is delicious because of the sweet taste of palm sugar, creamy from the grated coconut and the chewy texture of glutinous rice flour. The combination makes it delicious..." [G6]

Based on the statements given by the informants, the researchers have identified that many elderly people favoured Onde-Onde as their favourite food or dessert due to its chewy texture and the combination of the sweet filling and creaminess. These statements can also be strengthened by Jayasinghe et al. (2017), as they mentioned that sweet foods tend to be more flavourful than other types of food, so they may be more appealing to people with decreased taste and smell. Other than that, sweet foods can provide a quick source of energy for the elderly to do their daily activities. It is also an emotional comfort and a source of pleasure and enjoyment for them. However, it is important to choose sweet foods that are nutritious and not

high in sugar (Jeon et al., 2021). This is because high-sugar diets can lead to many health issues, such as high cholesterol and an increased risk of diabetes and cancer (Ballesteros et al., 2021). Overall, the elderly need to monitor their sugar intake and enjoy sweet foods moderately to prevent negative health consequences.

Understanding

Texture-modified foods (TMFs) are designed to be easy to chew and swallow for those people, mainly the elderly, who are having difficulties chewing or swallowing (Chalerm Sri et al., 2020). They are typically softer than regular foods, and they may be pureed, chopped or ground. However, most elderly people do not know the term 'Texture modified food,' but they do have a general idea of what it is all about. Hence, in this research study, researchers are trying to explore the elderly's understanding of TMFs. Several questions were asked during the interview sessions, such as "Do the elderly who are having trouble eating need to eat soft-textured foods?", "Do you know why soft textured foods are consumed?", "Who asked you to consume soft textured foods?" and "How do you know how to prepare TMFs?". These are some of the answers from the informants:

"...Of course, we need to eat soft-textured foods to make it easier to eat. If we felt uncomfortable eating rice, we tend to cook porridge. This is because some of us have difficulty chewing, and even some of us do not have the appetite to eat due to the diminished senses. Thus, any form of effort to improve eating behavior is welcome..." [G7]

"...To make it much easier to eat and also for our digestive system, as we are getting older, our digestive system does not function as well as during young age..." [G1]

"...At our age right now, we are facing difficulty in eating, especially with solid foods. So, some advice from the doctors is to consume soft-textured food. This is to help our digestive system and ensure we receive sufficient nutrition. We also referred to the doctors and nurses on how to prepare the soft textured foods..." [G3]

From the answers given by the informants, researchers noticed that most of them have a good understanding of TMFs and why it is needed for them to consume. The statement quoted by 'G7' shows that they understand that the elderly who are having eating difficulties need to eat soft-textured foods to make it easier for them to chew and swallow. Moreover, 'G1' is aware that as they grow older, their digestive system does not function as good as during their younger ages. Due to that, they must consume more soft-textured foods in their daily diet. Furthermore, 'G3' told the researchers that they were advised and taught by their doctors and nurses how to prepare TMFs at home and eat less hard-textured and unhealthy foods. As a result, many elderly people know that in order for them to get sufficient nutrition and improve their eating behavior, they must consume TMFs. Therefore, TMFs could help people restore their enjoyment of eating, which could enhance their quality of life.

Insight

According to Aguilera (2016), the elderly's perception towards TMFs varies depending on their individual experiences and preferences. Some elderly may have positive perceptions of TMFs, while others may have the opposite point of view. There are several reasons why the elderly may be hesitant to try TMFs, including taste, texture and appearance. To justify this statement, researchers asked the informants whether they would accept the TMFs if the texture and appearance of their favourite dessert, like kuih Onde-Onde, were changed into different edible textures.

"...In my opinion, Onde-Onde is a special traditional kuih, so to change its texture, we must change the name..." [G1]

"...When we look at it, we are afraid the new kuih Onde-Onde would not be attractive as the original anymore, as our mindset is set to its original look and taste..." [G7]

"...If we change the look and texture, the originality of the kuih will be lost..." [G3]

As stated by several informants, they are reluctant to eat their favourite dessert if the texture and appearance are changed. This is because Onde-Onde is a special traditional dessert that is unique and has been the same ever since. Just like 'G1' said that to change its texture, the name of the dessert also must be changed. 'G7' and 'G3' also stated that their mindset is set to its original look and taste, and if it is changed, the originality and authenticity of the dessert will be lost.

