KAP Study on Advancement in Food Preservation Methods Among the General Population in Saudi Arabia

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Abstract

Background: Food preservation is a prerequisite for a number of reasons. A few merchandises, like Certain vegetables, like fruits and root vegetables, are more prolific during specific seasons, while others are restricted to consumption during others. In particular domains, food products are synthesized in excess, while in others, there is not ample of them whenever needed. Today, food preservation is imperative for newly industrialized nations like India to accomplish their food supply solicits.

Methods: To gain insight into the KAP on food preservation among Saudi Arabian population, the research study deployed a cross-sectional survey. The questionnaire was administered in both

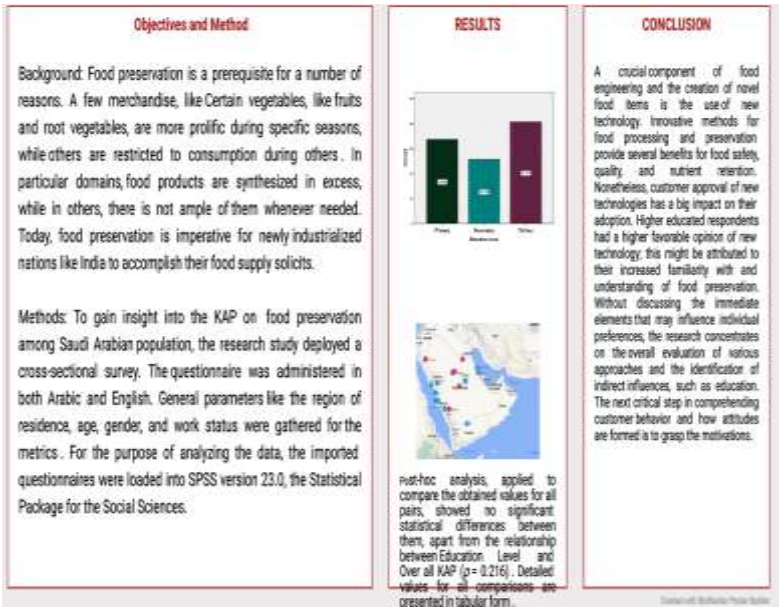
Arabic and English. General parameters like the region of residence, age, gender, and work status were gathered for the metrics. For the purpose of analyzing the data, the imported questionnaires were loaded into SPSS version 23.0, the Statistical Package for the Social Sciences.

Results: Post-hoc analysis, applied to compare the obtained values for all pairs, showed no significant statistical differences between them, apart from the relationship between Education level and overall KAP (p = 0.216). No Significant correlation exist between Gender and KAP factor. Knowledge Domain (Male: P= 0.968, x2 =1.823, Female: P= 0.776, x2 = 1.951).

Conclusion: A crucial component of food engineering and the creation of novel food items is the use of new technology. Innovative methods for food processing and preservation provide several benefits for food safety, quality, and nutrient retention. Nonetheless, customer approval of new technologies has a big impact on their adoption. Higher educated respondents had a higher favourable opinion of new technology; this might be attributed to their increased familiarity with and understanding of food preservation

Keywords: Preservation, Food, Methods, Survey, Analysis.

Graphical Abstract



Introduction

In contemporary society, keeping food fresh has blossomed into an indispensable service for the typical the victim [1]. Food preservation is a prerequisite for a number of reasons [2]. A few merchandises, like Certain vegetables, like fruits and root vegetables, are more prolific during specific seasons, while others are restricted to consumption during others [3]. In particular domains, food products are synthesized in excess, while in others, there is not ample of them whenever needed. Today, food preservation is imperative for newly industrialized nations like India to accomplish their food supply solicits [4]. Additionally, it affirms that there will always be food while claiming the supply will never run out [5]. Famine and other calamities like food scarcity can also be mitigated [6]. Mangoes, papayas, tomatoes, juicy fruits, vegetables, and many more commodities are examples of semi-perishable and perishable foods [7]. Civilized fauna thus devised methods for stockpiling such seasonal treats for later use [8]. Foods are perishable and deteriorative by nature firmly on how their work, major food preservation techniques can be segmented into three classes: curbing a recur both before and after processing; directly banning microorganisms, yeast, molds, and enzymes; and slowing or eradicating chemical deterioration and bacterial growth [9]. The fundamental pillars for food are cultivated by an array of harvesting sectors [10]. Poor oversight or poor planning in crop yields may be dodged by steering clear of amiss locations, timings, and amounts for raw food components and by deploying modest preservation tactics to boost storage life [11].

