

EFFECTS OF MALTODEXTRIN AS FAT REPLACER ON THE CHEMICAL AND SENSORY PROPERTIES OF BARAZEQ, GHURIBEH, AND MA'AMUL

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ABSTRACT

Objective: The objective of this study was to assess the effect of maltodextrin as fat replacer at various levels on some structural and sensory properties of Ma'amul, Barazeq, and Ghuribeh.

Methods: This study was conducted to evaluate the effects of fat replacing with maltodextrin at various levels (i.e., 10, 20, 30, and 40%) on Ma'amul, Barazeq, and Ghuribeh chemical and quality characteristics.

Results: Fat and energy were significantly ($p < 0.05$) reduced with the increase of maltodextrin level in these bakery products. Overall acceptance, flavor, color, and softness of Ma'amul, Barazeq, and Ghuribeh were not significantly affected by the replacement in ratio ranging from 10% to 20% when compared to controls. Greater replacements (i.e., 30 and 40% maltodextrin) showed a significant reduction on sensory acceptability of the three products.

Conclusion: Ma'amul, Barazeq, and Ghuribeh are rich fat traditional sweet bakery products that are usually consumed in the Middle East. The maximum fat level that could be replaced in Ma'amul, Barazeq, and Ghuribeh were 40%, 30%, and 20%, respectively.

Keywords: Fat Replacer, Barazeq, Ma'amul, Ghuribeh, Maltodextrin, Sensory properties.

INTRODUCTION

Bakery products are one of the most common foods consumed in the world in relation to their nutritional values, variability, and organoleptic properties [1]. Barazeq, Ma'amul, and Ghuribeh are traditional sweet bakery products that are consumed by most of the population in Jordan, Lebanon, Syria, Palestine, Turkey, and Eastern Europe. These products are generally prepared from the same ingredients that include low protein flour, sugar, and fat. Fat content of these products ranges from 20% to 40%, which influences the products rheological properties and overall quality. It is known that fats are responsible for the texture, mouthfeel, and overall smoothness of the baked products. For example, fat in baking aids is creating a tenderized product, shorter dough, and lubricate the structure by dispersed during dough mixing. This is believed to prevent the starch and protein from forming a continuous network [1].

The awareness of the relationship between food and health had dramatically risen recently in health sector and food industry. The efforts of the food industry have been directed toward the production of healthy food. Fat, for example, is the most recognized food component with a proven relationship with diseases such as cardiovascular diseases, obesity, hypertension, colon cancer, and headaches [2]. Therefore, great effort has been made to reduce the fat from food formulations without affecting their flavor and texture [3].

At present, the tendency in the food sector is to utilize fat replacers in different foods to mimic the textural and sensory attributes provided by fat but give considerably lower number of calories [4]. Of these, fat replacers are the carbohydrate-based replacers including maltodextrin, modified starches, inulin, and hydrocolloids. These replacers have been reported to mimic fat by binding water, retard staling and still providing smoothness, and the desired product's mouthfeel [5,6].

Based on these benefits of these replacers, the objective of this study was to assess the effect of maltodextrin as fat replacer at various levels on some structural and sensory properties of Ma'amul, Barazeq, and Ghuribeh.

MATERIALS AND METHODS

Materials

The preparation of the three sweet bakery products was done using the following ingredients: For Ghuribeh, 1 kg wheat flour, margarine, ghee (in different levels based on addition of fat replacers), 500 g table sugar, and 2.5 g vanilla, colorant; for Barazeq, 1 kg wheat flour, margarine, ghee, 500 g table sugar, 2.5 g vanilla, 250 ml skim milk, and 600 g sesame; and for Ma'amul, 1 kg wheat flour, margarine, ghee, 250 g table sugar, 2.5 g vanilla, and 250 ml skim milk. Mahaleb and anise colorant are including 100 g butter, 700g ground dates, 30 g anise, and 15 g cinnamon for the fillings. Pistachio and almonds were purchased from local market in Irbid, Jordan.

Replacement of fat in Ma'amul, Barazeq, and Ghuribeh using maltodextrin

Table 1 presents the percentages of maltodextrin of margarine content used as fat replacer in Ma'amul, Barazeq, and Ghuribeh.

Preparation of Barazeq

Vegetable fat, ghee, fat replacer, and sugar were placed in a bowl and mixed well. Milk, flour, vanilla, and half the amount of sesame, and salt were added to the mix and mixed well until having a flexible paste was formed. The dough is placed in the fridge for 1 h. The dough was shaped into small balls. These balls were pressed by hand to take a flat shape (i.e., 5 cm in diameter) and then are dipped in sesame before baking at 180°C for 15 min.

Preparation of Ghuribeh

Melted vegetable fat, ghee, fat replacer, and sugar were placed and mixed well in a bowl. Flour and colorant were then added gradually with continuous kneading using electrical mixer to produce a thick paste. The dough was formed into different shapes according to the traditional and known shapes of Ghuribeh, spiral shape. A piece of pistachios or almonds was placed in the middle of the formed paste for decoration. The formed dough pieces are placed on a tray and baked in an oven at 185°C for 15 min.