Despite that, their perception towards TMFs would be different if there were some innovations and attractive appearances made. For instance, by introducing the concept of gastrophysics and molecular gastronomy, like spherification techniques, foam, or gelification.

"...How about changing it to jelly-like or ice-cream but with the flavour and taste of Onde onde..is it possible?. If it does, then we might consider accepting it..." [G1]

"...I think if the kuih Onde-Onde is made in various colours, like we can make it colourful to make it look attractive..." [G3]

'G1' specified that if the TMFs could change into more creative and innovative textures and looks, they might want to try it. This also goes for 'G3' by saying that if there is a variety of colours, it will be more attractive to eat. This is because the presentation and innovation of food can increase appetite and make food more appealing to the elderly. Consequently, it is possible and practical to incorporate modern cooking techniques such as molecular gastronomy and gastrophysics knowledge into revolutionary TMFs through thorough analysis and development. Doing this could enhance the food experience and make it more enjoyable for them, and create a memory. In short, as mentioned by Liu et al. (2022), getting the elderly's perception towards TMFs is necessary to consider the expectations of the elderly in terms of food design characteristics to promote healthy ageing. Texture modification of food is of great importance for elderly consumers to maintain nutritional status and the ability to enjoy a meal.

Explore the Acceptance of Texture-Modified Food Among the Elderly

Enjoyment

To explore the acceptance of TMFs by the elderly, researchers have acknowledged their eating habit and their enjoyment. This is because eating enjoyment is a vital part of life. For the elderly, it is challenging to enjoy food as much as they once did due to changes in their taste buds, smell and vision. Additionally, the elderly are more likely to experience health conditions that affect their appetite or make it difficult to eat (Sheiham, 2001).

“...It is important to make sure the size of the kuih is not too big, and the texture must not be too chewy. At the same time, if possible, the quantity of the sugar must be reduced...” [G1]

“...Like most Doctors advised the elderly people are advised to reduce sugar intake due to health issues. So we have to be modest in everything we consume. This situation may affect our appetite...” [G3]

In line with the statements quoted by ‘G1’ and ‘G3’, specific features of the food must be taken into account for them to enjoy eating it. ‘G1’ stated that the size of the Onde-Onde must be bite-sized with a softer texture, and the quantity of sugar for the filling must be reduced. This is because, as stated by ‘G3’, they are advised by their doctor to reduce sugar intake in their eating habit and be more cautious during eating due to health issues that they are currently having. For example, some of the informants have diabetes and due to that, they are unable to consume sugar often. Diabetes in the elderly could lead to several complications, such as it can damage to the blood vessels in the eyes and leading to vision loss, an increased risk of heart disease and also increased risk of depression (Kirkman, 2012). Furthermore, a journal referred to Ulrich et al., in 2015, also points out that the elderly can have difficulty chewing and swallowing due to teeth, jaw and gum issues. This can make it difficult for them to enjoy eating, as they may not be able to eat the foods that they enjoy, or they may have to eat slowly and carefully. Moreover, this statement can be toughened by the answers given by several informants, as they have common issues with enjoying chewy textured foods.

“...Usually for us, chewing is a little bit hard as the texture is chewy and stuck on the teeth and gum...” [G6]

“...Sometimes during chewing, I felt a little bit uncomfortable as it is always stuck here and there due to a teeth issue...” [G7]

Overall, due to all of the difficulties that the elderly are experiencing, their eating habit changes drastically. They are unable to enjoy their food without concern about their health conditions. This will make them lose their appetite as they will always be anxious about getting ill. Hence, it will lead to depression and malnutrition as they are consuming a lesser amount of food.

