

## EVALUATION OF INFORMATION LABEL FOR SOME LOCAL PICKLED PRODUCTS AND ESTIMATION OF SODIUM BENZOATE THEREIN

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### ABSTRACT

The study aimed to evaluate the information label of some local pickle products and estimate sodium benzoate therein. 85 samples of locally made pickles were collected from Baghdad city markets and randomly from five different areas in Baghdad it included (Al-Shula, Al-Bayaa, Al-Nahrawan, Al-Taji, and Abu Ghraib), which were divided into groups P1, P2, P3, P4 and P5, respectively, according to those areas, samples information label was scanned and compared with the Iraqi standard specification for the information card of packaged and canned food IQS 230, the results showed that 25.9% of the samples were devoid of the indication card information, 32.9% matched and 41.20% did not match, and 71.8% of the pickled samples gave a positive test result when the qualitative detection of sodium benzoate, this indicates that it is used to preserve the product , as for 28.2%, the result was negative, the average concentration of this substance for the samples for groups P1, P2, P3, P4 and P5 was 1704,23, 973,67, 995,81, 1216,27 and 1142,19 mg/kg respectively, 40.98% of the samples analyzed in which the concentration of sodium benzoate exceeds the permissible limit of 1000 mg/kg that was determined by the Iraqi standard specification for pickles IQS 1128.

Keywords: Pickles, label information, sodium benzoate.

تقييم بطاقة الدلالة لبعض منتوجات المخللات المحلية وتقدير بنزوات الصوديوم فيها

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### الخلاصة

هدفت الدراسة الى تقييم بطاقة الدلالة لبعض منتوجات المخللات المحلية وتقدير بنزوات الصوديوم فيها، تم جمع 85 عينة من المخللات المحلية الصنع من اسواق مدينة بغداد وبشكل عشوائي من خمس مناطق مختلفة في مدينة بغداد شملت ( الشعلة والبياع والنهروان والتاجي وابي غريب) قسمت الى مجاميع P1 و P2 و P3 و P4 و P5 على التوالي تبعاً لتلك المناطق، وتم مسح معلومات بطاقة الدلالة للعينات ومقارنتها مع المواصفة القياسية العراقية الخاصة بطاقة دلالة المواد الغذائية المعلبة والمعبأة IQS 230، وظهرت النتائج ان 25.9 % من العينات خالية من معلومات بطاقة الدلالة و32.9% مطابقة و41.20% غير مطابقة، وقد أعطت 71.8% من عينات المخللات نتيجة فحص موجبة عند الكشف النوعي لبنزوات الصوديوم مما يدل على استخدامه في حفظ المنتج، أما 28.2% كانت نتيجتها سالبة، وظهرت النتائج أن متوسط تركيز هذه المادة لعينات المجاميع P1 و P2 و P3 و P4 و P5 بلغ 1704.23 و 973.67 و 995.81 و 1216.27 و 1142.19 ملغ/ كغم على التوالي، وان 40.98% من العينات التي تم تحليلها يتجاوز تركيز بنزوات الصوديوم فيها الحد المسموح به 1000 ملغ/ كغم الذي حدده المواصفة القياسية العراقية للمخللات IQS 1128.

الكلمات المفتاحية: مخللات، بطاقة الدلالة، بنزوات الصوديوم.

