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Health Awareness of Food Preservation Techniques Among Patients in Saudi Arabia: A Review of Kidney Disease Patients

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Abstract

The study's objective was to clarify the Saudi Arabian patients with kidney disease health understanding food preservation methods. The study makes use of qualitative research, a technique designed to first determine the current context of an incident before attempting to provide an explanation. As a result, it is focused on accurately depicting the event and is grounded in a study of reality or the event as it truly takes place. Understanding food deterioration mechanisms and food preservation

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procedures are essential for ensuring food safety and long shelf life. Additionally, food drying is an essential procedure in the food industry that makes room for the development of new ingredients and products. According to recent studies, new drying techniques can now be used to increase drying efficacy and efficiency, reducing energy consumption while maintaining the quality of the finished product. Inhibiting well-known physical processes such as heat transfer, moisture evaporation, chemical reaction, and enzymatic response is the basis for many preservation procedures. When manufacturing, processing, purposefully, and actively packing, and consuming food products that have undergone nanoprocessing, regulatory rules as well as safety and health considerations must be taken into account. Thanks to the development of microbiological technologies for food preservation, there have been encouraging decreases in food deterioration.

Keyword: *Awareness; Food Preservation; Kidney Disease Patients; Saudi Arabia*

Introduction

Foods are organic materials that are eaten to provide nutrition. Foods come from either plants or animals and include organic compounds such as moisture, protein, fat, carbohydrate, and minerals. Foods become perishable as a result of microbiological, chemical, or physical processes. Food spoilage can affect the nutritional value, color, texture, and palatability of the food (Rahman, 2007).

Foods must therefore be preserved if they are to keep their quality for a longer time. Food preservation is characterized as the procedures or methods used to control both internal and external elements that could lead to food spoiling. Food preservation's main goal is to extend its shelf

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life while preserving its original nutritional content, color, texture, and flavor (Amit et al., 2017).

The practice of "food preservation" has a long history. It was originally practiced by a prehistoric tribe after they killed a large animal that they were unable to consume at the time. Understanding how to preserve food was the first and most crucial step in creating civilization. Different cultures throughout history have employed largely comparable fundamental methods to preserve food (Nummer, 2002). All across the world, conventional food preservation methods like pasteurization, drying, freezing, chilling, and chemical preservation are widely utilized. Irradiation, high-pressure technology, and hurdle technology are a few examples of how new technologies and the evolution of old ones are being influenced by scientific advances (Blum, 2012; Freedman, 2011; Rahman, 2014).

In comparison to the general population, individuals on maintenance dialysis (MD) have inferior quality of life, significantly higher morbidity, higher hospitalization rates, and higher death (Collins et al., 2015; Kalantar-Zadeh et al., 2001; Nicolucci and Procaccini, 2000). According to numerous research, MD patients have a high rate of protein-energy malnutrition (PEM), which can range from 18% to 75% (Kopple, 2017; Mehrotra and Kopple, 2001). In contrast to the general population, where being overweight raises the risk of cardiovascular disease, nutritionally deficient individuals exhibit traits such a low body mass index, a low weight-for-height ratio (Kopple et al., 1999), or a low blood cholesterol concentration (,150 mg/dL) (Lowrie and Lew, 1990). Seem to have a

substantial correlation with greater rates of morbidity and mortality, including a higher risk of cardiovascular death in MD patients.

The dialysis patient needs a special diet, and the diet is an important part of the health care plan, such as: first, get the right amount of calories and protein. Second, monitoring micronutrients in the diet of dialysis patients, such as sodium and fluids, phosphorus and calcium, potassium, and vitamins and minerals (National kidney foundation, nutrition and hemodialysis, 2013).

Research Problem

One of the most important contentious—topics in the history of nephrology is the nutritional approach in the various stages of renal insufficiency. Patients on dialysis are extremely susceptible to both malnutrition, which is characterized by low proteincalorie intake, and cachexia, which is characterized by impaired food digestion or utilization in the presence of hypercatabolism and systemic inflammation.