In ancient times, people used the sun and wind to naturally dry their food [12]. Since the beginning of time, fruits and vegetables have been dried. humankind. Freezing was also an apparent preservation method for the correct temperatures [13]. Fermentation was also employed in a number of locations across the world. Rather than being invented, it was found. Microorganisms converted the sugars produced from starch into alcohol through fermentation [14]. It's amazing how early humans were able to recognize, control, and encourage these fermentations [15]. Meals might be Better-quality foods bursting with additional nutritional, practical, useful, and savory characteristics may be found in value-added food items [16]. The keen interest of consumers for more convenient and healthful food substitutions affects food preservation tactics [17]. Eating should be jocular for customers rather than

monotonous. People wish to visit consume a broad range of meals with different flavors and tastes [18]. Throughout the entirety of the globe, classic techniques of food preservation such as chemical preservation, pasteurization, freezing, chilling, and drying are comprehensively deployed [19]. The fabrication of new technologies and the evolution of prevailing ones, encompassing hurdle, high-pressure, and irradiated technology, are facilitated by technological progress [20]. Compared to modern food preservation techniques, several historical food preservation techniques, such jamming fruits, cost less energy and had a smaller carbon footprints protocols [21]. The fruits were first prepared by boiling them to destroy microbes and lower their moisture content, then adding enough sugar to stop microbial development and putting them in an airtight container to keep contamination at bay [22]. Inadequate food preservation techniques were the cause of almost 97.0% of food-borne outbreaks in the United States [23]. Past research has uncovered the issues that food handlers in the food service industry deal with. These include being aware of the proper cooking temperatures, storage temperatures, and cleanliness [24]. To the best of our knowledge, no research of this type has been done on food preservation using W.H.O. questionnaires, and there aren't many studies on food handlers' knowledge of the five principles of food safety. For these reasons, the goal of this study is to evaluate general population members' knowledge, attitudes, and practices regarding the five principles of food safety.

Methods

Participants

To gain insight into the KAP on cancer immunotherapy as a therapeutic method among Saudi Arabian population, the research study deployed a cross-sectional survey. The individuals that took part were selected at random from distinct elements of the nation. Snowball sampling was used to choose a total of 25 respondents. The attendees in the research had to be at least eighteen years old and have lived in various regions of Saudi Arabia. Conversely, people under the age of eighteen and those who had just moved to Saudi Arabia were not allowed to participate in the survey.

Questionnaire

Part 1: The questionnaire, which had four sections, was administered in both Arabic and English. General parameters

like the region of residence, age, gender, and work status were gathered for the metrics

Part 2: Participants inquired questions on various types of food preservation tactics in the Knowledge section. A right response was worth one point, and a wrong response was worth zero. After that, these scores were divided into two groups: high and low knowledge levels.

Section 3: Attitude: Participants' attitudes on the pros and drawbacks of proper use food preservation approach were looked at. A higher rating suggested a more upbeat perspective on these subjects.

Section 4: Execution of strategies that boost participants' understanding and conviction about safety food handling. Better practice is apparent by a higher score.

Statistical Analysis

For the purpose of analyzing the data, the imported questionnaires were loaded into SPSS version 23.0, the Statistical Package for the Social Sciences. The social and demographic information and KAP of the participants in food preservation methods in Saudi Arabia were reviewed using the frequency percentage. Chi-square analyses were used for exploring demographic variables, including educational attainment. The association between dependent (KAP) and independent variables (age, gender, etc.) has been illustrated using scatter plots and box plots.

Ethical Consideration

Not applicable

Results of Study

Figure 1: Participants' place of residence throughout KSA and nearby are highlighted on a map plot. Among 150 participants, Majority of them are from (Bahrain 11%) side, followed by Yemen side (10 %) and tiniest contribution from participants of Madinah (3%), Makkah (6%) and Kuwait (3%) respectively.