## INTRODUCTION

The information label for foodstuffs is the only tool that enables consumers to obtain information and warnings about food products and helps in making their purchasing decisions, it is one of the most important measures of the level of progress and development of countries around the world, therefore, the legislative authorities and institutions related to the food processing and circulation system, as well as health organizations responsible for individual health and food safety, all seek to develop legislation, legal texts and standard specifications that must be followed by all food manufacturers and traders, (**Bacarella et al., 2015**), the legal legislation in this field stipulates that packed and canned foods contain complete and clear data about the number of the production batch, storage conditions, the presence of warning signs on how to deal with this type of food before and after opening, the existence of the validity date and use of the language of the country in which the food is consumed to be the consumer. Fully aware of the information that gives a complete idea of food before the purchase and consumption process (**Alsoufi et al., 2020**). Raw or fresh foods are considered perishable materials because of their composition that helps the growth of microorganisms that cause food spoilage and contamination, the presence of the activity of decomposing enzymes or chemical changes that occur in them during preparation, storage and marketing processes, therefore, food preservation methods have developed from adding salt, sugar, drying and smoking to food, passing through cooling and freezing techniques, natural and industrial food additives have diversified as a way to preserve food from spoilage for the longest possible period and to add the desired sensory qualities at the same time (**Xu et al., 2019**), benzoic acid with the symbol (E210) is a common preservative used in many acidic foods. this acid appears naturally in apples, strawberries and butter, it maintains a pH between 2.5-4 when added to acidic food products such as pickles and sauces (**Reddy et al., 2015**). benzoic acid has a low solubility in water, so it is converted to acid salts such as sodium or potassium benzoate, which have the ability to pass through cell membranes as they are quickly soluble in water (**Akbari- Adergani et al., 2013**), the permissible limit of adding sodium benzoate in pickled fruit and vegetable products does not exceed 1000 mg/kg according to the legislation approved by **Codex (2015)**, generally 5 mg/kg of body weight per day (**Al-Kamil et al., 2016**), some studies have revealed the dangers of long-term accumulation of sodium benzoate levels in food, represented by health problems such as changes in the normal indicators of blood serum, changes in liver and kidney functions, nervous system disorders such as convulsions, as well as hyperactivity in children and adults (**Mamur et al., 2012; Pongsavee, 2015**), this exacerbates the danger of general high benzoate concentration, when interacts with ascorbic acid in the presence of metals, especially copper and iron, at room temperature of 25 ° C and with the help of oxygen, which leads to the formation of benzene compounds, which are classified within the first group of substances most dangerous to human health, being proven that they are among the causes of tumors and cancer **IARC (2012)**, some surveys have been conducted to assess the potential risks of consuming food products preserved with sodium benzoate such as juices, sauces and pickles, and because the latter contains ascorbic acid and a low pH value and is rich in minerals, all of these factors provide an ideal environment for the formation of benzene compounds, and the presence of oil can lead to some types of pickles indicate the product's ability to retain more gasoline (**Kharat et al., 2016; Zengin et al., 2011**), in view of the diversity and abundance of Iraqi pickle products and the high demand for their consumption by all age groups, this study was conducted to evaluate the information label of some local pickle products and to estimate sodium benzoate in them.

## MATERIALS AND METHODS

### Samples of local pickles

Locally manufactured pickles (85 samples) were randomly collected from five different regions in Baghdad governorate, including (Al-Shula, Al-Bayaa, Al-Nahrawan, Al-Taji, and Abu Ghraib) to be divided into groups P1, P2, P3, P4 and P5, respectively, according to the regions, the samples were placed in plastic containers on which a sticker was placed that included the place and quantity of the sample, kept in the refrigerator until laboratory examination, noting that in some areas more than one sample was collected because they contain a larger number of locale pickle factories.

### Information label scan

Samples covers had been read, for the purpose of complaisance with Iraqi Standard regulation which deals with food labeling **IQS 230 (1989)**, it was also compared to the Iraqi standard for pickles **IQS 1128 (2013)**. The product name, brand, ingredients, production date, expiry date and weight have been scanned.

### Standard materials and solutions

All chemicals used in the experiment were of an analytical type. Standard samples of sodium benzoate were obtained from the German company (Sigma Aldrich), while standard and carrier phase solutions were used according to the analytical standards used for high-performance liquid chromatography (HPLC).

### Qualitative determination of sodium benzoate

For the initial detection of sodium benzoate in samples of local pickles, the method of Ferric chloride test was followed, Mentioned in **FSSAI (2015)**, using acidify the food product with hydrochloric acid (1+3) and extract with diethyl ether, removing last traces of solvent by evaporate the solvent on a hot water bath under a current of air, the residue dissolved in few ml of hot water and few drops of 0.5% ferric chloride solution was added, presence of benzoic acid in the sample can be inferred when ferric benzoate is precipitated in the solution with a pink to orange color (salmon color).

### Quantitative determination of sodium benzoate by HPLC technique

High-performance liquid chromatography (HPLC) of the Market Research and Consumer Protection Center, University of Baghdad, Iraq was used to estimate sodium benzoate in 85 samples of local pickles prepared for this examination, the analysis was carried out using a column C18 with dimensions of 2.0×60 mm, a flow rate of 1 mL/min, and a temperature of 20°C, the samples were measured at a wavelength of 230 nm to determination of sodium benzoate according to the method mentioned by **Sirhan (2018)**, mobile phase was prepared with the following ratios: 30 Water (volume / volume): 55 acetonitrile :15 formic acid 5%.

## RESULTS AND DISCUSSION

The results (Table 1) showed that the percentage of samples conforming to the Iraqi specification was 32.9%, they contain all the information and data required in the Iraqi specification for the food information label of them are packed in airtight plastic bags containers or heat-treated glass containers, the percentage of pickles samples that were completely devoid of the information label was 25.9%, most of them are pickles kept in heat-sealed polyethylene bags without mentioning any information about the product, while the percentage of samples that did not conform to the information label specification was 41.20%, they carry only the name of the product and its trademark, or contain only the name of the product, some of them contain the production date, expiry date and weight without the rest of the information, they are also packed in polyethylene bags.