In order to avoid malnutrition, kidney patients must be aware of food preservation methods, as a kidney patient needs special care, and within this care, the patient needs a healthy diet. This study presents previous studies to discuss health awareness of food preservation methods among patients in the Kingdom of Saudi Arabia. A review of patients with kidney disease.

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Research Questions

The problem of the current study can be summarized in the following questions:

1. What are the food preservation techniques?
2. How can kidney patients be aware of food preservation and have healthy food?

Research Objectives

The problem of the current study can be summarized in the following objectives:

1. To explain food preservation techniques.
2. To explain the health awareness of kidney disease patients.

Methodology

The study uses qualitative research, a methodology created to first ascertain the existing context of a specific incident before attempting to offer an explanation. Because of this, it is concerned with authentically portraying the event and is based on research into reality or the event as it actually occurs. The qualitative method is crucial to research since it is regarded as a fundamental tenet of scientific inquiry and is frequently seen to be the sole approach suitable for studying many human fields. The qualitative approach focuses on accurately defining, describing, and explaining the phenomenon in both qualitative and numerical terms. It also requires treating the phenomenon as it actually is, as stated by its definition. The study followed the qualitative approach to explain the

health awareness of food preservation techniques among kidney disease patients in Saudi Arabia.

Food Preservation Techniques

Acquiring the knowledge to preserve meals was one of the key revolutionary inventions of human civilization since it was a requirement for a man to settle down in one area and create a society. It is crucial and difficult to extend the shelf life of food products without affecting their original nutritional value. Food is an organic, perishable product that can go bad owing to physical, chemical, or microbiological processes. In the past, many traditional methods for preserving food while preserving its nutritional content and texture included drying, chilling, freezing, and fermentation. Preservation methods have evolved and become more contemporary as time and demand have gone on. The most recent developments in food preservation include the pulsed electric field effect, high-pressure food preservation, and irradiation. Additionally, other chemical agents have been developed as food additives and preservatives. However, due to potential health risks, there are growing worries about the use of chemical additives and preservatives in food products. The food processing and preservation industry has been rapidly increasing to keep up with consumer demand. Understanding food deterioration mechanisms and food preservation procedures is essential to ensuring food safety and long shelf life. In this review, various food categories, food deterioration mechanisms, as well as the workings and uses of both conventional and cutting-edge food preservation systems, have all been collated and examined (Amit et al., 2017).

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Food drying is a vital food industry method that opens up opportunities for new product development and ingredient research. The technology used for commercial food drying has advanced significantly in recent years, including pre-treatments, methods, tools, and quality. Recent studies have shown that novel drying techniques can now be used to increase the effectiveness and efficiency of drying so that energy consumption can be decreased while also maintaining the quality of the finished product. These techniques include microwave- or ultrasound-assisted drying, high electric field drying, heat pump drying, and reflectance window drying (Moses et al., 2014).

To solve the problem of food waste, proper food preservation must be carried out. Nowadays, a variety of methods for food preservation are used all over the world. Each technique emphasizes one or more of the essential components of food waste, such as microbial growth, enzymatic activity, chemical reaction, and physical damage. As a result, the preservation procedures greatly influence the required process conditions. Numerous preservation methods are carried out based on well-known physical processes, such as heat transmission, moisture removal, and suppression of chemical and enzymatic reactions (Joardder and Masud , 2019).

There are numerous ways to freeze today. Their use is influenced by the product's kind, volume of manufacturing, packaging, availability, and refrigerant cost. A recent technique for freezing food products relies on the use of liquid gases, namely nitrogen and carbon dioxide. Technologies that employ liquid gases aid in the growth of the

refrigeration sector. According to research, Poland's livestock and forestry industries, fruit and vegetable processing, and beverage production can all use liquid gas freezing (Kondratowicz and Matusevičius, 2002).