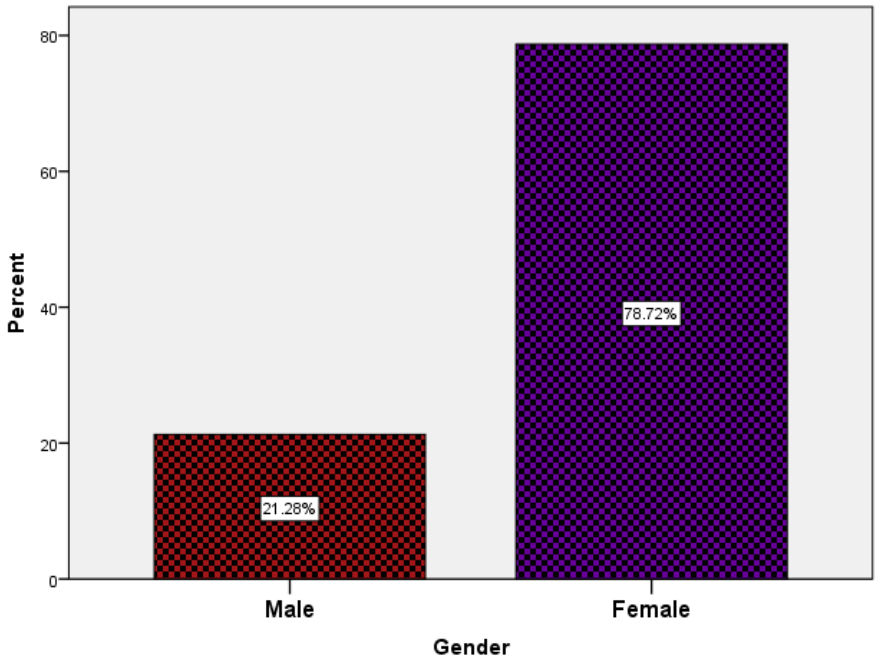


Figure 2: Illustrates the gender distribution of people participating in studies. There were 21.28% of male participants and 78.72% of female participants.

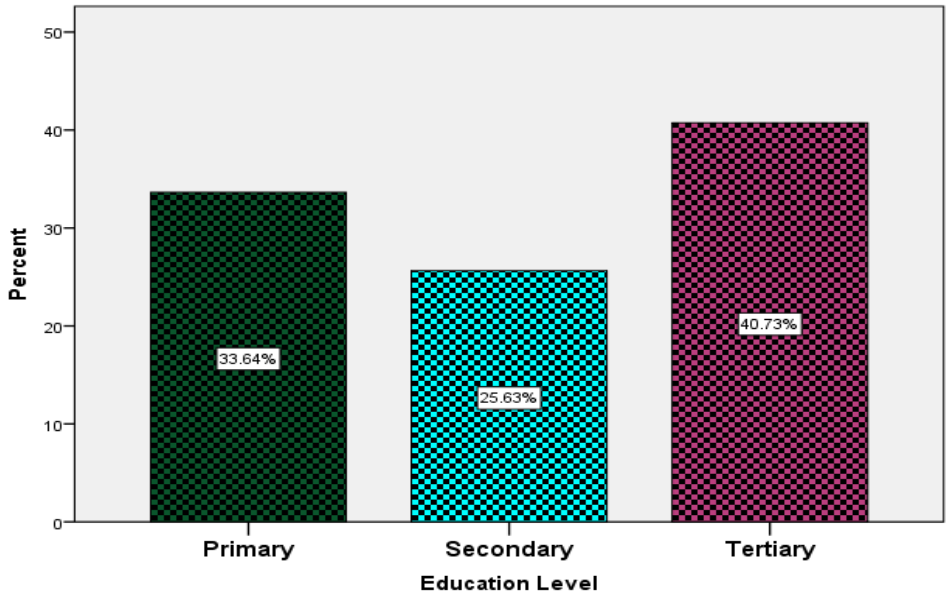


Figure 3: Illustrates the Education level of people participating in studies. 33.64% of participants attained Primary Education, 25.63% of participants attained Secondary Education and Majority 40.73% attained Tertiary level of Education.