**Table (1):** The information label scan for local pickles samples.

| samples  | No. | Percentage (%) |
|--|-----|----------------|
| Total no. of samples   | 85  | 100            |
| No. of samples not partially conforming to information label specification | 22  | 25.9           |
| Number of samples completely devoid of label information                   | 35  | 41.20          |
| The number of samples conforming to the specification                      | 28  | 32.9           |

A scan of the of information label data was conducted for 35 samples of local pickles that did not partially conform to the information label specification as shown in (Table 2), according to the totals belonging to the geographical areas from which the samples were drawn, the results showed that pickles samples which contained only the name of the product only ranged between 69.2 - 91.4%, and in which the brand was mentioned amounted to 68.6 - 79.7%, while the pickles that contained a clear detail of the ingredients amounted to 19.7 - 4.23%, as for the samples that contained the shelf life only, it ranged between 33.8 - 42.6%, while the samples that contained the weight of the product recorded a percentage ranging

**Table (2):** The presence of information label data in samples that partially do not conform to the Iraqi standard.

| Presence data of information label (%) |              |       |             |                            |        |
|--|--------------|-------|-------------|----------------------------|--------|
| Groups                                 | Product Name | Brand | Ingredients | Production and expiry date | Weight |
| P1                                     | 74.1         | 71.5  | 19.7        | 33.8                       | 25.6   |
| P2                                     | 91.4         | 75.1  | 23.4        | 37.5                       | 27.8   |
| P3                                     | 87.5         | 79.7  | 22.5        | 42.6                       | 30.4   |
| P4                                     | 88.6         | 72.9  | 21.9        | 35.4                       | 33.2   |
| P5                                     | 69.2         | 68.6  | 18.2        | 34.3                       | 24.9   |
| Average                                | 81.36        | 73.56 | 22.74       | 37.5                       | 38.38  |

between 24.9 - 33.2%, it is noted that the product name was the most present on the sample covers compared to other information, as for the information on the shelf life, ingredients and weight, it was the least available in the information label, (Alsoufi *et al.*, 2019) indicated that 20,45% of the total samples of packaged foods that they studied, such as milk and its derivatives, biscuits, types of canned goods, drinks and juices, were in violation of the Iraqi standard specifications **IQS 1847 (2012)** regarding the shelf life of foodstuffs, as for the **Alsoufi *et al.*(2020)** study, who scanned the information label for imported canned food samples, they found that most of them were in conformity with the Iraqi standard **IQS 230 (1989)**, the information card of packaged and canned food, including the name of the material, trade name, country of origin, and weight, except for some samples, such as canned peas, carrots, tomato paste, and processed cheddar cheese, which were devoid of the serving number or the validity period was not clear, the researchers pointed out that the data contained in the information label for canned food is one of the important indicators for both the consumer and the regulatory authorities, this information should not be hidden with anything else, whether it is decreed, written or printed, in a study conducted by **Siriex *et al.* (2013)**, regarding the consumer's view of the food indication label, it showed that 94.8% of the imported foodstuffs in the UK markets carry a clear and useful information label from the consumer's point of view and conform to the approved standard, (**Bacarella *et al.*, 2015**) studied the importance of food labeling as a means of information and tracking according to consumers' opinion in Italy, the results showed that the consumer's failure to obtain clear data through the information label leads to their reluctance to buy the food item due to a lack of information, product characteristics and the health effects of food safety for consumption, while 91% of consumers

confirmed that the modern technology represented by the QR Code (Quick Response Code) solves problems related to the quality and safety of food products by providing correct and adequate information, which enhances consumer confidence in the product and is an effective way to enhance credibility of production companies and raising the value of the product.

The results (Table, 3) showed the qualitative detection of sodium benzoate in 85 samples of local pickles in Baghdad city, some samples gave a positive test result, which indicates the use of sodium benzoate in their manufacture, while others were negative, and this gives evidence of the absence of the mentioned substance, the results indicated that most of the samples contain sodium benzoate, which numbered 61(71.8% of the total samples examined), while the number of samples free of this substance reached 24(28.8% of the total samples used in the examination), this refers to the use of sodium benzoate in the manufacture of pickles by many small local factories, with the exception of some of them, which may use

**Table (3):** The qualitative detection of sodium benzoate in local pickles samples.

| Samples                                   | NO. | Percentage (%) |
|---|-----|----------------|
| Total no. of samples                      | 85  | 100            |
| Positive samples for sodium benzoate test | 61  | 71.8           |
| negative samples for sodium benzoate test | 24  | 28.2           |

high concentrations of table salt and some spices, especially turmeric, in preserving their pickles, the results of this study are close to what was found by **Al-Kamil et al. (2016)** when examining samples of local pickles made in the city of Basra in southern Iraq, as it was found that 70% of them contain high concentrations of sodium benzoate, while 30% were free of this material, (**Reddy et al., 2015**) indicated that 62.8% of samples of Indian pickles used in preparing food for school children contain different concentrations of sodium benzoate.

