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EFFECT OF POLYSACCHARIDES ON THE COOKING QUALITY AND SENSORY CHARACTERISTICS OF CARP FISH PATTIE

BY

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ABSTRACT

Heat-set binders (polysaccharides) from different sources including xanthan, carrageenan, arabic gum and glucan at 0.5 and 1.0% level were added to improve the texture and cooking properties of carp fish (*Cyprinus carpio)* pattie. Water holding capacity (WHC), plasticity, shrinkage, cooking loss, cooking yield, hardness, water & fat retention and sensory characteristics were determined.

The addition of heat-set binders enhances the plasticity and WHC especially when arabic gum was used at any concentration followed by glucan then carrageenan and xanthan. All samples containing polysaccharides showed significantly ($p<0.01$) less reduction in shrinkage reached to 7.86 and 8.53% for fried and grilled fish pattie samples contained 1% of arabic gum, respectively. The lowest cooking loss value appeared in fish pattie samples containing 1% of arabic gum, reached 10.09% in fried fish pattie, on the other hand grilled common carp fish pattie which contained 1% of arabic gum, glucan, carrageenan and xanthan showed higher cooking yield as compared with fried pattie samples. The addition of different heat-set binders significantly ($p<0.01$) reduced the hardness values of fish pattie samples, however, the lower value was achieved by addition of 0.5 and 1% arabic gum for fried fish pattie samples. The highest recorded percentage of water retention appeared in grilled fish pattie containing 1% carrageenan followed by 1% glucan and finally 1% arabic gum, while the highest percentage of fat retention was observed in fried fish pattie especially in samples containing 0.5 and 1% of arabic gum.

The panel test indicated that significant ($p<0.01$) improvements in sensory attributes of samples contained different sources of heat-set binders. As the concentration of heat-set binders increased, the scores of sensory attributes were increased. The grilled fish patties received higher total scores and more acceptance than those fried patties.

Key words: carp fish – fish patties - polysaccharides – eating quality – physical properties – sensory attributes.

INTRODUCTION

Fish and fishery play a significant role in the diet in many parts of Africa often representing the main and more easily accessible form of animal proteins in many rutal communities. Post harvest losses of fish and fishery products are high in many African countries (Taskaya *et al.*, 2003). Fish is known to be a great nutritional value for human consumption as their proteins has a high biological value and contains all the essential amino acids.

Carp fish (*Cyprinus carpio.*) is produced largely from fish farms and is unacceptable to the popular in the fresh form (Darweash 1996).

Fish burgers are acceptable fast food products by the consumers in the world. Pattie products were developed in an attempt to increase the acceptability and utilization of carp fish. The frying process was the major problem in fish products. Frying oil imparts desirable flavor and textural properties to food. In addition, uptake of undesirable flavors and excess absorption of oil by the product also occurred (Holownia *et al.*, 2000). Moisture loss is a critical factor affecting the quality of fried products. Several studies reported that many hydrocolloids, long chain polymers; form gels can be used in frying to reduce oil absorption (Mallikarjunan *et al.*, 1995). Food hydrocolloids with thermal gelling or thickening properties have been widely investigated. Adding food hydrocolloids as dry ingredients is a practical way to lower oil uptake of deep- fat fried foods (Funami *et al.*, 1999). Gums are also used for stabilization of emulsions, suspension of particulates, control of crystallization and inhibition of synersis (the release of water from fabricated foods) as reported by Glicksman, (1991). On the other hand, Huffman and Shah (1995) found that use of carrageenan as binder and stabilizer has also escalated in the processing industry for fish, poultry and meat products such as patties and sausage.

Therefore, overall goal of our study to monitor the eating quality and cooking properties of fried or grilled carp fish patties as result of adding heat-set binders (food polysaccharides) such as xanthan, carrageenan, arabic gum and glucan.