One of the earliest methods of biopreservation used by humans is the fermentation of different foods by lactic acid bacteria (LAB). Despite the fact that bacterial antagonism has been known for more than a century, in recent years it has garnered increasing scientific attention, notably with the introduction of different lactic acid bacteria strains. The capacity of many LAB to create bacteriocins, which are antibacterial substances, is a crucial characteristic. Due to their potential use as natural alternatives to chemical food preservatives in the manufacturing of foods with extended shelf life and/or safety, interest in these compounds has significantly increased over the past few years. Consumer understanding of the connection between diet and health is rising. Recent scientific data supports the probiotic LAB's function in mediating a variety of beneficial health benefits. Lactic acid bacteria traditional probiotic dairy strains have a long history of safe use, and the majority of strains are thought of as commensal microorganisms with no pathogenic potential (Soomro et al., 2002).

Secondary metabolites known as plant phenolics are essential for a plant's response to biotic and abiotic stressors. In terms of managing chronic diseases in humans and food preservation, these phytochemicals are likewise becoming more and more important. It is possible for phenolic substances from various food crops to behave as natural antioxidants

since they have various chemical and biological properties. These phenolic phytochemicals are abundant in plant-based foods for humans and can be employed efficiently for food preservation and bioactive enrichments by stimulating critical metabolic pathways. Foods made from plants are shielded from microbial deterioration during post-harvest storage by phenolic compounds. Phenolics aid to prevent biochemical and physical food deterioration, extend the shelf life of food, and improve nutritional value in addition to provide biotic protection (Sarkar and Shetty, 2014).

Numerous areas of food science have undergone radical change as a result of the quick development of nanotechnology, particularly those that deal with food processing, packing, storage, transportation, functionality, and other safety-related issues. The food industry has used a wide variety of nanostructured materials (NSMs), from inorganic metal, metal oxides, and their nanocomposites to nano-organic materials incorporating bioactive chemicals. Despite the enormous advantages that nanotechnology offers, there are growing worries about its application since the buildup of NSMs in the environment and human bodies can pose a number of health and safety risks. As a result, when producing, processing, thoughtfully and actively packing, and consuming food products that have undergone nanoprocessing, regulatory laws as well as safety and health considerations must be taken into account (Bajpai et al., 2018).

The use of biotechnological technologies in food preservation has produced encouraging reductions in food deterioration. One of the

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important success elements in this application field is the design and development of extremely effective food preservatives. However, research was ongoing to develop viable substitutes to replace traditional methods due to the inherent drawbacks of the bulk forms of such preservatives. This method is now practical in practically every element of food preservation because to nanotechnology. The previous few decades have seen extensive research into this area of nanobiotechnology's interface, and a wealth of literature has been documented. For a variety of purposes, researchers have created effective nanopreservatives (NPRs). The literature on nanotechnology-based food preservation, however, does not cover the molecular aspects of food preservation. The physics of intermolecular and interfacial forces, as well as nanotechnology, which are crucial to creating edible coatings, have a significant knowledge deficit in the interface domain (ECs). For the development of effective NPRs, it is vital to identify the contributing nano- and molecular-level components. Additionally, it is crucial to comprehend the potential health effects of NPRs in the public's interest and concern (Bhuyan et al., 2019).

When it comes to ensuring the safety and security of food, the food industry (FI) is among the most crucial sectors of any nation's economy. The application of new technology in this field is a novel strategy that might be taken into consideration. This industry sector should pursue sustainable development through the use of nanotechnologies and higher productivity in light of the increase in population and per capita food consumption. Numerous nanostructured materials (NSMs) have been applied in the FI, ranging from nano-organic materials containing

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bioactive compounds to inorganic metals, metal oxides, and their nanocomposites. Given the many benefits of nanotechnology, there are growing concerns about its use because the accumulation of nanoscale materials (NSMs) in the atmosphere and in human bodies may provide a number of health and safety issues. As a result, regulatory guidelines as well as safety and health hazards must be considered while creating, handling, wisely and actively packing, and using food products that have undergone nanoprocessing (Hutapea et al ., 2021).