The results of the analysis of 61 samples of pickles positive for the examination of sodium benzoate (Table, 4) using HPLC technique showed that 25 samples had concentrations higher than the acceptable limits in the Iraqi specification for pickles **IQS 1128 (1989)** and **codex (2003)** that the permissible limit for adding this substance as a preservative should not exceed 1000 mg/kg, the average concentration of this substance for the samples belonging to the areas of Al-Shula, Al-Bayaa, Al-Nahrawan, Al-Taji, and Abu Ghraib was 1704.23, 973.67, 995.81, 1216.27 and 1142.19 mg/kg, respectively, the pickled samples from three regions, Al-Shoala, Al-Taji and Abu Ghraib recorded concentration rates of sodium benzoate higher than the permissible limits, and the samples from Al-Bayaa and Al-Nahrawan regions contained critical concentrations of this substance that approached 1000 mg/kg, the results of the study of **Al-Kamil et al. (2016)** were close to what this study found in that the concentration of sodium benzoate in samples of locally-made pickles packed in plastic bags in Basra city exceeded the permissible limits, ranging between 958-2154 mg/kg, also, the study of **Rai et al. (2010)**, when examining pickles in Nepal, it was found that the concentration of this substance ranged between 986 and 2192 mg/kg, as for **Xu et al. (2019)** they found a difference in the concentration of sodium benzoate in the pickles used in ready meals according to the type of packing. The pickles packed in glass containers recorded a low average concentration of the substance amounting to 20 mg/kg, while it rose in polyethylene bags packing to 780 mg/kg, (**Reddy et al., 2015**) pointed out that there is little need to use high concentrations of chemical preservatives in the production of pickles in India due to the addition of flavor additives, herbs and types of crushed chili peppers in a large percentage that act as antioxidants that help preserve the product for a long time even when packing in bags, polyethylene instead of canning the product, the concentration of sodium benzoate recorded values of 224- 436 mg/kg.



**Table (4):** The positive samples of pickles analysis for sodium benzoate using HPLC.

| Groups | No. of positive samples for sodium benzoate test | No. of samples with high concentrations of sodium benzoate | Average | Range            |
|--------|--|--|---------|------------------|
| P1     | 13   | 5  | 1704.23 | 987.93- 1712.42  |
| P2     | 8  | 3  | 973.67  | 964.62- 995.53   |
| P3     | 9  | 4  | 994.81  | 884.46- 998.25   |
| P4     | 14   | 6  | 1216.27 | 974.96 – 1235.13 |
| P5     | 17   | 7  | 1142.19 | 989.47- 1178.54  |
| Total  | 61   | 25   |         |                  |

In the study of **Delavar et al. (2012)**, when examining the pickled cucumber samples produced in Arak city factories in Iran, it was found that the concentration of sodium benzoate in the canned pickles recorded an average of 28 mg/kg, while the percentage in the product packed in polyethylene bags ranged between 235-742 mg/kg, as all concentrations were within acceptable limits, **Kharat et al. (2016)** indicated that preserving pickles prepared from fruits and vegetables rich in ascorbic acid with the use of sodium benzoate can help to form benzene compounds that are more dangerous to health than sodium benzoate, especially if there are no antioxidants components in the product, the pickles samples recorded values of benzene ranging between 219-296 mg/kg when the concentration of sodium benzoate increased by 1100 mg/kg and more, exceeding the acceptable limits for benzene derivatives in pickles, juices and sauces, which should not exceed about 1 mg/kg, they explained that it is possible to reduce this risk by avoiding the use of sodium benzoate in pickles as a preservative and using alternative methods such as irradiation preservation.

## CONCLUSION

Most of the pickles samples under study did not conform to the Iraqi specification for the information label for foodstuffs, as some of them were completely devoid of any information and others were incomplete and largely unclear, this indicates a clear complacency on the part of some factories and retail stores in applying the conditions and standards of quality and safety approved by the legislative and regulatory authorities, the percentage of sodium benzoate, which is used as a preservative, increased in one third of the pickles samples in concentrations higher than the permissible limits in the Iraqi specification for pickles 1000 mg/kg, which poses a potential danger to consumer health and safety.

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