MATERIALS AND METHODS

Fish:

Common carp (*Cyprinus carpio.*) samples were obtained from EL-Sarwo farm, EL- Dakahlia governorate, National Institute of Oceanography and Fisheries at 2005 season. The fish samples were put in ice box and transferred to Food Science Department, Fac. of Agric., Ain Shams University for further technological treatments and analysis.

Polysaccharides:

Polysaccharides from different sources including xanthan (bacterial source), carrageenan (seaweed source), Arabic gum (plant source) and glucan were obtained from Sigma Chemical Co. (st. Louis, Mo.), USA.

Preparation of fish patties:

Fish patties were prepared according to the method described by Chandrasekhar and Mohite, (1978). The fish samples were washed, hand deboned, manually cut to small pieces and washed again to get rid of any blood traces, and then drained for a few minutes. Fish meat was ground through a 0.64 cm plate using a laboratory universal kitchen machine (Varimix – Spomoasy, Poland), then fish patties were prepared by blending minced fish with the following ingredients:

Table (A): Recipe used in the preparing of fish pattie containing different level of polysaccharides.

Ingredients	gram	Spices mixture*
Minced fish meat	75.0	Black pepper 42.0 g
Vegetable oil	9.0	Cumin 23.0 g
Starch	8.0	All spices 18.0 g
Sodium chloride	2.3	Clove 2.0 g
Sodium bicarbonate	0.4	Coriander 5.0 g
Polyphosphate	0.3	Cubeb 2.0 g
Onion	2.5	Cardamom 2.0 g
Garlic	0.5	Red pepper 1.0 g
Spices mixture*	2.0	Ginger 5.0 g

To evaluate the effects of investigated different polysaccharide sources (xanthan, carrageenan, arabic gum and glucan) 0.5 and 1.0 % of the aforementioned polysaccharides per mixture of fish pattie ingredients were mixied with minced fish meat and other additives. Mixing was carried out by the mixing device of the Varimix Kitchen machine and 1 cm thick pattie style of 50 g weight and 8.5 cm diameter were formed by a manually operated forming machine (NOAW – Affetacrane, Italy). Different fish pattie samples were stacked with waxed paper between then, placed in polyethylene bags and kept frozen (at – 18°C) until analysis and cooking.

Cooking processes:

The two cooking methods selected in this study were frying and grilling. Frying was carried out in an electrical fryer pan (Moulinex brand) using sunflower oil at 150°C for 5 min, immediately removed and drained to remove excess oil. Grilling was conduced on a hot plate in a temperature controlled drying oven at 160°C in each side of pattie for 10 minutes.

Analytical methods:

Moisture, crude protein (Nx6.25), ether extract and ash contents were determined according to the A.O.A.C. (1995).

Percentages of cooking loss, cooking yield, shrinkage and fat or water retention were estimated according to Roland *et al.* (1981) where:

$$\% \text{ Cooking loss} = \frac{\text{Raw weight - Cooked weight}}{\text{Raw weight}} \times 100$$

$$\% \text{ Cooking yield} = \frac{\text{Cooking weight}}{\text{Raw weight}} \times 100$$

$$\% \text{ Shrinkage} = \frac{\text{Raw diameter} - \text{Cooked diameter}}{\text{Raw diameter}} \times 100$$

$$\text{Water or fat retention} = \frac{\text{Moisture or fat in cooked pattie}}{\text{Moisture or fat in raw pattie}} \times \text{yield}$$

Hardness of different fish pattie samples was determined according to Sanderson *et al.* (1988), by measuring Tension Compression (TC^2). An anvil of 1 mm diameter was used to penetrate the sample at a crosshead speed of 250 mm/min. The results were calculated as g/cm^2.

Water holding capacity (WHC) and plasticity of different fish pattie samples were determined according to the method described by Volovinskaia and Merkoolora (1958). Results were presented as cm^2 per 0.3 g sample.