Table 2: Effect of fat replacement on Jordanian traditional bakery products chemical parameters using maltodextrin

Concentration	ASH*	Moisture*	Fat*	Protein*	CHO*	Energy†
Ma'amul						
0	0.81±0.02	10.4±0.2	26.8±0.6	6.2±0.23	56.1±0.5	490.4
10	1.05±0.08	11.1±0.2	23.5±0.5	6.8±0.19	57.6±0.6	469.1
20	0.93±0.04	11.8±0.2	21.1±0.3	6.6±0.50	59.8±0.8	455.5
30	0.87±0.02	12.5±0.2	19.2±0.4	6.4±0.17	61.0±0.3	442.4
40	0.91±0.13	13.3±0.1	17.2±0.40	6.3±0.21	62.3±0.4	429
Barazeq						
0	0.82±0.02	2.1±0.1	25.2±0.73	9.2±0.32	62.3±0.73	512
10	0.80±0.07	2.5±0.05	23.1±0.2	9.7±0.67	64.2±0.43	502
20	0.81±0.01	2.9±0.03	19.3±0.4	9.5±0.06	65.3±0.43	497
30	0.84±0.02	3.3±0.06	17.2±1.46	9.3±0.06	66.7±1.35	488
Ghuribeh						
0	0.24±0.03	2.1±0.08	26.6±0.5	4.9±0.03	66.2±0.2	523.8
20	0.21±0.04	2.6±0.03	23.9±0.4	5.2±0.03	68.1±1.0	508.3
	0.18±0.03	3.2±0.02	22.0±0.5	5.5±0.14	69.1±0.4	490

*Values are means (%) of n=2 measurements, ± standard deviation, †Values are presented in Kcal and calculated from fat (9 Kcal/g), protein (4 Kcal/g), and CHO (carbohydrate) (4 Kcal/g). Values within a column followed by a common letter are not significantly different (p>0.05)

Table 3: Sensory properties (i.e., overall liking, softness, flavor, and color) of Ma'amul, Barazeq, and Ghuribeh made using fractions (i.e., 10, 20, 30, and 40%) maltodextrin as fat replacer

Properties	0	10	20	30	40
Ma'amul					
Overall acceptance	6.9±1.4 ^a	6.8±1.2 ^a	6.0±1.7 ^b	5.6±1.8 ^b	5.4±1.9 ^b
Softness	7.4±1.5 ^a	6.6±1.3 ^a	5.5±1.7 ^b	4.6±2.1 ^b	4.8±2.0 ^b
Flavor	6.9±1.5 ^a	6.7±1.5 ^a	5.7±2.0 ^b	5.1±1.9 ^b	5.3±2.1 ^b
Color	6.9±1.6 ^a	6.8±1.6 ^a	6.5±1.6 ^{ab}	5.5±1.9 ^{bc}	5.7±1.9 ^c
Barazeq					
Overall acceptance	7.2±1.6 ^a	7.1±1.6 ^a	5.5±2.0 ^b	6.3±2.0 ^{ab}	NA
Softness	7.3±1.8 ^a	6.8±2.3 ^a	5.1±2.2 ^b	5.7±2.1 ^b	NA
Flavor	7.6±1.9 ^a	6.8±1.6 ^a	5.3±2.3 ^b	6.6±2.2 ^a	NA
Color	7.2±1.6 ^a	7.1±1.6 ^a	5.5±2.0 ^b	6.3±2.0 ^{ab}	NA
Ghuribeh					
Overall acceptance	8.1±0.7	7.7±0.7 ^a	7.1±1.0 ^b	NA	NA
Softness	7.5±1.3 ^a	7.3±1.3 ^a	6.9±1.1 ^a	NA	NA
Flavor	7.6±1.3 ^a	7.3±1.3 ^a	6.8±0.79 ^b	NA	NA
Color	8.2±1.0 ^a	7.9±1.0 ^a	7.2±1.49 ^b	NA	NA

*Values within a column followed by a common letter are not significantly different (p>0.05)

in which fat replaced maltodextrins at 10% showed the highest and the most significant liking scores. A significant decrease in the flavor scores was observed in the samples in which fat replaced with 20, 30, and 40% with maltodextrins when compared to those of controls. Furthermore, no significant difference in the flavor between the Ma'amul samples in which fat was replaced by maltodextrins at 20, 30, and 40% and in the Barazeq samples in which fat was replaced by maltodextrins at 20 and 30%. The decrease in flavor of these products might be due to the fact that flavors in food are either lipid soluble or water soluble. Fat acts as carrier of lipid-soluble flavors acts. Moreover, fat acts as flavor precursor during baking, frying, and lipolysis. Therefore, replacement of fat in food with maltodextrins results in the decrease in flavor medium; thus, many fat-soluble flavors may leave the product [12]. Furthermore, replacing fat with maltodextrins is expecting to increase the retention of water-soluble flavor compounds.

No significant differences between overall acceptability liking scores of controls and Ma'amul and Barazeq treatments when replaced with 10% maltodextrin and with 20% maltodextrin in Ghuribeh.

AUTHORS' CONTRIBUTIONS

MS helped in collection of data and information, KA supervised MS, and HA formulated and wrote the manuscript.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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