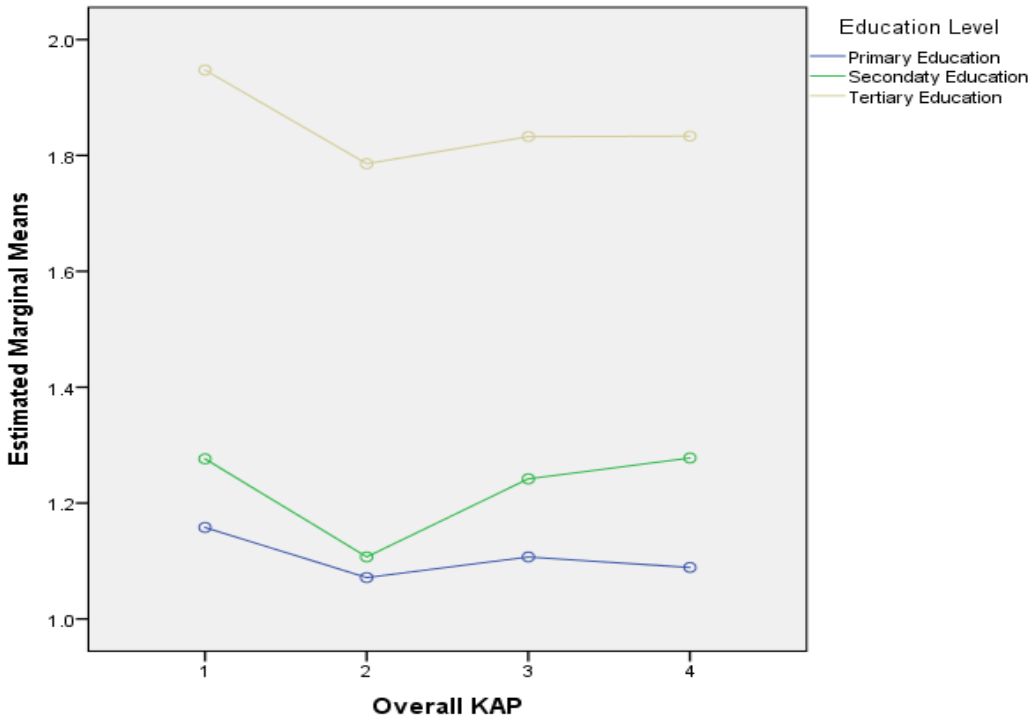


Figure 4: Post-hoc analysis, applied to compare the obtained values for all pairs, showed no significant statistical differences between them, apart from the relationship between Education

Level and over all KAP (p = 0.216) . Detailed values for all comparisons are presented in tabular form.

Table 1: Participants response as per education and intercept to knowledge-based questions.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	1993.853	1	1993.853	4724.680	.000
Education	1.888	3	.629	1.492	.216

Table 2: Response of participants to knowledge-based questions. Correct response graded 1 and Incorrect response graded 0. Mean score of responses were 45.6 %. Score above 45.6 % were considered to be high knowledge level. Participants have fair knowledge on food preservation techniques (68.4 % and 58.9 % respectively).

KQ	Frequency (%) correct response	Frequency (%) Incorrect response
K1	68.4 %	31.6%
K2	58.9 %	41.1 %

Table 3: Response of participants to Attitude based questions. Positive Attitude is graded 1 and Negative attitude is graded 0. Mean score of responses were 47%. Score above 47% were considered to Positive attitude towards food preservation and Score below 47% were considered to be negative attitude on food quality. Participants have Positive attitude for (50.6 %).

AQ	Frequency (%) correct response	Frequency (%) Incorrect response
A1	50.6 %	49.4 %
A2	44.6 %	55.4 %

Table 4: Response of participants to practice based questions. A high score indicated improved practice. Mean score for responses were 54.5%. Score above 54.5% were considered to

be good practice. Participants exhibited good practice towards shelf life of food and associated preservatives

PQ	Frequency (%) correct response	Frequency (%) Incorrect response
P1	54.9 %	45.1 %
P2	54.2%	45.8 %

Table 5: Depicts correlation between Gender and KAP factor. No Significant correlation exist between Gender and KAP factor. Knowledge Domain (Male: P= 0.968, x2 =1.823, Female: P= 0.776, x2 = 1.951).

Gender	Knowledge			Attitude			Practice		
	P value	X2	Likely hood ratio	P value	X2	Likely hood ratio	P value	X2	Likely hood ratio
Male	0.968	1.823	4.724	0.776	1.951	5.131	0.187	2.056	5.357
Female	0.629	1.447	4.304	0.476	0.433	4.959	0.130	3.942	3.610

Discussion

One becomes susceptible to contaminated food selection and makes themselves an easy target for food-related illnesses when they disregard appropriate food storage, the sources of food-borne diseases, and their long-term effects. Consumers are nonetheless wary of new technology and concerned about food safety, even in spite of their enthusiasm in innovative food processing and preservation techniques. A greater emphasis on educating people about these technologies ought to lead to their adoption. The current study examined about knowledge, attitudes, and practices related to food Preservation tactics on Saudi Arabia's population. In sharp contrast to other research carried out in Saudi Arabia (KSA), our study included a broad population from different locations and sectors. The aforementioned approach made it easier to find pertinent data. Among 150 participants, Majority of them are from (Bahrain 11%), followed by yemen (10 %) and tiniest contribution from participants of Madinah (3%), Makkah (6%)

and Kuwait (3%) respectively. . There were 21.28% of male participants and 78.72% of female participants. 33.64% of participants attained Primary Education, 25.63% of participants attained Secondary Education and Majority 40.73% attained Tertiary level of Education.