Sensory attributes of the different fish pattie were evaluated by a panel group of ten members, randomly selected from the staff members of the Dep. of Food Sci., Fac. of Agric., Ain Shams Univ. Panelists were asked to evaluate appearance, color, odor, taste, tenderness, juiciness and overall acceptability according to 9- point hedonic scale (Larmond, 1974).

The statistical analysis system (SAS 1996) was used to carry out mean values, standard error in addition to an over all analysis of variance (ANOVA) and least significant differences (LSD) at 0.01.

RESULTS AND DISCUSSION

Chemical composition of carp fish meat and prepared pattie:

Chemical composition of carp fish meat was summarized in Table (1). Results showed that, carp fish meat contained 78.04 % (moisture), 80.97 % (crude protein), 11.78 % (fat), 5.21 % (ash) and 2.05 % (nitrogen free extract) on dry basis. These results are in agreement with those of Khallaf (1986),Shaltout (1989) and Ibrahim (1994) who mentioned that the values of moisture, protein, fat and ash of fresh common carp fish were arounded 78.74%, 81.67%, 13.29% and 4.28%, respectively. While others were little varied with reviewed by Steffens *et., al* (1991). This variation occurring in the chemical composition and freshness tests of common carp fish may be due to the intrinsic nature bearing upon genetics, morphology and physiology or environmental relating to the living conditions particularly the feeding types as reported by Ibrahim (2004). From the same table, it could be noticed the chemical composition of prepared fish patties without any addition of polysaccharides. The protein content was 66.17%, while the fat and ash content were 10.85 and 4.55%, respectively, in the same time the free nitrogen extract was 18.43%.

Table (1): Chemical composition of fresh common carp fish and prepared fish pattie on dry basis ± standard error

Sample	Moisture %	Protein %	Fat %	Ash %	FNE *%
Carp fish meat	78.04 ± 0.102	80.97 ± 0.200	11.78 ± 0.110	5.21 ± 0.210	2.05 ± 0.101
Carp fish pattie	66.15 ± 0.110	66.17± 0.220	16.22± 0.250	6.55± 0.350	11.06± 0.260

*: Free Nitrogen Extract (NFE) calculated by differences.

Physical properties of carp fish patties:

Water Holding Capacity:

From Fig (1) it could be noticed that there was an effect of used polysaccharides (xanthan, carrageenan, arabic gum and glucan) on water holding capacity (WHC) of pattie samples. Control patties showed the lowest WHC when compared to other samples containing different polysaccharides. As the concentration of polysaccharides was increased there was an improvement in WHC values. i.e., it was reduced from 4.867 to 4.493 cm^2/0.3 g as xanthan gum was used in ratio from 0.5 to 1.0%, respectively. As seen in the same figure the common carp fish patties containing carrageenan showed better WHC values than that contained xanthan gum, it reached 4.107 and 4.493 cm^2/0.3 g for samples contained 1.0% of carrageenan and xanthan, respectively. These results coincided with that of Wallingford and Labuza (1983) who found that carrageenan has the highest water binding capacity followed by xanthan and guar gum. From the same figure it could be easily concluded that the best polysaccharides in enhancement WHC value of prepared fish pattie was arabic gum at ratio of 1.0 %.

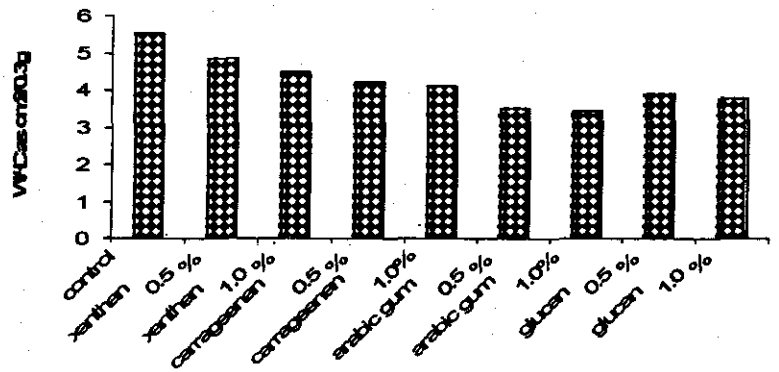

Fig (1): Water holding capacity values as cm^2/0.3g of different common carp fish pattie contained different ratios of polysaccharide.