The most often utilized probiotics are lactic acid-producing bacteria, which are crucial for defending the body against dangerous microorganisms, boosting the host immune system, enhancing feed digestion, and lowering metabolic abnormalities. A Gram-positive member of the Lactobacillus genus, Lactobacillus fermentum (Lb. fermentum) has been demonstrated to improve immune function and guard against gastrointestinal and upper respiratory illnesses that spread through the community. Additionally, Lb. fermentum strains produce a variety of powerful antimicrobial peptides that can be used as antibiotic substitutes or as food preservatives. Probiotic Lb. fermentum strains have been shown to have additional benefits, including the ability to lower blood cholesterol levels (as cholesterol-lowering agents) and may protect against alcoholic liver disease and colon cancer in humans. The last point is that Lb. fermentum is a crucial microorganism in sourdough technology, contributing to the flavor, texture, or health-promoting dough ingredients, and has recently been used to develop new food products like fortified and functional foods with advantageous properties for human health. The market for the food business is currently being significantly

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impacted by the development of such new foods. The implementation of alternative environmentally friendly solutions in the production processes and/or suitable biological alternatives to reduce the use of antibiotics in feed and food is also prompted by consumers' growing consumer awareness. Here, we provide a description of the use of L. fermentum strains in the biomedical and food preservation domains, with an emphasis on probiotic properties like the synthesis of bacteriocin. We also discuss the use of L. fermentum as cell factories to enhance the effectiveness and nutritional content of functional foods (Naghmouchi et al., 2020).

Consumers have recently been more conscious of the harm to human health caused by the use of chemical preservatives in food. On the other hand, the dairy industry's growing need for new preservatives and innovative means of preservation to increase shelf life and avoid deterioration of dairy products. Antimicrobial peptides known as bacteriocins are thought to be safe since the mammalian gastrointestinal tract's proteolytic enzymes can quickly break them down. Additionally, the majority of bacteriocin makers are members of the lactic acid bacteria (LAB) group, which naturally occurs in food and has a long history of safe use in the dairy sector. Bacteriocins, whether purified or excreted by strains that produce bacteriocins, are an excellent substitute for the use of chemical preservatives in dairy products because they pose no health risks. It is possible to add bacteriocins to dairy products in refined or crude form, as a bacteriocin-producing LAB during fermentation, or as an adjuvant culture. Bacteriocins and bacteriocin-producing LAB have been used in a number of applications to successfully control infections in

milk, yogurt, and cheeses. One of the more recent techniques is adding bacteriocins directly to food surfaces or packaging in purified or semi-purified form, or adding bacteriocin-producing LAB to bioactive films and coatings (Silva et al., 2018).

Health Awareness of Kidney Disease Patients

Patients with chronic renal disease are at a higher risk of morbidity and mortality when they have hyperphosphatemia (CKD). In addition to being instructed to follow a low-phosphate diet, patients with CKD are frequently given phosphate-lowering medication. However, phosphate compounds are frequently found in commercially processed foods and beverages, but the amount is rarely indicated in the ingredient list, making it challenging for CKD patients to select the right diet. The study examined CKD patients receiving hemodialysis for their knowledge of foods and beverages with chemically added phosphate. The subjects were 153 patients randomly chosen from the Dialysis Center of Hirosaki City, Japan, who had an average age of 56 years and 76 females. A questionnaire was given to the subjects. According to the survey's findings, 93% of the participants knew that soda has a high sugar content, but only 25% knew that these drinks also include phosphate (phosphoric acid). Despite the fact that 43% of the individuals drank at least one to five cans of soda per week and 17% occasionally ate "fast food," 78% of the subjects were aware of the harmful effects of consuming a high phosphate diet. By measuring the urine calcium, phosphate, protein, and sugar contents of overnight-fasted healthy volunteers (n = 55; average age 20.70.3 years; 20 men and 35 females), the research also evaluated

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the immediate consequences of high-phosphate-containing carbonated drink consumption. When compared to the baseline level attained when fasting, urine calcium excretion was observed to be significantly higher 2 hours after ingesting 350 ml of carbonated soda (0.150.01 vs. 0.090.01, p = 0.001). According to the results of our survey, CKD patients receiving hemodialysis are not sufficiently aware of the phosphate that is buried in their food. This highlights the need for educational programs to make CKD patients more aware of this problem (Shutto et al., 2013).