Post-hoc analysis, applied to compare the obtained values for all pairs, showed no significant statistical differences between them, apart from the relationship between Education Level and overall KAP ($p = 0.216$). However Participants who attained Tertiary school secured higher scores compared to other category of participants. According to earlier research, knowledge increased with age and increased educational attainment, a finding that this study contradicts [25]. Despite the fact that responders from a variety of academic fields showed a positive, substantial correlation with KAP, pharmacy students had the highest scores. According to this study, students with backgrounds in healthcare had much higher KAP toward FS&H than they did for courses unrelated to health [26]. This was demonstrated by Majowicz et al. (2016) in a prior research [27]. yet, with a Malaysian research, a noteworthy correlation was discovered between the respondents' age and educational background as well [28].

Unkles bay et al.'s (1998) study revealed a substantial positive correlation between the respondents' KAP and their year of study [29]. Participants have fair knowledge on food preservation techniques (68.4 % and 58.9 % respectively). This demonstrates how our results dis agree with those of other studies. [30]. According to Osili et al. (2013), the least amount of knowledge was related to safely freezing, preparing, and reheating food [31]. This makes sense in light of the findings. Very few respondents correctly answered questions on maintaining food temperatures in several studies [32]. The participants in this recent research exhibited low knowledge of safe food temperature and reheating, while having acceptable ratings for knowledge, attitude, and practice. Sharif et al. (2013) discovered that their understanding of defrosting and safe temperature (the fourth key) was lacking [33]. It was demonstrated by Cuprasitrut et al. (2011) that the subjects refrigerated goods that were ready to consume [34]. Buccheri et al. (2007) also revealed that 61% of respondents defrosted frozen meals at room temperature, indicating that nursing staff members lacked understanding on the proper temperature for keeping ready-to-eat (warm and cold) food [35]. This finding is consistent with all of these investigations.

The questions that dealt with increasing a shelf life of food preservatives received the highest marks in the attitude section. This was in line with the findings of Buccheri et al. (2007), who discovered that maintaining food at a safe temperature was the best attitude [36]. According to research by Rosnani et al. (2014), 80% of respondents did not agree to separate raw and cooked food [37]. According to Kitagawa et al., 93% of participants lacked separate storage for cooked and raw food [38]. Even if training does not lead to improvements in the way that employees handle food, it is nevertheless vital for guaranteeing that they have the awareness and understanding necessary to adhere to food hygiene regulations [39]. As a result, other instructional approaches are needed, such as those founded on models of motivational health education and promotion [40]. Food workers' habits are influenced by a variety of personal, social, and professional difficulties; these topics need to be researched in order to understand how behavioral changes may occur [41]. Food handlers ought to get appropriate training on food safety principles, according to a 1998 World Health Organization declaration [42]. Therefore, food handler training programs and public health courses need to include the five food safety keys. Two of the keys, which are to prepare food properly and to keep it at a safe temperature, require special emphasis [43-45]. Because most people don't know enough about these, they require greater attention. Retaking these classes on a regular basis could be beneficial [46].

Advantages of the research

The poll was crafted pursuant to a preceding investigation and was first tested in an analogous setting. After that, the survey materials were written in both Arabic and English to help research participants understand them better and to lessen any difficulties that could have arisen while collecting data.

Study limitations

Analogous to all other cross-sectional research designs, this one displays the result and the exposure simultaneously. Therefore, using this study design alone to prove a cause-and-effect link is not practical.

Conclusion

A crucial component of food engineering and the creation of novel food items is the use of new technology. Innovative methods for food processing and preservation provide several benefits for food safety, quality, and nutrient retention.

Nonetheless, customer approval of new technologies has a big impact on their adoption. Higher educated respondents had a higher favorable opinion of new technology; this might be attributed to their increased familiarity with and understanding of food preservation. Without discussing the immediate elements that may influence individual preferences, the research concentrates on the overall evaluation of various approaches and the identification of indirect influences, such as education. The next critical step in comprehending customer behavior and how attitudes are formed is to grasp the motivations.

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Data Availability

The research article and Supplementary material contain the original contributions achieved during the study; for additional information, approach the corresponding author.

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