Plasticity:

Plasticity values showed a pattern similar to that of WHC as seen in Fig (2). Control samples appeared lower plasticity than those fish pattie samples containing different polysaccharides. The addition of investigated polysaccharides enhances the both plasticity and WHC especially when arabic

gum was used at any concentration (0.5 or 1.0 %) followed by glucan then carrageenan and finally xanthan.

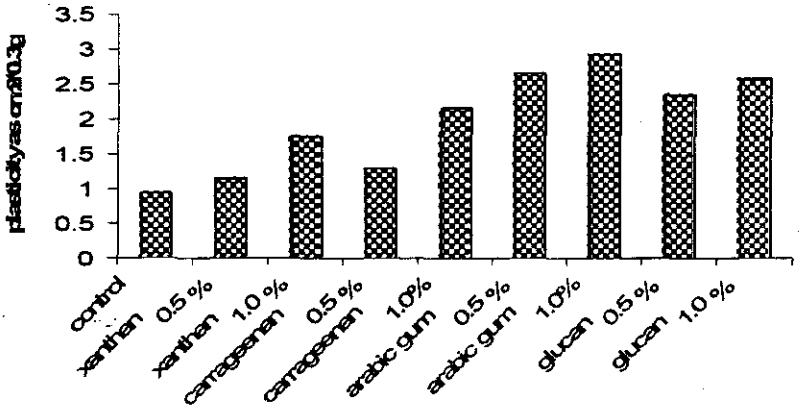

Fig (2): Plasticity values as cm^2/0.3g of different common carp fish pattie contained different ratios of polysaccharide

Shrinkage:

From Table (2) it could be revealed that the all fish pattie samples had a significant ($p<0.01$) reduction in diameter (shrinkage) due to the loss in fat and moisture during frying or grilling. Control sample showed the highest reduction in diameter it reached 21.04 %.Generally, common carp fish pattie containing different polysaccharides showed significant ($p<0.01$) less reduction in shrinkage, where the shrinkage values were 12.54, 10.63 7.86 and 13.42% for fried fish patie containing 1.0% of xanthan, carrageenan, arabic gum and glucan, respectively. On the other hand, the values of the same parameter were 11.96, 10.24, 8.53 and 11.50%,respectively for grilled fish pattie samples containing 1.0% of the aforementioned polysaccharides. Such decrease in shrinkage was lesser as addition of polysaccharides improving the binding properties of restructured fish products. These results are agreed with Huffman and Shah (1995). Concerning cooking methods, the degree of shrinkage was lower in grilled patties compared with fried samples. These results are in accordance with that mentioned by Mostafa *et al.* (2002).

Cooking loss:

Cooking loss values of different fish pattie samples are given in Table (2), it could be observed that the same trend in this criteria (cooking loss) was similar to the observed trend of shrinkage. It could be seen that the control fish pattie sample had higher cooking loss % followed by samples containing xanthan, carrageenan, glucan and finally arabic gum, where the cooking loss of the aforementioned fried pattie samples containing 1.0% of different polysaccharides were 28, 26, 21, 18 and 10%, respectively . This is due to the role of this polysaccharides in retarding the losses of water and fat during cooking as proved by Ulu, (2005).Who reported that the addition of 0.5 – 1.0 % carrageenan or guar gum improved all cooking parameters for meatballs. The lowest cooking loss

value was appeared in samples containing 1.0% of arabic gum,i.e. it reached 10% in fried pattie samples. These observed results of cooking loss could be correlated with the results of WHC of fish pattie samples containing the same level of polysaccharides.