High dietary phosphorus (P) burden may aggravate hyperparathyroidism and renal osteodystrophy in those with chronic kidney disease, induce vascular calcification and cardiovascular events, and raise mortality. Dietary P may be significant depending on its nature (organic versus inorganic), source (animal versus plant derived), and ratio to dietary protein, in addition to its total amount. Due to the poor gastrointestinal absorption of phytate-based P, organic P is less accessible in plant meals like seeds and legumes. Because organic P is more slowly absorbed by the intestine, inorganic P may be underreported in nutrient databases along with other additive-containing processed, preserved, or enhanced foods and soft beverages. Therefore, compared to natural sources that are obtained from organic (animal and vegetable) food proteins, the P load from food additives is disproportionately large proportional to its dietary intake. Higher protein consumption has positive effects on nutrition and longevity in dialysis patients, according to observational and metabolic studies. Given the strong correlation between protein and P consumption, this makes it difficult to provide a balanced diet. The absolute dietary P content as well as the P-to-protein ratio in foods should be discussed

when providing dietary guidance to individuals with chronic renal disease. Along with the proper prescription of P binders, foods with the least amount of inorganic P, low P-to-protein ratios, and an adequate protein content that are consistent with the patient's acceptable palatability and enjoyment should be suggested. These objectives might be more easily attained if in-center and closely supervised meals were provided throughout hemodialysis treatment sessions at the dialysis clinic (Kalantar-Zadeh et al., 2010).

Conclusion and Recommendations

The aim of the study is to explain the health awareness of food preservation techniques among Kidney disease patients in Saudi Arabia. The study uses qualitative research, a methodology created to first ascertain the existing context of a specific incident before attempting to offer an explanation. Because of this, it is concerned with authentically portraying the event and is based on research into reality or the event as it actually occurs.

The study concluded the following, to ensure food safety and long shelf life, it is crucial to comprehend food deterioration mechanisms and food preservation techniques. Moreover, food drying is a crucial process in the food business that creates space for new product research and ingredient development. New drying methods can now be utilized to boost drying efficacy and efficiency, lowering energy consumption while retaining the quality of the finished product, according to recent studies. Numerous preservation techniques work by inhibiting well-known physical processes such as heat transfer, moisture removal, and chemical and

enzymatic response. Regulatory guidelines as well as safety and health factors must be taken into account when creating, processing, deliberately, and actively packing, and consuming food goods that have undergone nanoprocessing. There have been encouraging decreases in food deterioration thanks to the introduction of microbiological technology for food preservation.

The study recommended the following:

- Kidney patients should take care of a healthy food.
- Doctors should educate kidney patients on the foods they should eat.
- Patients should be aware of ways to store food properly and hygienically.

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References

Amit, S. K., Uddin, M., Rahman, R., Islam, S. M., & Khan, M. S. (2017). A review on mechanisms and commercial aspects of food preservation and processing. Agriculture & Food Security, 6(1), 1-22.

Moses, J. A., Norton, T., Alagusundaram, K., & Tiwari, B. K. (2014). Novel drying techniques for the food industry. Food Engineering Reviews, 6(3), 43-55.

Joardder, M. U., & Masud, M. H. (2019). Food preservation techniques in developing countries. In Food Preservation in Developing Countries: Challenges and Solutions (pp. 67-125). Springer, Cham.

Kondratowicz, J., & Matusevičius, P. (2002). Use of low temperatures for food preservation. Veterinarija ir Zootechnika, 17(39), 88-92.

Soomro, A. H., Masud, T., & Anwaar, K. (2002). Role of lactic acid bacteria (LAB) in food preservation and human health-a review. Pakistan Journal of Nutrition, 1(1), 20-24.

Sarkar, D., & Shetty, K. (2014). Metabolic stimulation of plant phenolics for food preservation and health. Annu Rev Food Sci Technol, 5(1), 395-413.