Requirement

The elderly’s acceptance towards TMFs could vary depending on some requirements, such as the ingredients, dietary considerations, health concern, ease and their appetite (Wu et al., 2022). They may be perfectly happy to accept and eat TMFs, or they may find them to be unappealing or difficult to eat. Regarding the ingredients, TMFs should be made with flavourful and rich

ingredients, such as herbs, spices and sauces. This is because every single ingredient has the properties that play crucial roles in influencing the sensory characteristics of food. For example, the texture is attributed to how food tastes and feels in the mouth. Meanwhile, the colour of food can affect its perceived flavour and quality, such as the freshness of the food (Faat and Zainal, 2016; Raheem et al., 2021). The richness of the ingredients will also help to make them more appealing to taste. It is also quoted by 'G1' that the food will be accepted if the ingredients are rich enough to make it tasty.

"...Yes, we accept the food if the ingredients are rich to make it tastier and even better..." [G1]

Moreover, most of the informants are willing to take TMFs as their daily diet due to dietary considerations and health concerns.

"...We will be thankful if that kind of food exists as our health condition needs it for us to have enough nutrition and energy..." [G7]

'G7' said that they would be thankful if TMFs could improve their nutritional intake. This is because, as for the elderly, their ability to absorb and utilize nutrients becomes less efficient and their nutrient requirements increase. Therefore, they need to consume enough nutrients to meet their nutritional needs. Other than that, good nutrition is essential for maintaining good health, controlling weight and preventing malnutrition and diseases. On top of that, TMFs could also help to reduce the risk of choking and aspiration and improve the quality of life for people with swallowing difficulties (Gallego et al., 2022).

However, it is really important to make the TMFs look appealing. For example, by using different colours and shapes, many elderly people need time to adjust and adapt to a new food because their appetite and moods always change (Faat et al., 2022; Raheem et al., 2021). 'G6' also mentioned that, as they are growing older, their acceptance towards new foods depends on the taste and look, and it will take time to adapt to it due to changes in their appetite.

"...it depends on the taste and look. Sometimes, as we are getting older, our moods change, so maybe it will take some time to adapt to it..." [G6]

To build up the statement, Schiffman and Graham (2000) also stated that aging can result in reduced calorie needs and decreased food intake, which may all lead to changes in appetite and taste perception. Oral issues, such as missing teeth and changes in nutrient requirements, which could affect their ability to digest and absorb certain types of food, are also reasons why the elderly need time to adapt to new food. Besides that, the taste of food can have a significant impact on the appetite of the elderly. For example, the elderly may find new types of food less palatable due to changes in taste and smell (Faat et al., 2023). All in all, texture, appearance and taste are critical factors in the elderly's food consumption, while nutritional content is associated with muscle health. Add to that, providing soft, palatable, attractive and healthy TMFs for the elderly, particularly those with chewing or swallowing difficulties are crucial aspect in order to ensure they have the appetite to consume adequate amounts of food in their daily diet (Wu et al., 2022). In this study, the goal of getting knowledge about the perception and acceptance of TMFs among the elderly in Malaysia has been achieved. The information

shows that their perceptions and acceptance of TMFs are diverse. Some of them are unwilling to accept TMFs if the texture and appearance have been altered, while others have said that they would give it a try if TMFs could make them enjoy eating again, as they are concerned about their health and nutritional status. The significance of the study lies in the fact that it demonstrates the importance of taking into account the preferences and requirements of the elderly when designing TMFs by providing proper ingredients, texture, taste and smell that are essential for their health and well-being. This is because it is vital to their nutrition and meal enjoyment, promotes food satisfaction and gives them a terrific chance to share a lifetime of memories. To sum up, the findings and discussions identified by the researcher have been discussed. The data collection shows that three themes have emerged for the perception towards TMFs among the elderly, and two themes have emerged for the acceptance towards TMFs among the elderly.

Suggestion For Future Research

Recommendations for future studies, conducting an experimental food development integrating TMFs and modern cooking techniques, provide another platform to extend the knowledge. A deeper study that focuses on TMFs with gastrophysics can be carried out, especially in Malaysia, as it is a new field of study that explores the multisensory experience of eating, including the perception of taste, texture and aroma, and this could help those elderly who are having eating difficulties enjoy eating again.

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