Cooking yield:

From Table (2) it could be concluded that the cooking yield of common carp fish patties was significantly ($p<0.01$) affected by addition of investigated polysaccharides. The lowest value was appeared in control one either fried (71) or grilled (73.51%). On the other hand, grilled common carp fish patties contained 1.0% of arabic gum, or glucan, or carrageenan, or xanthan showed higher cooking yield (89.09, 85.69, 85.88 and 77.55%), when compared with fried fish pattie samples (90, 82, 79 and 74%), respectively. The enhancement of cooking yield of those samples which contained such polysaccharides could be referred to the batter dissolving and distribution of the gums in the pattie samples as reported by Hanan, (2002). This could be improved the binding capacity of fish pattie samples which resulted more cooking yield.

Table (2): Mean values of shrinkage, cooking loss and cooking yield of fried and grilled common carp fish pattie contained different polysaccharides

Fish samples	Fried pattie			Grilled pattie		
	Shrinkage %	Cooking loss %	Cooking yield %	Shrinkage %	Cooking loss %	Cooking yield %
Control	21.04^{A}	28^{A}	71^{G}	19.78^{A}	26.49^{A}	73.51^{H}
Xanthan 0.5 %	14.80^{B}	28^{A}	72^{G}	13.69^{B}	24.80^{B}	75.20^{G}
Xanthan 1.0 %	12.54^{C}	26^{B}	74^{F}	11.96^{D}	22.45^{C}	77.55^{F}
Carrageenan 0.5 %	13.38^{C}	23^{C}	77^{E}	12.70^{C}	20.38^{D}	79.62^{E}
Carrageenan 1.0 %	10.63^{D}	21^{D}	79^{D}	10.24^{E}	14.12^{F}	85.88^{C}
Arabic gum 0.5 %	11.31^{D}	15^{F}	85^{B}	10.14^{E}	12.65^{G}	87.35^{B}
Arabic gum 1.0 %	7.86^{E}	10^{G}	90^{A}	8.53^{F}	10.913^{H}	89.09^{A}
Glucan 0.5 %	13.40^{C}	19^{ED}	81^{C}	12.76^{C}	16.95^{E}	83.05^{D}
Glucan 1.0 %	13.42^{C}	18^{E}	82^{C}	11.50^{D}	14.31^{F}	85.69^{C}
LSD	0.932	1.358	1.249	0.694	0.888	0.888

LSD: Least significant difference

Means with the same letters are not significantly different ($p>0.01$)

Texture (Hardness):

Texture analysis for fish and fish products are important parameter for, quality control and product development in the seafood industry. Numerous mechanical methods have been used to measured texture of food products, however there is little agreement on which is the best method (Coppes, *et.al.*, 2002).

Table (3) represented the values of hardness obtained for the fried and grilled fish pattie samples. The control fish pattie samples which cooked by fried or grilled showed a hardness values 760 and 660 g/ cm^2, respectively. The

addition of different polysaccharides significantly ($p<0.01$) reduced the hardness values of fish pattie samples. The lower values were achieved by addition of 1.0 % and 0.5 % arabic gum for fried pattie samples being 217 and 270 g/ cm^2, respectively, where it was 238and 285g/ cm^2, respectively for grilled fish pattie samples. It could be noticed that, the grilling process decreased the hardness value of both control sample and samples containing different sources of polysaccharide. The arabic gum and carrageenan were the suitable gums for improving texture characteristics of fish patties. These results agree with statement achieved by Defreitas *et al.* (1997b) who montioned that carrageenan dissolves throughout fish during processing and gel forms during cooling enhancing texture properties of the products and improving product juiciness. Both xanthan and glucan did not achieve the hardness values obtained by addition of arabic gum and carrageenan. It could be explained by the low solubility of these polysaccharides compared with that of arabic gum and carrageenan.