Bajpai, V. K., Kamle, M., Shukla, S., Mahato, D. K., Chandra, P., Hwang, S. K., ... & Han, Y. K. (2018). Prospects of using nanotechnology for food preservation, safety, and security. Journal of food and drug analysis, 26(4), 1201-1214.

Bhuyan, D., Greene, G. W., & Das, R. K. (2019). Prospects and application of nanobiotechnology in food preservation: molecular perspectives. Critical reviews in biotechnology, 39(6), 759-778.

Hutapea, S., GHAZI AL-SHAWI, S., Chen, T. C., You, X., Bokov, D., Abdelbasset, W. K., & Suksatan, W. (2021). Study on food preservation materials based on nano-particle reagents. Food Scienc

Naghmouchi, K., Belguesmia, Y., Bendali, F., Spano, G., Seal, B. S., & Drider, D. (2020). Lactobacillus fermentum: A bacterial species with potential for food preservation and biomedical applications. Critical reviews in food science and nutrition, 60(20), 3387-3399.

Silva, C. C., Silva, S. P., & Ribeiro, S. C. (2018). Application of bacteriocins and protective cultures in dairy food preservation. Frontiers in microbiology, 9, 594.

Shutto, Y., Shimada, M., Kitajima, M., Yamabe, H., Saitoh, Y., Saitoh, H., & Razzaque, M. S. (2013). Inadequate awareness among chronic kidney disease patients regarding food and drinks containing artificially added phosphate. PLoS One, 8(11), e78660.

Kalantar-Zadeh, K., Gutekunst, L., Mehrotra, R., Kovesdy, C. P., Bross, R., Shinaberger, C. S., ... & Kopple, J. D. (2010). Understanding sources of dietary phosphorus in the treatment of patients with chronic kidney disease. Clinical Journal of the American Society of Nephrology, 5(3), 519-530.

Rahman, M. S. (Ed.). (2007). Handbook of food preservation. CRC press.

Nummer BA. Historical origins of food preservation. 2002. http://nchfp.uga.edu/publications/nchfp/factsheets/food_pres_hist.html

Blum, D. (2012). Food that lasts forever. TIME Magazine, 12.

Freedman, D. H. (2011). The bright, hi-tech future of food preservation, in discover magazine.

Rahman R. Food preservation. 2014. http://en.banglapedia.org/index.php?title=Food_Preservation

National kidney foundation, nutrition and hemodialysis, (2013)

Collins, A. J., Foley, R. N., Gilbertson, D. T., & Chen, S. C. (2015). United States Renal Data System public health surveillance of chronic kidney disease and end-stage renal disease. Kidney international supplements, 5(1), 2-7.

Kalantar-Zadeh, K., Kopple, J. D., Block, G., & Humphreys, M. H. (2001). Association among SF36 quality of life measures and nutrition, hospitalization, and mortality in hemodialysis. Journal of the American Society of Nephrology, 12(12), 2797-2806.

Nicolucci, A., & Procaccini, D. A. (2000). Why do we need outcomes research in end stage renal disease?. Journal of Nephrology, 13(6), 401-404.

Kopple, J. D. (1997). Nutritional status as a predictor of morbidity and mortality in maintenance dialysis patients. ASAIO journal (American Society for Artificial Internal Organs: 1992), 43(3), 246-250.

Mehrotra, R., & Kopple, J. D. (2001). Nutritional management of maintenance dialysis patients: why aren't we doing better?. Annual review of nutrition, 21, 343.

Kopple, J. D., Zhu, X., Lew, N. L., & Lowrie, E. G. (1999). Body weight-for-height relationships predict mortality in maintenance hemodialysis patients. Kidney international, 56(3), 1136-1148.

Lowrie, E. G., & Lew, N. L. (1990). Death risk in hemodialysis patients: the predictive value of commonly measured variables and an evaluation of death rate differences between facilities. American Journal of Kidney Diseases, 15(5), 458-482.