Table (3): Hardness values of common carp fish pattie as affected by the addition of different ratios of polysaccharides

Fish pattie samples	Hardness value as g/ cm^2	
	Fried	Grilled
Control	760^{A}	660^{A}
Xanthan 0.5 %	413^{C}	370^{CD}
Xanthan 1.0 %	307^{DEF}	263^{F}
Carrageenan 0.5 %	397^{CD}	337^{DE}
Carrageenan 1.0 %	350^{CDE}	300^{EF}
Arabic gum 0.5 %	270^{EF}	285^{EF}
Arabic gum 1.0 %	217^{F}	238^{F}
Glucan 0.5 %	537^{B}	470^{B}
Glucan 1.0 %	447^{BC}	422^{BC}
LSD	99	62

LSD: Least significant difference.
Means with the same letters are not significantly different ($p<0.01$)

Water and fat retention:

The obtained results from Table (4) revealed that the percentages of water and fat retention were 59 and 85% in fried common carp fish patties control sample, respectively, while, the same parameters were 55 and 69%, respectively, for control fish pattie samples cooked by grilling. From the same table it could be concluded that there were significant ($p<0.01$) effects of such different polysaccharides on water retention of fried common carp fish pattie samples. However grilled fish pattie samples showed significant ($p<0.01$) different effect on water and fat retention. The highest recorded percentages of water retention were appeared in grilled fish patties containing 1 % carrageenan followed by 1 % glucan and finally 1 % arabic gum On the other hand, both cooking methods showed significant ($p<0.01$) different effects on both water & fat retention. The highest percentage of fat retention was observed in fried common carp fish patties especially in samples containing 0.5 % and 1.0 % of arabic gum Concerning to cooking methods the percentage of fat retention in fish pattie samples was higher than that of grilled samples. These results are in accordance of Mostafa, *et.al.*, (2002).

Table (4): Water and fat retention of fried and grilled common carp fish pattie containing different ratios of polysaccharides

Fish pattie samples	Fried Grilled			
	Water retention %	Fat retention%	Water retention %	Fat retention %
Control	59^{B}	85^{BC}	55^{G}	69^{E}
Xanthan 0.5 %	53^{E}	81^{D}	56^{G}	70^{E}
Xanthan 1.0 %	52^{F}	84^{C}	59^{E}	73^{D}
Carrageenan 0.5 %	53^{E}	86^{BC}	57^{F}	79^{C}
Carrageenan 1.0 %	55^{D}	87^{B}	64^{A}	83^{B}
Arabic gum 0.5 %	57^{CD}	91^{A}	60^{CD}	88^{A}
Arabic gum 1.0 %	62^{A}	92^{A}	61^{BC}	88^{A}
Glucan 0.5 %	56^{D}	87^{B}	60^{D}	82^{B}
Glucan 1.0 %	58^{BC}	87^{B}	62^{B}	83^{B}
LSD	1.441	2.459	1.254	2.322

LSD: Least significant difference.
Means with the same letters are not significantly different ($p>0.01$)

Sensory evaluation of fried & grilled common carp fish patties:

Data in Table (5) revealed that the sensory properties of fried common carp fish pattiecontaining different ratios of polysaccharides. As seen from this Table it could be easily found that there was significant ($p<0.01$) effect of such polysaccharides on sensory properties of fried samples. Fish pattie containing polysaccharides were given higher ratings than the control samples for most sensory attributes. As the concentration of polysaccharide is increased, the scores of sensory attributes were increased i.e. tenderness was 9.0 and 9.4 for fish patties containing carrageenan at 0.5 % and 1.0 %, respectively.

Table (5): Mean values of seasory attributes of fried common carp fish patties containing different polysaccharides

Fish samples	Sensory attributes						
	Appea-rance	Color	Odor	Taste	Ten-derness	Juiciness	Overall accepta-bility
Control	7.5^{C}	8.0^{A}	8.4^{A}	7.0^{B}	7.7^{C}	7.8^{B}	7.6^{D}
Xanthan 0.5 %	7.6^{BC}	8.0^{A}	8.0^{A}	7.8^{AB}	8.0^{BC}	8.0^{AB}	7.8^{CD}
Xanthan 1.0 %	7.8^{BC}	7.6^{A}	8.2^{A}	8.0^{AB}	8.2^{BC}	8.4^{AB}	8.0^{BCD}
Carrageenan 0.5 %	8.4^{AB}	8.2^{A}	8.6^{A}	8.6^{AB}	8.8^{ABC}	8.8^{AB}	9.0^{A}
Carrageenan 1.0 %	8.8^{A}	8.4^{A}	8.8^{A}	8.8^{A}	8.6^{ABC}	8.8^{AB}	8.8^{AB}
Arabic gum 0.5 %	8.8^{A}	9.0^{A}	9.6^{A}	9.0^{A}	9.0^{AB}	9.2^{A}	9.2^{A}
Arabic gum 1.0 %	9.0^{A}	8.8^{A}	9.4^{A}	9.2^{A}	9.4^{A}	9.2^{A}	9.2^{A}
Glucan 0.5 %	8.8^{A}	8.8^{A}	9.2^{A}	8.6^{AB}	9.0^{AB}	9.0^{A}	8.6^{ABC}
Glucan 1.0 %	8.8^{A}	9.0^{A}	9.2^{A}	8.4^{AB}	8.8^{ABC}	8.8^{AB}	8.6^{ABC}
LSD	0.991	1.757	1.621	1.641	1.120	1.017	0.977

LSD: Least significant difference.
Means with the same letters are not significantly different ($p>0.01$)

Table (6) showed that the sensory evaluation of grilled different common carp fish patties containing different ratios of polysaccharides. The sensory panel assigned lower scores to control samples in comparison with fish

pattie samples containing different polysaccharides. There was an enhancement in sensory attributes which appeared in samples containing arabic gum followed by carrageenan and xanthan, these results were agreed will with reported by (Hanan 2002). Generally, there were significant ($p<0.01$) improvements in sensory attributes of grilled common carp fish pattie contained polysaccharides. The grilled common carp fish pattie received higher total scores and were more acceptable than those cooked by frying.

Table (6): Mean values of sensory attributes of grilled common carp fish patties containing different polysaccharides

Fish samples	Sensory attributes						
	Appea-rance	Color	Odor	Taste	Tender-ness	Juici-ness	Overall accepta-bility
Control	7.8^{C}	7.8^{C}	7.8^{C}	7.8^{B}	7.8^{C}	7.8^{C}	7.8^{C}
Xanthan 0.5 %	8.4^{ABC}	8.2^{BC}	8.4^{ABC}	8.4^{AB}	8.8^{ABC}	8.8^{ABC}	8.0^{BC}
Xanthan 1.0 %	8.2^{BC}	8.4^{ABC}	8.8^{AB}	8.6^{AB}	9.0^{ABC}	9.0^{ABC}	9.0^{AB}
Carrageenan 0.5 %	8.4^{ABC}	8.4^{ABC}	9.0^{A}	8.6^{AB}	8.6^{ABC}	8.6^{ABC}	8.6^{ABC}
Carrageenan 1.0 %	8.8^{AB}	8.8^{AB}	9.2^{A}	9.4^{A}	9.6^{A}	9.6^{A}	9.6^{A}
Arabic gum 0.5 %	8.8^{AB}	8.8^{AB}	8.8^{AB}	8.8^{AB}	9.2^{AB}	9.0^{ABC}	9.0^{AB}
Arabic gum 1.0 %	9.0^{A}	9.0^{A}	8.8^{AB}	8.8^{AB}	9.2^{AB}	9.2^{AB}	9.2^{AB}
Glucan 0.5 %	8.0^{C}	8.0^{C}	8.00^{BC}	8.0^{B}	9.0^{ABC}	8.8^{AB}	8.4^{BC}
Glucan 1.0 %	8.0^{C}	8.0^{C}	8.0^{BC}	8.2^{AB}	8.2^{BC}	8.2^{B}	8.6^{ABC}
LSD	0.790	0.790	0.959	1.216	1.357	1.356	1.132

LSD: Least significant difference

Means with the same letters are not significantly different ($p>0.01$)

CONCLUSIONS

The obtained results showed that common carp fish can be successfully utilized for the production of low cost, nutritionally and high quality attributes fish pattie. Incorporation of different investigated polysaccharides (xanthan, carrageenan, arabic gum and glucan) was beneficial in improving physical and sensory characteristics at each investigated level (0.5 and 1.0%). Cooking prepared fish pattie samples by grilling method can be recommended as highly sensory cooking method.

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تاثير السكريدات العديدة على جودة الطهى والخواص الحسية لباتية سمك المبروك

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تم استخدام بعض السكريدات العديدة من مصادر مختلفة مثل الزنثان- الكاراجينان- الصمغ العربى- الجلوكان كمواد مضافة بنسبة ٠,٥و ١,٠% لتحسين كلا من القوام و خصائص الطهى لباتية السمك المصنع من اسماك المبروك. ولقد تم تقييم المنتج من خلال قياس كلا من القدرة على امتصاص الماء- البلاستيكية – الانكماش – الفاقد من الطهى – ريع الطهى – الصلابة – القدرة على الاحتفاظ بالماء و الدهن – الخصائص الحسية.

اظهرت النتائج ان اضافة السكريدات سابقة الذكر ادى الى تحسين كلا من البلاستيكية و القدرة على امتصاص الماء للباتية المصنع خاصة عند استخدام الصمغ العربى سواء عند تركيز ٠,٥ او ١,٠% يلية الجلوكان ثم الكاراجينان و الزنثان. العينات التى تم اضافة السكريدات العديدة اليها اظهرت اختلافا معنويا بالنسبة للانكماش حيث سجلت ٧,٨٦ و ٨,٥٣% لباتية السمك المقلى و المشوى المحتوى على ١,٠% من الصمغ العربى على الترتيب مقارنة بالعينات الكنترول التى سجلت ٢١,٠٤ و ١٩,٧٨% على التوالى . و لقد اعطت عينات الباتية المعاملة اقل فاقد من الطهى بقيمة مقدارها ١٠,٠٩%.كما لوحظ ان باتية سمك المبروك المشوى و المحتوى على ١,٠% من كل من الصمغ العربى – الجلوكان – الكاراجينان – الزنثان اظهر اعلى قيمة لريع الطهى بالمقارنة بنفس النوع من الباتية و تم طهية بالقلى. و لقد ادى اضافة الانواع السابقة الذكر من السكريدات العديدة الى تحسين معنوى فى قوام منتج الباتية المصنع. و افضل القيم سجلت مع العينات المضاف اليها٠,٥ او١,٠% من الصمغ العربى. اظهرت العينات المضاف اليها ١,٠% من الكاراجينان و تم طهيها بالشى اعلى قيمة فى القدرة على الاحتفاظ بالماء يليها العينات المحتوية على الجلوكان ثم الصمغ العربى. بينما العينات التى اضيف لها ٠,٥ او ١,٠% من الصمغ العربى و تم طهيها بالقلى اعطت اعلى قيم فى الاحتفاظ بالدهن.

اظهرت نتائج التقيم الحسى للباتية المصنع اختلافا معنويا فى الصفات الحسية بين العينات التى اضيف لها السكريدات العديدة و الاخرى المنتجة دون اضافة مع تحسن فى الصفات الحسية للمنتج بزيادة التركيز المستخدم من السكريدات العديدة. كما ان الباتية المصنع من سمك المبروك و تم طهيه بالشى اعطى اعلى قيم للخصائص الحسية و كان اكثر قبولا بالمقارنة بالباتية المطهى بطريقة القلى.